

**FEDERAL HIGHWAY
ADMINISTRATION
EASTERN FEDERAL LANDS
HIGHWAY DIVISION**

**HYDRAULICS DATA
SUMMARY
FINAL 100% SUBMITTAL**

REHABILITATION OF BLUE RIDGE
PARKWAY FROM MILEPOST 359.7
TO MILEPOST 375.1

PRA-BLRI 2P14
CONTRACT NO. DTFH71-02-D-00004
TASK ORDER 0003

ARCADIS

Brian Whitaker, PE
Project Manager

Hydraulics Data Summary
Final 100% Submittal

Rehabilitation of Blue Ridge
Parkway from Milepost 359.7
to Milepost 375.1

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Task Order 0003

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Federal Highway Administration -
Eastern Federal Lands Highway Division

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Data Section

Background

Blue Ridge Parkway is a 469-mile scenic corridor that connects Shenandoah Valley in Virginia to the Great Smoky Mountains National Park in North Carolina. Adjacent to the parkway, which ranges in elevation from 649 feet to 6047 feet, are recreational areas that include picnic facilities, hiking trails, visitor centers, overlooks, and campgrounds.

The Blue Ridge Parkway, conceived as a Depression-relief project in the 1930s, took more than 50 years to construct. The parkway is frequented by visitors who come to enjoy the vistas and the foliage and a number of citizen groups concerned with maintaining the pristine nature of the mountain ranges traversed by the Parkway.

The pavement along Blue Ridge Parkway and adjacent access roads and pull-offs are in various stages of deterioration and in need of rehabilitation. Area features, such as asphalt paths, granite curbs, rubble and masonry walls, and steps are also in need of repair. This project consists of the rehabilitation of Blue Ridge Parkway extending between Milepost 359.7 at the Balsam Gap Overlook and Milepost 375.1. The project also includes reconstruction and replacement or rehabilitation of ditches, pipes, walls, sidewalks, and curbs.

This project is for the Eastern Federal Lands Highway Division (EFLHD) of the Federal Highway Administration (FHWA) of the U.S. Department of Transportation and the U.S. National Park Service (NPS). The Blue Ridge Parkway is used by thousands of tourists every year and special consideration will be made to ensure that the overlooks, Visitor Center, and the Parkway itself remain accessible at all times.

The purpose of this report is to document the gathering of hydrologic and hydraulic data for the existing road culverts and to present this data for the project.

Introduction

The project area for this work is generally limited to Blue Ridge Parkway between Milepost 359.7 and Milepost 375.1. Exhibit 1 is a project location map. Project improvements include:

- Pavement patching, full-depth and shallow
- Milling and asphaltic overlay
- Resetting of stone curb
- Asphalt sidewalk construction
- Ditch rehabilitation; stone, paved and grass
- Rehabilitation or replacement of existing circular corrugated metal pipe culverts
- Replacement of inlet grates
- Stone wall reconstruction

This project is located within the Pisgah National Forest and no future land use change is planned for this area. Changes associated with this project will be rehabilitation and replacement of existing surface development features, therefore there will be no increase in impervious area.

Along the project corridor, Blue Ridge Parkway is located near the top of a ridge. Stormwater along this portion of the roadway is ultimately conveyed to Swannanoa River and Dillingham Creek via road side ditches/swales and culverts that drain to numerous tributaries and creeks. No increase in the peak stormwater runoff and no additional stormwater pollutant loading will result from this project. The counties of Buncombe and Yancey do not require additional stormwater requirements beyond the FHWA regulations.

ARCADIS staff collected field data, including a visual assessment of the existing drainage system for this project. This site reconnaissance occurred over four separate events: September 21-29, 2003; May 12-16, 2004; July 21, 2004; and March 28-31, 2005.

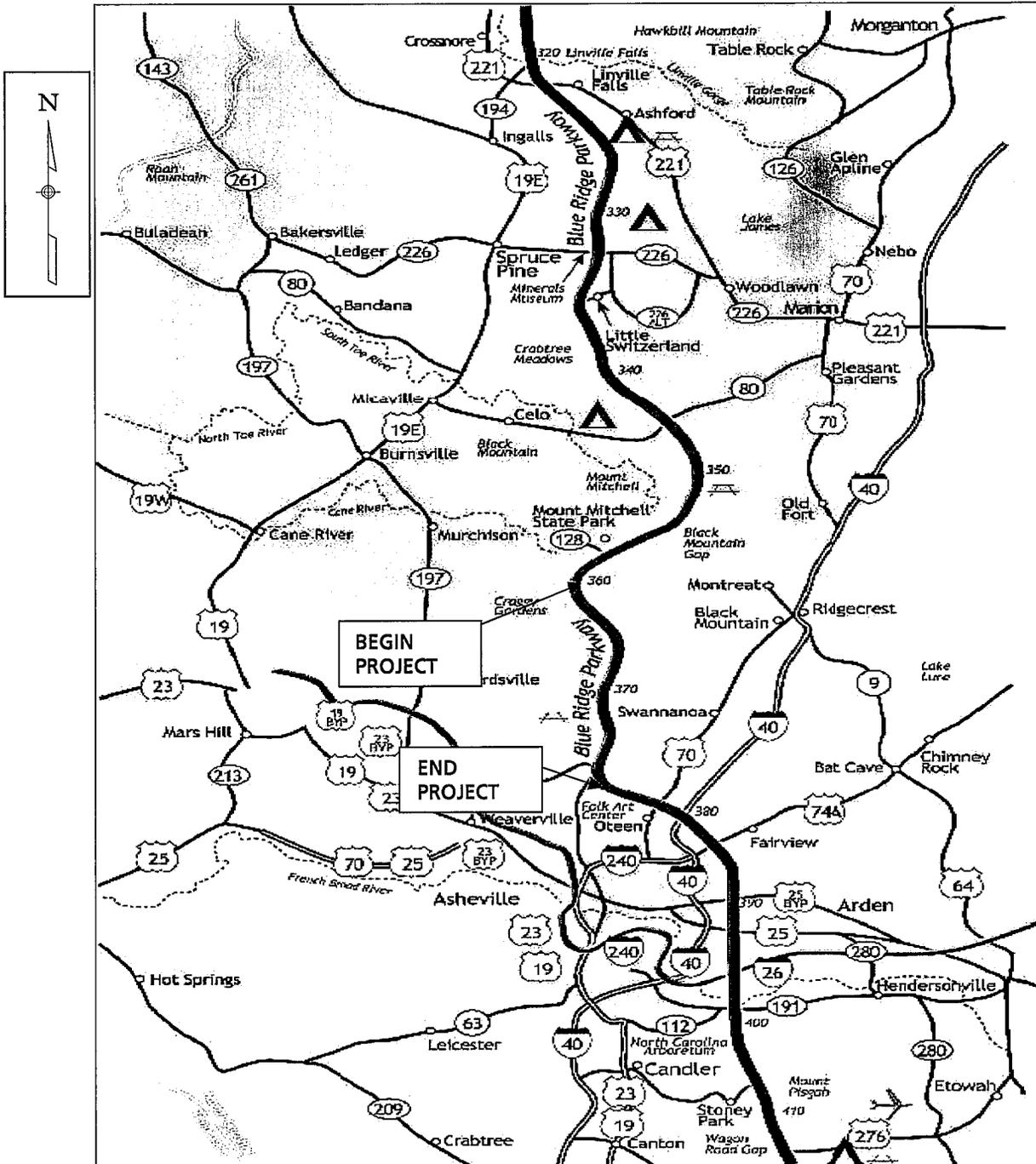


Exhibit 1. Vicinity Location Map (not to scale)

Map Source: www.blueridgeparkway.org

Existing Storm Drainage System

The storm drainage system along the Blue Ridge Parkway consists of circular corrugated metal pipe culverts, stone and concrete box culverts, and drainage ditches.

Sixteen single-barrel box culverts convey the runoff under the Parkway from drainage areas ranging in size from 25 to 675 acres. The box culverts range in size from 2-foot by 2-foot to 5-foot by 5-foot and are constructed of either concrete or stacked-cemented granite blocks.

Within the project limits, there are 183 circular pipe culverts along Blue Ridge Parkway. An additional 29 circular pipe culverts constitute the storm drainage systems of pull-offs, the Craggy Gardens Picnic Area Access Road and the Visitor's Center. Circular pipe culverts show evidence of previously being lined with asphalt and range in size from 12 to 36 inches. Inlet structures include headwalls, Type 4A inlets, Type 4B inlets, Type 4C inlets and catch basins. Headwalls along the project corridor are constructed of either concrete or cut-stacked granite blocks.

Stone-lined, asphalt-paved, and grassed drainage ditches are present along the roadway. The stone lined ditches have historical value and therefore should be preserved and care should be taken during ditch reconditioning.

Existing Storm Drainage System Evaluation

Overall, the ditches along the project corridor are in good condition. Repaving of asphalt-lined ditches and reconditioning of grassed ditches is needed, but positive drainage is evident. Stoned-lined channels are in very good condition and require minimal reconditioning.

Headwalls along the project, which are in fair to good condition, require stone replacement, repointing, and/or reconditioning. The condition of concrete tops, which are covered with moss and ground clutter, range from cracked to collapsed and therefore are in need of rehabilitation or replacement. Grate inlets, which are 50 to 90 percent covered with ground clutter, need to be cleared of debris.

The pipes that were accessible for inspection were in various stages of deterioration. Corrosion was evident and the condition of the asphalt lining of the pipe culverts ranged from good to severely deteriorated and in some cases, absent. The capacity of a majority of the pipe culverts was reduced by vegetation and sediment buildup, and in some cases, further reduced by the partial or total collapse of the culvert itself. The capacity of inlet structures was also reduced by silt, debris, and vegetative growth. Due to steep embankments, silt buildup, and limited internal visibility of culverts attached to drop inlets or adjacent to rock outcrops, an evaluation of the condition and size of all pipe culverts could not be performed. In locations where pipes could not be measured, a pipe size was assumed based upon a visual estimation and/or the size of other pipes in the vicinity. The following information includes the condition of pipe culverts that were evaluated and the reason why other pipe culverts were not evaluated.

| Station of Pipe Culvert Along Craggy Gardens Picnic Area Access Road | Evaluation |
|--|---|
| 24+60, 30+32 | Culvert is in poor condition |
| 2+81, 4+83, 8+55, 14+10, 20+83, 35+24, 37+77, 41+09, 43+50, 47+90, 54+05, 56+91, 58+46 | Culvert is in fair condition |
| 51+74 | Culvert appears to be in fair condition (half of culvert is filled with silt) |
| 46+71 | Unable to evaluate condition of culvert (Culvert is filled with silt) |

| GrayBeard Mountain Parking Overlook | Evaluation |
|--|------------------------------|
| 15" CMP | Culvert is in fair condition |

| Craggy Dome Parking Overlook | Evaluation |
|--|--|
| 18" CMP (West, lower parking area) | Unable to evaluate condition of culvert* |
| 18" CMP (Connects to above pipe via inlet) | Culvert is in fair condition |
| 18" CMP (East, upper parking area) | Unable to evaluate condition of culvert* |
| 18" CMP (Connects to above pipe via inlet) | Unable to evaluate condition of culvert* |
| 18" CMP (Connects to above pipe via inlet) | Culvert is in fair condition |

| Craggy Gardens Visitor Center | Evaluation |
|--------------------------------------|------------------------------|
| 18" CMP (North Parking Area) | Culvert is in fair condition |
| 18" CMP (North Parking Area) | Culvert is in fair condition |
| 12" CMP (North Parking Area) | Culvert is in fair condition |
| 15" CMP (South Parking Area) | Culvert is in fair condition |

| Craggy Gardens Picnic Area Parking | Evaluation |
|---|--|
| 15" CMP | Unable to evaluate condition of inlet* |
| 15" CMP | Unable to evaluate condition of inlet* |

| Location of Pipe/Box Culvert Along Parkway | Evaluation |
|--|------------------------------|
| 359/39+15, 361/42+66, 362/14+86, 363/27+91, 363/44+08, 363/47+57, 364/15+45, 364/25+05, 364/38+00, 365/0+28, 365/28+46, 365/38+05, 366/6+00, 366/7+60, 366/13+84, 366/23+60, 366/29+89, 366/46+19, 366/53+48, 367/24+30, 367/29+13, 368/32+35, 368/47+48, 369/7+72, 369/12+97, 369/22+11, 369/40+96, 369/42+95, 369/56+45, 370/13+93, 370/18+56, 370/28+60, 370/31+50, 371/20+07, 373/27+35, 373/34+67, 374/5+42, 374/31+19, 374/36+94, 374/43+83, | Culvert is in good condition |
| 359/50+49, 359/52+25, 360/3+80, 360/8+50, 360/11+45, 360/13+97, 360/17+45, 360/21+42, 360/25+20, 360/34+92, 360/40+26, 360/49+95, 360/53+51, 361/10+37, 361/30+12, 361/37+51, 361/39+35, 361/46+58, 361/52+18, 362/3+21, 362/5+79, 362/12+50, 362/18+93, 362/21+98, 362/25+05, 362/27+22, 362/30+33, 362/33+54, 362/34+78, 362/39+30, 362/42+80, 363/0+25, 363/7+27, 363/10+27, 363/18+43, 363/23+91, 363/32+58, 363/35+89, 363/51+50, 364/9+85, 364/13+88, 364/18+30, 364/20+54, 364/23+65, 364/41+10, 364/45+75, 364/51+00, 365/3+43, 365/10+48, 365/14+00, 365/17+25, 365/19+01, 365/22+49, 365/25+00, 365/32+93, 365/34+07, 365/39+55, 365/43+10, 366/3+48, 366/9+48, 366/17+00, 366/20+00, 366/26+50, 366/35+66, 366/39+98, 366/42+00, 366/47+62, 367/1+46, 367/4+51, 367/8+89, 367/11+48, 367/15+20, 367/18+40, 367/22+40, 367/27+36, 367/32+06, 367/36+40, 367/39+08, 367/41+13, 367/45+04, 367/47+87, 367/51+34, 368/1+87, 368/6+58, 368/15+25, 368/19+31, 368/23+82, 368/28+40, 368/34+52, 368/37+89, 368/43+18, 369/3+77, 369/26+96, 369/33+49, 369/52+83, 370/5+52, 370/22+64, 370/33+40, 370/40+80, 370/45+75, 370/49+56, 371/6+32, 371/11+22, 371/14+07, 371/23+56, 371/26+25, 371/30+30, | Culvert is in fair condition |

| Location of Pipe/Box Culvert Along Parkway | Evaluation |
|--|--|
| 371/34+20, 371/40+49, 371/42+56,371/43+92, 371/51+24,372/0+75, 372/11+88, 372/14+33, 372/17+50, 372/19+50, 372/23+70,372/26+54,372/29+45,372/32+69, 372/36+18, 372/39+52,372/43+00, 373/0+26, 373/3+43, 373/17+84, 373/21+05, 373/24+39, 373/45+37, 373/50+00, 374/10+80, 374/52+80 | |
| 359/43+32, 361/24+43,361/26+54, 362/8+68, 362/46+93, 363/41+18, 365/6+86, 366/51+64, 371/2+50, 371/37+25, 372/49+45 | Culvert is in poor condition |
| 361/49+40, 363/14+75, 365/48+47, 367/43+34, 371/47+50, 372/5+40, 372/46+16, 373/7+39, 373/30+35, 373/36+17, 374/12+79,374/15+67, 374/19+20, 374/46+78, 374/48+12, 374/55+23 | Unable to evaluate condition of culvert (Due to: Clogged, proximity to rock outcropping, attached to inlet, outlet location, vegetative overgrowth) |

*Pipe culvert ties to inlet on both ends

Photographs

The following photographs are representative of the general condition of the storm drainage system along Blue Ridge Parkway. Clearing, grubbing, and sedimentation removal in the vicinity of pipe culverts and inlet structures are needed to increase the capacity of the storm drainage system. In some cases, the replacement of pipe culverts is required to provide adequate capacity.



369/39+15



360/8+50



359/52+25



360/11+45



360/13+97



360/34+92



360/17+48



361/52+18



360/21+42



362/12+50

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Photographs – Drop Inlets

Hydraulics Data Summary

Blue Ridge Parkway Rehabilitation



363/18+43



366/26+50



363/32+58



367/22+40



366/23+60



367/47+87

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Photographs – Drop Inlets

Hydraulics Data Summary

Blue Ridge Parkway
Rehabilitation



371/2+50



374/52+80



372/49+45



Picnic Area Access Road Sta. 2+80

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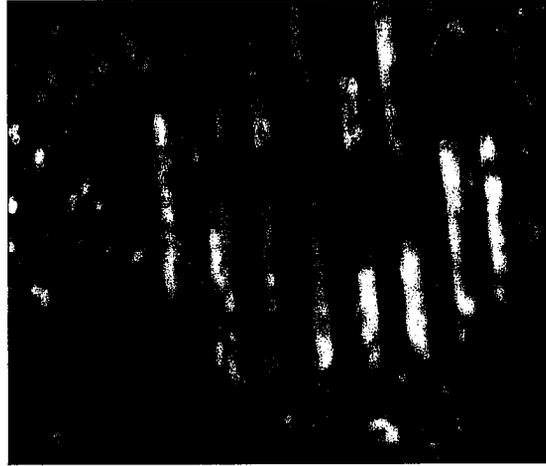
Photographs – Catch Basins

Hydraulics Data Summary

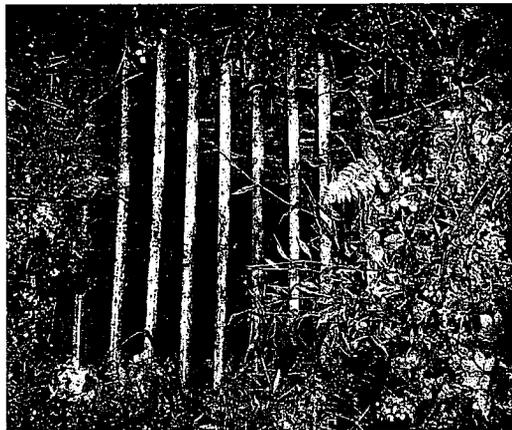
Blue Ridge Parkway
Rehabilitation



365/33+93



37321+05



372/46+16



374/43+83



373/7+39



374/48+12



359/43+31



361/30+12



360/3+80



361/37+51



360/40+26



363/41+18

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Photographs – Headwalls

Hydraulics Data Summary

Blue Ridge Parkway
Rehabilitation



364/9+85



367/29+13



365/19+01



368/43+18



367/4+51



369/37+44

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Photographs – Headwalls

Hydraulics Data Summary

Blue Ridge Parkway
Rehabilitation



370/5+52



Picnic Area Access Road Sta. 4+82



370/33+40



Picnic Area Access Road Sta. 8+57



370/45+75



Picnic Area Access Road Sta. 35+23



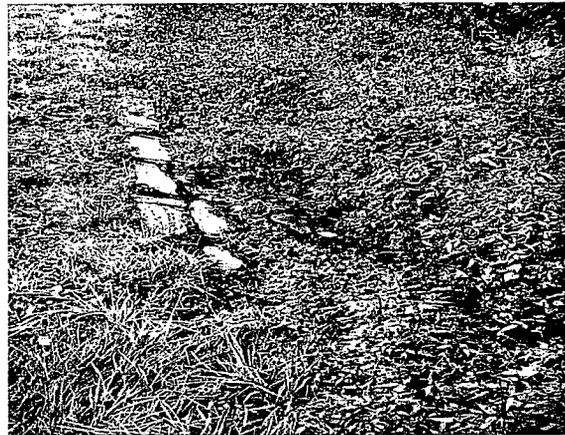
Rubble waterway @ 364/18+00



Paved waterway @ 367/10+00



Paved waterway @ 364/50+00



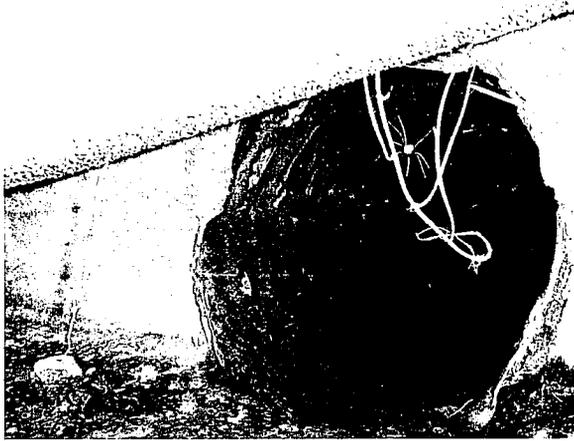
Rubble waterway @ 368/31+00



Grass waterway @ 365/3+00



Rubble waterway @ 371/2+00



361/26+54



362/14+86



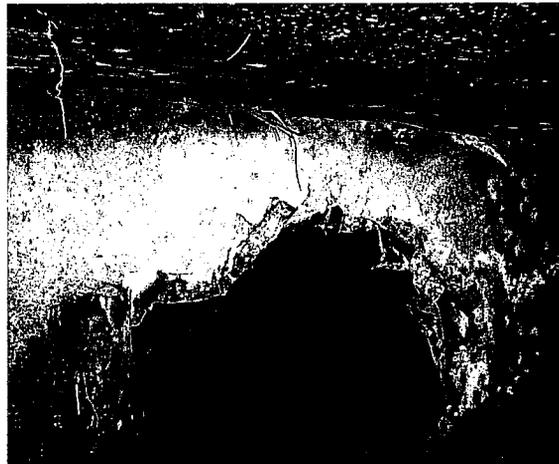
362/34+78



363/0+25



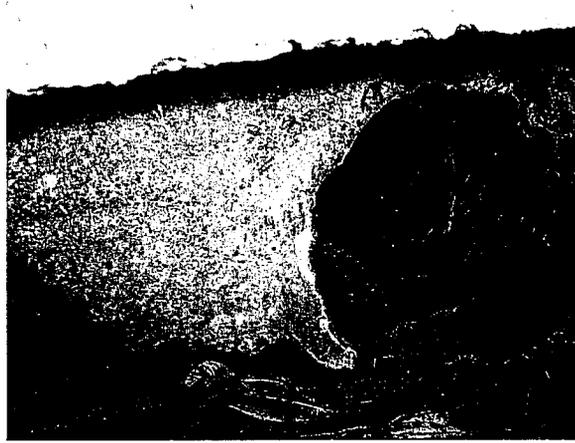
362/5+79



364/13+88



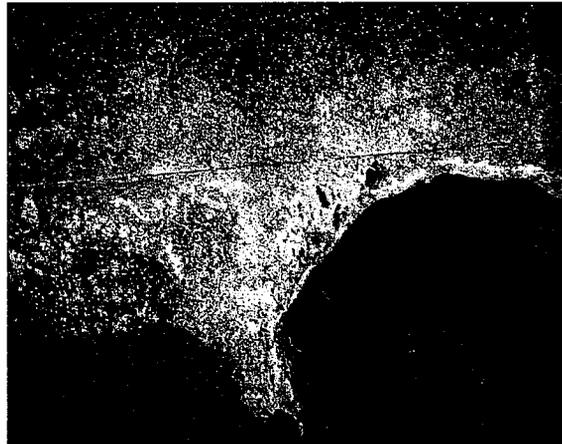
365/6+86



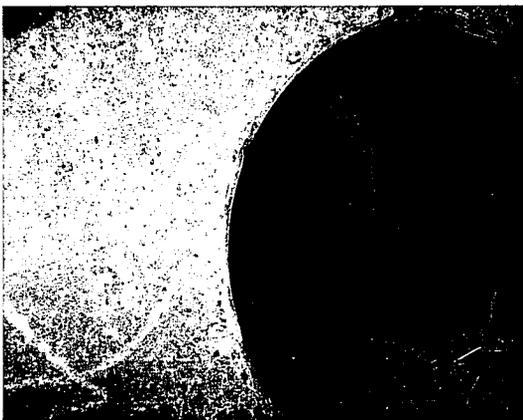
365/34+07



365/12+68



365/39+55



365/28+46



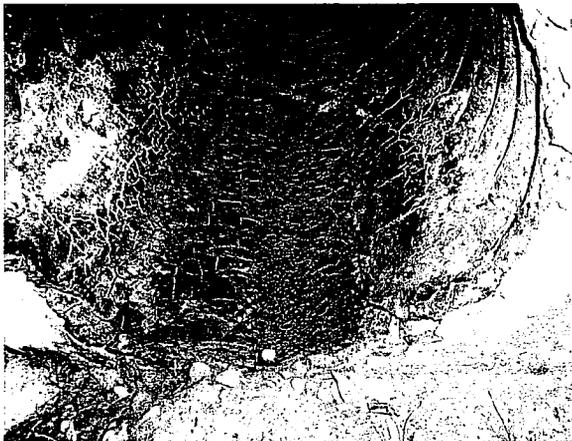
366/6+00



366/23+60



367/27+36



366/38+98



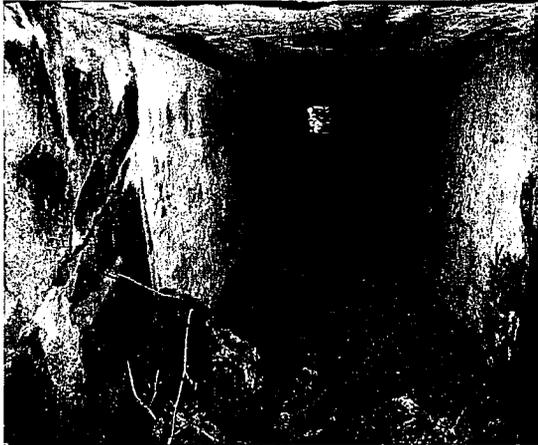
Picnic Area Access Road Sta. 24+60



366/51+64



Picnic Area Access Road Sta. 37+77



364/15+45 (4' x 3' RCBC)



368/43+18 (4' x 3' RCBC)



366/29+89 (3' x 3' RCBC)



369/7+72 (3' x 3' RCBC)



367/45+04 (4' x 3' RCBC)



369/12+97 (3' x 3' RCBC)



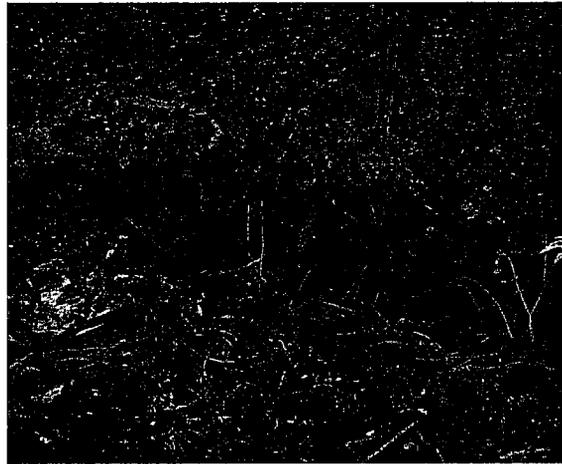
369/22+11 (4' x 3' RCBC)



370/18+56 (4' x 4' RCBC)



369/40+96 (3' x 3' RCBC)



374/31+19 (5' x 5' RCBC)



370/13+93 (4' x 4' RCBC)



374/36+94 (3' x 3' RCBC)

Analysis Section

Design Objective

The design objectives for this project are as follows:

1. Investigate and evaluate the existing hydraulic conditions, including the materials, types and sizes of all culverts and drainage structures, and paved and unpaved ditches and channels located along the roadway and pull-offs within the project limits.
2. Provide recommendations for any required drainage improvements to meet FHWA requirements for adequate drainage.

Information Sources

The design basis for this project has been developed from four principle sources:

1. *Federal Lands Highway Project Development and Design Manual*, June 1996 Metric Revision.
2. North Carolina Department of Transportation, Division of Highways *Guideline for Drainage Studies and Hydraulic Design*.
3. Advice from EFLHD concerning NPS preferences.
4. U.S. Geological Survey *Water-Resources Investigations Report 01-4207*.

Design Methods

Culverts and drainage structures were primarily identified by visual inspection. Drainage areas to individual culverts were determined using United States Geological Survey (USGS) quadrangle maps for Craggy Pinnacle, Montreat and Mt. Mitchell, dated 1976, 1994, and 1966, respectively. See Exhibit 2 for a topographic site map.

Peak runoff flows for the 10- and 50-year return period storm events for rural watersheds larger than 1 square mile were determined in accordance with the North Carolina Department of Transportation Hydraulics Unit design policy of using data compiled by the USGS. Precipitations for these storm events were obtained from USGS *Water-Resources Investigations Report 01-4207*. Peak runoff flows for the 10-, 25-, and 50-year return storm events for rural watersheds with a drainage area less than

1 square mile were determined using the hydrological procedure and charts presented in Appendix C of the NCDOT Division of Highways Hydrology Charts.

The Federal Lands Highway *Project Development and Design Manual* and the North Carolina Department of Transportation, Division of Highways *Guideline for Drainage Studies and Hydraulic Design* specify a minimum design flood frequency of 25 years for cross drains along Craggy Gardens Picnic Area Access Road and a minimum design flood frequency of 50 years for cross drains along the Parkway.

The capacity of pipe culverts and box culverts was evaluated using the U.S. Department of Transportation Federal Highway Administration *Hydraulic Charts for the Selection of Highway Culverts*.

The following assumptions were used in the analysis:

- Culverts and drainage structures were clean and unobstructed
- Culverts are inlet controlled

Blue Ridge Parkway Hydrologic Computations

Hydrologic Computations
Q₁₀ and Q₅₀

Federal Highway Administration
Eastern Federal Lands Highway Division
Project PRA-BLRI 2P14

| Station | Pipe | Inlet Structure | Str. No. | DA (acres) | Hydrologic Contour (NCDOT Chart C 200.1) | Shape Parameter (W/L) | W/L Correction Factor for DA>10ac. | Drainage Area Cover Correction Factor | Limits of W/L * DA correction factor - 0.7 to 1.5 | Q ₅₀ (cfs) from NCDOT Chart C 200.2) | Q ₅₀ (cfs) with correction factor | Q ₁₀ (cfs) (Q ₅₀ *0.53) |
|-----------|------------|-----------------|----------|------------|--|-----------------------|------------------------------------|---------------------------------------|---|---|--|---|
| 359/39+15 | 18" CMP | Tp 4B Inlet | 1 | 16 | 8 | 0.2 | 0.48 | 0.68 | use 0.7 | 30 | 21 | 11 |
| 359/43+32 | 18" CMP | Stone Headwall | 2 | 1 | 8 | 4.5 | | 0.68 | use 0.7 | 5 | 4 | 2 |
| 359/50+49 | 18" CMP | Tp 4B Inlet | 3 | 6 | 8 | 0.62 | | 0.68 | use 0.7 | 14 | 10 | 5 |
| 359/52+25 | 24" CMP | Tp 4B Inlet | 4 | 4 | 8 | 0.47 | | 0.68 | use 0.7 | 11 | 8 | 4 |
| 360/03+80 | 24" CMP | Stone Headwall | 5 | 17 | 8 | 1 | 1.15 | 0.68 | 0.78 | 30 | 23 | 12 |
| 360/08+50 | 18" CMP | Tp 4B Inlet | 6 | 11 | 8 | 0.67 | 0.35 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 360/11+45 | 18" CMP | Tp 4B Inlet | 7 | 9 | 8 | 0.5 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 360/13+97 | 18" CMP | Tp 4B Inlet | 8 | 23 | 8 | 0.37 | 0.73 | 0.68 | use 0.7 | 41 | 29 | 15 |
| 360/17+45 | 18" CMP | Tp 4B Inlet | 9 | 11 | 8 | 0.75 | 1 | 0.68 | 0.75 | 21 | 16 | 8 |
| 360/21+42 | 18" CMP | Tp 4B Inlet | 10 | 21 | 8 | 0.89 | 0.54 | 0.68 | use 0.7 | 38 | 27 | 14 |
| 360/25+20 | 18" CMP | Tp 4B Inlet | 11 | 7 | 8 | 1.73 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 360/34+92 | 18" CMP | Stone Headwall | 12 | 1 | 8 | 5 | | 0.68 | use 0.7 | 5 | 4 | 2 |
| 360/40+26 | 24" CMP | Stone Headwall | 13 | 1 | 8 | 5 | | 0.68 | use 0.7 | 5 | 4 | 2 |
| 360/49+95 | 18" CMP | Tp 4B Inlet | 14 | 1 | 8 | 1.67 | | 0.68 | use 0.7 | 5 | 4 | 2 |
| 360/53+51 | 18" CMP | Tp 4B Inlet | 15 | 1 | 8 | 2 | | 0.68 | use 0.7 | 5 | 4 | 2 |
| 361/10+37 | 15" CMP | Stone Headwall | 16 | 0.5 | 8 | 4.67 | | 0.68 | use 0.7 | 3 | 2 | 1 |
| 361/24+43 | 24" CMP | Tp 4B Inlet | 17 | 4 | 8 | 0.57 | | 0.68 | use 0.7 | 11 | 8 | 4 |
| 361/26+54 | 18" CMP | Conc. Headwall | 18 | 7 | 8 | 1 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 361/30+12 | 30" CMP | Stone Headwall | 19 | 34 | 8 | 1.9 | 3.5 | 0.68 | use 1.5 | 57 | 86 | 45 |
| 361/37+51 | 18" CMP | Stone Headwall | 20 | 8 | 8 | 0.35 | | 0.68 | use 0.7 | 17 | 12 | 6 |
| 361/39+35 | 30" CMP | Stone Headwall | 21 | 23 | 8 | 0.35 | 0.7 | 0.68 | use 0.7 | 41 | 29 | 15 |
| 361/42+66 | 18" CMP | Tp 4B Inlet | 22 | 7 | 8 | 1.36 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 361/46+58 | 18" CMP | Tp 4B Inlet | 23 | 7 | 8 | 1 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 361/49+40 | 18" CMP | Tp 4B Inlet | 24 | 8 | 8 | 0.5 | | 0.68 | use 0.7 | 17 | 12 | 6 |
| 361/52+18 | 18" CMP | Tp 4B Inlet | 25 | 8 | 8 | 0.5 | | 0.68 | use 0.7 | 17 | 12 | 6 |
| 362/03+21 | 18" CMP | Tp 4B Inlet | 26 | 10 | 8 | 0.5 | 0.8 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 362/05+79 | 18" CMP | Tp 4B Inlet | 27 | 7 | 8 | 0.71 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 362/08+68 | 18" CMP | Stone Headwall | 28 | 11 | 8 | 0.94 | 1.05 | 0.68 | 0.71 | 21 | 15 | 8 |
| 362/12+50 | 24" CMP | Tp 4B Inlet | 29 | 10 | 8 | 0.67 | 0.9 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 362/14+86 | 18" CMP | Tp 4B Inlet | 30 | 17 | 8 | 1.12 | 1 | 0.68 | use 0.7 | 30 | 21 | 11 |
| 362/18+93 | 18" CMP | Tp 4B Inlet | 31 | 9 | 8 | 0.86 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 362/21+98 | 18" CMP | Stone Headwall | 32 | 11 | 8 | 1 | 1.1 | 0.68 | 0.75 | 21 | 16 | 8 |
| 362/25+05 | 18" CMP | Tp 4B Inlet | 33 | 7 | 8 | 0.9 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 362/27+22 | 18" CMP | Tp 4A Inlet | 34 | 11 | 8 | 0.7 | 1 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 362/30+33 | 18" CMP | Tp 4B Inlet | 35 | 13 | 8 | 0.95 | 1.1 | 0.68 | 0.75 | 24 | 18 | 10 |
| 362/33+54 | 18" CMP | Tp 4B Inlet | 36 | 7 | 8 | 0.24 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 362/34+78 | 18" CMP | Tp 4B Inlet | 37 | 11 | 8 | 0.7 | 0.95 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 362/39+30 | 24" CMP | Stone Headwall | 38 | 22 | 8 | 0.5 | 0.87 | 0.68 | use 0.7 | 40 | 28 | 15 |
| 362/42+80 | 18" CMP | Tp 4B Inlet | 39 | 10 | 8 | 0.5 | 0.78 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 362/46+93 | 18" CMP | Tp 4B Inlet | 40 | 22 | 8 | 1 | 0.6 | 0.68 | use 0.7 | 39 | 27 | 14 |
| 363/00+25 | 18" CMP | Tp 4B Inlet | 41 | 8 | 8 | 1.55 | | 0.68 | use 0.7 | 17 | 12 | 6 |
| 363/07+27 | 18" CMP | Stone Headwall | 42 | 13 | 8 | 1.1 | 1.1 | 0.68 | 0.75 | 24 | 18 | 10 |
| 363/10+27 | 24" CMP | Stone Headwall | 43 | 3 | 8 | 3 | | 0.68 | use 0.7 | 9 | 6 | 3 |
| 363/14+75 | 18" CMP | Tp 4B Inlet | 44 | 3 | 8 | 5 | | 0.68 | use 0.7 | 9 | 6 | 3 |
| 363/18+43 | 18" CMP | Tp 4B Inlet | 45 | 2 | 8 | 6.97 | | 0.68 | use 0.7 | 7 | 5 | 3 |
| 363/23+91 | 18" CMP | Stone Headwall | 46 | 3 | 8 | 0.73 | | 0.68 | use 0.7 | 9 | 6 | 3 |
| 363/27+91 | 18" CMP | Tp 4B Inlet | 47 | 3 | 8 | 0.48 | | 0.68 | use 0.7 | 9 | 6 | 3 |
| 363/32+58 | 24" CMP | Tp 4B Inlet | 48 | 43 | 8 | 0.35 | 0.78 | 0.68 | use 0.7 | 68 | 48 | 25 |
| 363/35+89 | 24" CMP | Stone Headwall | 49 | 49 | 8 | 0.44 | 0.9 | 0.68 | use 0.7 | 75 | 53 | 28 |
| 363/41+18 | 18" CMP | Stone Headwall | 50 | 23 | 8 | 0.25 | 0.55 | 0.68 | use 0.7 | 40 | 28 | 15 |
| 363/44+08 | 24" CMP | Tp 4B Inlet | 51 | 28 | 8 | 0.43 | 0.85 | 0.68 | use 0.7 | 47 | 33 | 17 |
| 363/47+57 | 18" CMP | Conc. Headwall | 52 | 23 | 8 | 0.53 | 0.9 | 0.68 | use 0.7 | 40 | 28 | 15 |
| 363/51+50 | 18" CMP | Tp 4B Inlet | 53 | 23 | 8 | 0.57 | 1 | 0.68 | use 0.7 | 40 | 28 | 15 |
| 364/09+85 | 18" CMP | Tp 4C Inlet | 54 | 12 | 8 | 0.72 | 1 | 0.68 | use 0.7 | 19 | 13 | 7 |
| 364/13+88 | 18" CMP | Tp 4B Inlet | 55 | 9 | 8 | 0.18 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 364/15+45 | 4 x 3 RCBC | | 56 | 113 | 8 | 0.51 | 1.1 | 0.68 | 0.75 | 145 | 109 | 58 |
| 364/18+30 | 18" CMP | Tp 4B Inlet | 57 | 11 | 8 | 0.4 | 0.71 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 364/20+54 | 18" CMP | Tp 4B Inlet | 58 | 6 | 8 | 0.19 | | 0.68 | use 0.7 | 14 | 10 | 5 |
| 364/23+65 | 18" CMP | Tp 4B Inlet | 59 | 4 | 8 | 0.26 | | 0.68 | use 0.7 | 11 | 8 | 4 |
| 364/38+00 | 18" CMP | Tp 4B Inlet | 60 | 0.4 | 8 | | | 0.68 | use 0.7 | 3 | 2 | 1 |
| 364/41+10 | 18" CMP | Tp 4C Inlet | 61 | 3 | 8 | 1 | | 0.68 | use 0.7 | 8.5 | 6 | 3 |
| 364/45+75 | 24" CMP | Tp 4C Inlet | 62 | 11 | 8 | 2.1 | 1.35 | 0.68 | 0.92 | 21 | 19 | 10 |
| 364/51+00 | 18" CMP | Tp 4B Inlet | 63 | 14 | 8 | 0.7 | 1 | 0.68 | use 0.7 | 26 | 18 | 10 |
| 365/00+28 | 36" CMP | Tp 4B Inlet | 64 | 34 | 8 | 1.1 | 1.25 | 0.68 | 0.85 | 57 | 48 | 26 |
| 365/03+43 | 18" CMP | Tp 4B Inlet | 65 | 15 | 8 | 0.5 | 0.8 | 0.68 | use 0.7 | 28 | 20 | 10 |
| 365/06+86 | 18" CMP | Conc. Headwall | 66 | 13 | 8 | 0.67 | 0.9 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 365/10+48 | 18" CMP | Tp 4C Inlet | 67 | 17 | 8 | 0.55 | 0.9 | 0.68 | use 0.7 | 31 | 22 | 12 |
| 365/14+00 | 18" CMP | Conc. Headwall | 68 | 16 | 8 | 0.5 | 0.87 | 0.68 | use 0.7 | 30 | 21 | 11 |
| 365/17+25 | 18" CMP | Conc. Headwall | 69 | 9 | 8 | 0.69 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 365/19+01 | 18" CMP | Tp 4C Inlet | 70 | 11 | 8 | 1 | 1.15 | 0.68 | 0.78 | 21 | 16 | 9 |
| 365/22+49 | 18" CMP | Tp 4C Inlet | 71 | 9 | 8 | 1 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 365/25+00 | 18" CMP | Tp 4C Inlet | 72 | 11 | 8 | 1 | 1.1 | 0.68 | 0.75 | 21 | 16 | 8 |
| 365/28+46 | 24" CMP | Tp 4C Inlet | 73 | 5 | 8 | 0.37 | | 0.68 | use 0.7 | 13 | 9 | 5 |
| 365/32+93 | 18" CMP | 2 x 2 CB | 74 | 14 | 8 | 0.3 | 0.6 | 0.68 | use 0.7 | 26 | 18 | 10 |
| 365/34+07 | 18" CMP | Conc. Headwall | 75 | 6 | 8 | 0.2 | | 0.68 | use 0.7 | 14 | 10 | 5 |
| 365/38+05 | 2 x 2 RCBC | Stone Headwall | 76 | 11 | 8 | 1 | 1.1 | 0.68 | 0.75 | 21 | 16 | 8 |
| 365/39+55 | 18" CMP | Tp 4C Inlet | 77 | 3 | 8 | 1 | | 0.68 | use 0.7 | 9 | 6 | 3 |

| Station | Pipe | Inlet Structure | Str. No. | DA (acres) | Hydrologic Contour (NCDOT Chart C 200.1) | Shape Parameter (W/L) | W/L Correction Factor | Drainage Area Cover Correction Factor | Limits of W/L * DA correction factor - 0.7 to 1.5 | Q50 (cfs) from NCDOT Chart C 200.2) | Q50 (cfs) with correction factor | Q10 (cfs) (Q50*0.53) |
|-----------|------------|-----------------|----------|------------|--|-----------------------|-----------------------|---------------------------------------|---|-------------------------------------|----------------------------------|----------------------|
| 365/43+10 | 18" CMP | Tp 4C Inlet | 78 | 6 | 8 | 2 | | 0.68 | use 0.7 | 14 | 10 | 5 |
| 365/48+47 | 24" CMP | Stone Headwall | 79 | 13 | 8 | 2.5 | 1.5 | 0.68 | 1.02 | 24 | 24 | 13 |
| 366/03+48 | 18" CMP | Tp 4B Inlet | 80 | 7 | 8 | 1 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 366/06+00 | 18" CMP | Tp 4C Inlet | 81 | 7 | 8 | 1 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 366/07+60 | 18" CMP | Conc. Headwall | 82 | 11 | 8 | 0.25 | 0.5 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 366/09+48 | 24" CMP | Stone Headwall | 83 | 17 | 8 | 0.5 | 0.8 | 0.68 | use 0.7 | 31 | 22 | 12 |
| 366/13+84 | 18" CMP | Tp 4C Inlet | 84 | 10 | 8 | 0.3 | 0.6 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 366/17+00 | 18" CMP | Tp 4A Inlet | 85 | 10 | 8 | 0.2 | 0.45 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 366/20+00 | 30" CMP | Stone Headwall | 86 | 10 | 8 | 0.15 | 0.4 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 366/23+60 | 18" CMP | Tp 4B Inlet | 87 | 10 | 8 | 0.2 | 0.45 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 366/26+50 | 18" CMP | Tp 4B Inlet | 88 | 10 | 8 | 0.2 | 0.45 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 366/29+89 | 4 x 3 RCBC | Stone Headwall | 89 | 165 | 8 | 0.2 | 0.65 | 0.68 | use 0.7 | 200 | 140 | 74 |
| 366/35+66 | 30" CMP | Stone Headwall | 90 | 87 | 8 | 0.5 | 0.88 | 0.68 | use 0.7 | 117 | 82 | 43 |
| 366/39+98 | 18" CMP | Tp 4B Inlet | 91 | 9 | 8 | 0.2 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 366/42+00 | 18" CMP | Tp 4B Inlet | 92 | 8 | 8 | 0.2 | | 0.68 | use 0.7 | 17 | 12 | 6 |
| 366/46+19 | 30" CMP | Stone Headwall | 93 | 86 | 8 | 0.3 | 0.8 | 0.68 | use 0.7 | 130 | 91 | 48 |
| 366/47+62 | 18" CMP | Stone Headwall | 94 | 14 | 8 | 0.15 | 0.4 | 0.68 | use 0.7 | 25 | 18 | 9 |
| 366/51+64 | 24" CMP | Tp 4B Inlet | 95 | 58 | 8 | 0.2 | 0.6 | 0.68 | use 0.7 | 83 | 58 | 31 |
| 366/53+48 | 30" CMP | Stone Headwall | 96 | 107 | 8 | 0.1 | 0.4 | 0.68 | use 0.7 | 142 | 99 | 53 |
| 367/01+46 | 18" CMP | Stone Headwall | 97 | 7 | 8 | 0.1 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 367/04+51 | 30" CMP | Stone Headwall | 98 | 109 | 8 | 0.25 | 0.7 | 0.68 | use 0.7 | 142 | 99 | 53 |
| 367/08+89 | 18" CMP | Tp 4C Inlet | 99 | 16 | 8 | 0.4 | 0.72 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/11+48 | 24" CMP | Stone Headwall | 100 | 29 | 8 | 0.3 | 0.7 | 0.68 | use 0.7 | 50 | 35 | 19 |
| 367/15+20 | 18" CMP | Tp 4C Inlet | 101 | 16 | 8 | 0.3 | 0.6 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/18+40 | 18" CMP | Tp 4C Inlet | 102 | 16 | 8 | 0.25 | 0.55 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/22+40 | 18" CMP | Tp 4A Inlet | 103 | 16 | 8 | 0.3 | 0.6 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/24+30 | 18" CMP | Tp 4A Inlet | 104 | 16 | 8 | 0.2 | 0.5 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/27+36 | 18" CMP | Tp 4A Inlet | 105 | 16 | 8 | 0.6 | 0.9 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/29+13 | 24" CMP | Stone Headwall | 106 | 29 | 8 | 0.2 | 0.55 | 0.68 | use 0.7 | 50 | 35 | 19 |
| 367/32+06 | 18" CMP | Stone Headwall | 107 | 16 | 8 | 1 | 1.1 | 0.68 | 0.75 | 29 | 22 | 11 |
| 367/36+40 | 18" CMP | Stone Headwall | 108 | 16 | 8 | 1 | 1.1 | 0.68 | 0.75 | 29 | 22 | 11 |
| 367/39+08 | 18" CMP | Stone Headwall | 109 | 16 | 8 | 0.4 | 0.75 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 367/41+13 | 36" CMP | Stone Headwall | 110 | 94 | 8 | 0.4 | 1 | 0.68 | use 0.7 | 130 | 91 | 48 |
| 367/43+34 | 18" CMP | Tp 4A Inlet | 111 | 13 | 8 | 0.2 | 1.05 | 0.68 | 0.71 | 24 | 17 | 9 |
| 367/45+04 | 4 x 3 RCBC | Stone Headwall | 112 | 153 | 8 | 0.2 | 0.7 | 0.68 | use 0.7 | 190 | 133 | 70 |
| 367/47+87 | 18" CMP | Tp 4A Inlet | 113 | 13 | 8 | 0.4 | 0.7 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 367/51+34 | 18" CMP | Stone Headwall | 114 | 13 | 8 | 0.6 | 0.9 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 368/01+87 | 18" CMP | Tp 4A Inlet | 115 | 13 | 8 | 0.6 | 0.9 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 368/06+58 | 18" CMP | Stone Headwall | 116 | 13 | 8 | 0.8 | 1.05 | 0.68 | 0.71 | 24 | 17 | 9 |
| 368/15+25 | 18" CMP | Stone Headwall | 117 | 9 | 8 | 0.2 | | 0.68 | use 0.7 | 18 | 13 | 7 |
| 368/19+31 | 24" CMP | Stone Headwall | 118 | 18 | 8 | 1 | 1.15 | 0.68 | 0.78 | 33 | 26 | 14 |
| 368/23+82 | 24" CMP | Stone Headwall | 119 | 18 | 8 | 1 | 1.15 | 0.68 | 0.78 | 33 | 26 | 14 |
| 368/28+40 | 24" CMP | Tp 4C Inlet | 120 | 16 | 8 | 1 | 1.15 | 0.68 | 0.78 | 29 | 23 | 12 |
| 368/32+35 | 24" CMP | Stone Headwall | 121 | 13 | 8 | 0.3 | 0.6 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 368/34+52 | 24" CMP | Stone Headwall | 122 | 9 | 8 | 0.6 | | 0.68 | use 0.7 | 19 | 13 | 7 |
| 368/37+89 | 18" CMP | Stone Headwall | 123 | 13 | 8 | 0.7 | 1 | 0.68 | 0.70 | 24 | 17 | 9 |
| 368/43+18 | 18" CMP | Stone Headwall | 124 | 13 | 8 | 0.8 | 1.05 | 0.68 | 0.71 | 24 | 17 | 9 |
| 368/47+48 | 4 x 3 RCBC | Stone Headwall | 125 | 101 | 8 | 0.7 | 1.2 | 0.68 | 0.82 | 135 | 110 | 58 |
| 369/03+77 | 24" CMP | Stone Headwall | 126 | 13 | 8 | 0.5 | 1 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 369/07+72 | 3 x 3 RCBC | Stone Headwall | 127 | 37 | 8 | 0.5 | 0.98 | 0.68 | use 0.7 | 60 | 42 | 22 |
| 369/12+97 | 3 x 3 RCBC | Stone Headwall | 128 | 73 | 8 | 0.5 | 1.05 | 0.68 | 0.71 | 98 | 70 | 37 |
| 369/22+11 | 4 x 3 RCBC | Stone Headwall | 129 | 120 | 8 | 0.8 | 1.25 | 0.68 | 0.85 | 160 | 136 | 72 |
| 369/26+96 | 18" CMP | Stone Headwall | 130 | 11 | 8 | 0.4 | 0.8 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 369/33+49 | 18" CMP | Stone Headwall | 131 | 11 | 8 | 1 | 1.15 | 0.68 | 0.78 | 21 | 16 | 9 |
| 369/40+96 | 3 x 3 RCBC | Stone Headwall | 132 | 76 | 8 | 0.7 | 1.05 | 0.68 | 0.71 | 21 | 15 | 8 |
| 369/42+95 | 24" CMP | Stone Headwall | 133 | 18 | 8 | 0.3 | 0.7 | 0.68 | use 0.7 | 33 | 23 | 12 |
| 369/52+83 | 18" CMP | Stone Headwall | 134 | 11 | 8 | 1.2 | 1.3 | 0.68 | 0.88 | 21 | 19 | 10 |
| 369/56+45 | 18" CMP | Stone Headwall | 135 | 11 | 8 | 0.6 | 0.3 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 370/05+52 | 18" CMP | Stone Headwall | 136 | 11 | 8 | 0.7 | 1.05 | 0.68 | 0.71 | 21 | 15 | 8 |
| 370/13+93 | 3 x 4 RCBC | Stone Headwall | 137 | 125 | 8 | 0.8 | 1.1 | 0.68 | 0.75 | 165 | 123 | 65 |
| 370/18+56 | 3 x 4 RCBC | Stone Headwall | 138 | 169 | 8 | 0.3 | 0.95 | 0.68 | use 0.7 | 210 | 147 | 78 |
| 370/22+64 | 18" CMP | Stone Headwall | 139 | 11 | 8 | 0.8 | 1.05 | 0.68 | 0.71 | 21 | 15 | 8 |
| 370/28+60 | 24" CMP | Stone Headwall | 140 | 18 | 8 | 0.5 | 1.05 | 0.68 | 0.71 | 33 | 24 | 12 |
| 370/31+50 | 18" CMP | Tp 4B Inlet | 141 | 10 | 8 | 0.2 | 0.61 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 370/33+40 | 24" CMP | Stone Headwall | 142 | 18 | 8 | 0.5 | 1.05 | 0.68 | 0.71 | 33 | 24 | 12 |
| 370/40+80 | 24" CMP | Stone Headwall | 143 | 20 | 8 | 0.7 | 1.15 | 0.68 | 0.78 | 36 | 28 | 15 |
| 370/45+75 | 18" CMP | Stone Headwall | 144 | 22 | 8 | 0.6 | 1.05 | 0.68 | 0.71 | 40 | 29 | 15 |
| 370/49+56 | 30" CMP | Stone Headwall | 145 | 25 | 8 | 0.3 | 0.85 | 0.68 | use 0.7 | 43 | 30 | 16 |
| 371/02+50 | 18" CMP | Tp 4A Inlet | 146 | 12 | 8 | 0.4 | 0.75 | 0.68 | use 0.7 | 22 | 15 | 8 |
| 371/06+32 | 24" CMP | Tp 4A Inlet | 147 | 16 | 8 | 0.5 | 0.8 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 371/11+22 | 18" CMP | Stone Headwall | 148 | 11 | 8 | 0.8 | 1.05 | 0.68 | 0.71 | 21 | 15 | 8 |
| 371/14+07 | 18" CMP | Stone Headwall | 149 | 11 | 8 | 0.4 | 0.7 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 371/20+07 | 4 x 4 RCBC | Stone Headwall | 150 | 297 | 8 | 0.47 | 1.05 | 0.68 | 0.71 | 340 | 243 | 129 |
| 371/23+56 | 24" CMP | Stone Headwall | 151 | 10 | 8 | 0.3 | 0.8 | 0.68 | use 0.7 | 20 | 14 | 7 |
| 371/26+25 | 30" CMP | Stone Headwall | 152 | 26 | 8 | 0.2 | 0.58 | 0.68 | use 0.7 | 45 | 32 | 17 |
| 371/30+30 | 4 x 4 RCBC | Stone Headwall | 153 | 258 | 8 | 0.3 | 0.8 | 0.68 | use 0.7 | 360 | 252 | 134 |
| 371/34+20 | 18" CMP | Tp 4A Inlet | 154 | 16 | 8 | 0.4 | 0.8 | 0.68 | use 0.7 | 29 | 20 | 11 |
| 371/37+25 | 18" CMP | Conc. Headwall | 155 | 17 | 8 | 0.22 | 0.61 | 0.68 | use 0.7 | 31 | 22 | 12 |
| 371/40+49 | 36" CMP | 3 X 3 CB | 156 | 84 | 8 | 0.7 | 1.15 | 0.68 | 0.78 | 113 | 88 | 47 |

| Station | Pipe | Inlet Structure | Str. No. | DA (acres) | Hydrologic Contour (NCDDOT Chart C 200.1) | Shape Parameter (W/L) | W/L Correction Factor | Drainage Area Cover Correction Factor | Limits of W/L * DA correction factor - 0.7 to 1.5 | Q50 (cfs) from NCDDOT Chart C 200.2) | Q50 (cfs) with correction factor | Q10 (cfs) (Q50*0.53) |
|-----------|-----------------|-----------------|----------|------------|---|-----------------------|-----------------------|---------------------------------------|---|--------------------------------------|----------------------------------|----------------------|
| 371/42+56 | 18" CMP | Stone Headwall | 157 | 7 | 8 | 0.5 | | 0.68 | use 0.7 | 16 | 11 | 6 |
| 371/43+92 | 30" CMP | Stone Headwall | 158 | 17 | 8 | 0.2 | 0.5 | 0.68 | use 0.7 | 31 | 22 | 12 |
| 371/47+50 | 18" CMP | Conc. Headwall | 159 | 5 | 8 | 0.5 | | 0.68 | use 0.7 | 13 | 9 | 5 |
| 371/51+24 | 18" CMP | Stone Headwall | 160 | 5 | 8 | 1 | | 0.68 | use 0.7 | 13 | 9 | 5 |
| 372/00+75 | 24" CMP | 4.5 X 3 CB | 161 | 10 | 8 | 0.8 | 1.05 | 0.68 | 0.71 | 20 | 14 | 8 |
| 372/05+40 | 18" CMP | Conc. Headwall | 162 | 5 | 8 | 0.5 | | 0.68 | use 0.7 | 13 | 9 | 5 |
| 372/11+88 | 18" CMP | TP 4A Inlet | 163 | 15 | 8 | 1.1 | 1.2 | 0.68 | 0.82 | 27 | 22 | 12 |
| 372/14+33 | 18" CMP | TP 4B Inlet | 164 | 13 | 8 | 0.4 | 0.7 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 372/17+50 | 24" CMP | Stone Headwall | 165 | 20 | 8 | 0.4 | 0.8 | 0.68 | use 0.7 | 35 | 25 | 13 |
| 372/19+50 | 24" CMP | Conc. Headwall | 166 | 42 | 8 | 0.2 | 0.63 | 0.68 | use 0.7 | 68 | 48 | 25 |
| 372/23+70 | 18" CMP | TP 4A Inlet | 167 | 45 | 8 | 0.5 | 1.05 | 0.68 | 0.71 | 70 | 50 | 26 |
| 372/26+54 | 18" CMP | TP 4B Inlet | 168 | 11 | 8 | 0.5 | 0.8 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 372/29+45 | 18" CMP | Stone Headwall | 169 | 11 | 8 | 0.4 | 0.73 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 372/32+69 | 18" CMP | TP 4B Inlet | 170 | 13 | 8 | 0.5 | 0.85 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 372/36+18 | 24" CMP | Stone Headwall | 171 | 15 | 8 | 0.6 | 1 | 0.68 | use 0.7 | 27 | 19 | 10 |
| 372/39+52 | 24" CMP | Stone Headwall | 172 | 24 | 8 | 0.5 | 1 | 0.68 | use 0.7 | 42 | 29 | 16 |
| 372/43+00 | 24" CMP | TP 4A Inlet | 173 | 14 | 8 | 0.33 | 0.65 | 0.68 | use 0.7 | 26 | 18 | 10 |
| 372/46+16 | 24" CMP | 3 X 3 CB | 174 | 26 | 8 | 1 | 1.28 | 0.68 | 0.87 | 45 | 39 | 21 |
| 372/49+45 | 24" CMP | Conc. Headwall | 175 | 17 | 8 | 0.6 | 1 | 0.68 | use 0.7 | 30 | 21 | 11 |
| 373/00+26 | 18" CMP | Stone Headwall | 176 | 14 | 8 | 0.5 | 0.8 | 0.68 | use 0.7 | 26 | 18 | 10 |
| 373/03+43 | 24" CMP | TP 4A Inlet | 177 | 20 | 8 | 0.6 | 1 | 0.68 | use 0.7 | 35 | 25 | 13 |
| 373/07+39 | 24" CMP | 3 X 3 CB | 178 | 13 | 8 | 0.6 | 0.9 | 0.68 | use 0.7 | 24 | 17 | 9 |
| 373/17+84 | 18" CMP | TP 4A Inlet | 179 | 31 | 8 | 1.1 | 1.25 | 0.68 | 0.85 | 53 | 45 | 24 |
| 373/21+05 | 30" CMP | 3 X 3 CB | 180 | 26 | 8 | 0.25 | 0.6 | 0.68 | use 0.7 | 45 | 32 | 17 |
| 373/24+39 | 18" CMP | TP 4A Inlet | 181 | 10 | 8 | 1.1 | 1.13 | 0.68 | 0.77 | 20 | 15 | 8 |
| 373/27+35 | 18" CMP | Stone Headwall | 182 | 8 | 8 | 0.9 | 1.05 | 0.68 | 0.71 | 17 | 12 | 6 |
| 373/30+35 | 18" CMP | TP 4A Inlet | 183 | 8 | 8 | 0.7 | 1 | 0.68 | use 0.7 | 17 | 12 | 6 |
| 373/34+67 | 18" CMP | TP 4A Inlet | 184 | 11 | 8 | 0.7 | 1 | 0.68 | use 0.7 | 21 | 15 | 8 |
| 373/36+17 | 24" CMP | Stone Headwall | 185 | 24 | 8 | 0.1 | 0.4 | 0.68 | use 0.7 | 43 | 30 | 16 |
| 373/45+37 | 36" CMP | Stone Headwall | 186 | 66 | 8 | 0.8 | 1.2 | 0.68 | 0.96 | 90 | 86 | 46 |
| 373/50+00 | 24" CMP | Stone Headwall | 187 | 23 | 8 | 0.5 | 0.9 | 0.68 | use 0.7 | 40 | 28 | 15 |
| 374/05+42 | 2 x 2 RCBC | Stone Headwall | 188 | 140 | 8 | 0.5 | 1.1 | 0.68 | 0.75 | 190 | 142 | 75 |
| 374/10+80 | 24" CMP | 3 X 3 CB | 189 | 20 | 8 | 0.8 | 1.2 | 0.68 | 0.82 | 35 | 29 | 15 |
| 374/12+79 | 24" CMP | 3 X 3 CB | 190 | 30 | 8 | 0.2 | 0.5 | 0.68 | use 0.7 | 52 | 36 | 19 |
| 374/15+67 | 24" CMP | 3 X 3 CB | 191 | 31 | 8 | 0.3 | 0.75 | 0.68 | use 0.7 | 53 | 37 | 20 |
| 374/19+20 | 18" CMP | TP 4B Inlet | 192 | 20 | 8 | 0.5 | 0.95 | 0.68 | use 0.7 | 35 | 25 | 13 |
| 374/31+19 | 5 x 5 Stone Box | | 193 | 675 | 8 | | | 0.68 | | 623 | | 346 |
| 374/36+94 | 3 x 3 RCBC | Stone Headwall | 194 | 108 | 8 | 0.6 | 1.15 | 0.68 | 0.78 | 142 | 111 | 59 |
| 374/43+83 | 24" CMP | 3 X 3 CB | 195 | 57 | 8 | 0.7 | 1.15 | 0.68 | 0.78 | 85 | 66 | 35 |
| 374/46+78 | 24" CMP | 3 X 3 CB | 196 | 42 | 8 | 0.5 | 1 | 0.68 | use 0.7 | 66 | 46 | 24 |
| 374/48+12 | 24" CMP | 3 X 3 CB | 197 | 8 | 8 | 0.3 | 0.6 | 0.68 | use 0.7 | 17 | 12 | 6 |
| 374/52+80 | 24" CMP | Stone Headwall | 198 | 15 | 8 | 1 | 1.28 | 0.68 | 0.87 | 27 | 24 | 12 |
| 374/55+23 | 18" CMP | TP 4B Inlet | 199 | 7 | 8 | 0.4 | 1 | 0.68 | use 0.7 | 16 | 11 | 6 |

Pipe Culvert Analysis

Federal Highway Administration
Eastern Federal Lands Highway Division
Project PRA-BLRI 2P14

| Station | Pipe | Inlet Structure | Str. No. | Q10 (cfs) | Adequate Capacity for 10 Year Storm Event | Q50 (cfs) | Adequate Capacity for 50 Year Storm Event |
|-----------|------------|-----------------|----------|-----------|---|-----------|---|
| 359/39+15 | 18" CMP | Tp 4B Inlet | 1 | 11 | Yes | 21 | No |
| 359/43+32 | 18" CMP | Stone Headwall | 2 | 2 | Yes | 4 | Yes |
| 359/50+49 | 18" CMP | Tp 4B Inlet | 3 | 5 | Yes | 10 | Yes |
| 359/52+25 | 24" CMP | Tp 4B Inlet | 4 | 4 | Yes | 8 | Yes |
| 360/03+80 | 24" CMP | Stone Headwall | 5 | 12 | Yes | 23 | Yes |
| 360/08+50 | 18" CMP | Tp 4B Inlet | 6 | 8 | Yes | 15 | No |
| 360/11+45 | 18" CMP | Tp 4B Inlet | 7 | 7 | Yes | 13 | No |
| 360/13+97 | 18" CMP | Tp 4B Inlet | 8 | 15 | No | 29 | No |
| 360/17+45 | 18" CMP | Tp 4B Inlet | 9 | 8 | Yes | 16 | No |
| 360/21+42 | 18" CMP | Tp 4B Inlet | 10 | 14 | Yes | 27 | No |
| 360/25+20 | 18" CMP | Tp 4B Inlet | 11 | 6 | Yes | 11 | Yes |
| 360/34+92 | 18" CMP | Stone Headwall | 12 | 2 | Yes | 4 | Yes |
| 360/40+26 | 24" CMP | Stone Headwall | 13 | 2 | Yes | 4 | Yes |
| 360/49+95 | 18" CMP | Tp 4B Inlet | 14 | 2 | Yes | 4 | Yes |
| 360/53+51 | 18" CMP | Tp 4B Inlet | 15 | 2 | Yes | 4 | Yes |
| 361/10+37 | 15" CMP | Stone Headwall | 16 | 1 | Yes | 2 | Yes |
| 361/24+43 | 24" CMP | Tp 4B Inlet | 17 | 4 | Yes | 8 | Yes |
| 361/26+54 | 18" CMP | Conc. Headwall | 18 | 6 | Yes | 11 | Yes |
| 361/30+12 | 30" CMP | Stone Headwall | 19 | 45 | Yes | 86 | No |
| 361/37+51 | 18" CMP | Stone Headwall | 20 | 6 | Yes | 12 | Yes |
| 361/39+35 | 30" CMP | Stone Headwall | 21 | 15 | Yes | 29 | Yes |
| 361/42+66 | 18" CMP | Tp 4B Inlet | 22 | 6 | Yes | 11 | Yes |
| 361/46+58 | 18" CMP | Tp 4B Inlet | 23 | 6 | Yes | 11 | Yes |
| 361/49+40 | 18" CMP | Tp 4B Inlet | 24 | 6 | Yes | 12 | Yes |
| 361/52+18 | 18" CMP | Tp 4B Inlet | 25 | 6 | Yes | 12 | Yes |
| 362/03+21 | 18" CMP | Tp 4B Inlet | 26 | 7 | Yes | 14 | No |
| 362/05+79 | 18" CMP | Tp 4B Inlet | 27 | 6 | Yes | 11 | Yes |
| 362/08+68 | 18" CMP | Stone Headwall | 28 | 8 | Yes | 15 | Yes |
| 362/12+50 | 24" CMP | Tp 4B Inlet | 29 | 7 | Yes | 14 | Yes |
| 362/14+86 | 18" CMP | Tp 4B Inlet | 30 | 11 | Yes | 21 | No |
| 362/18+93 | 18" CMP | Tp 4B Inlet | 31 | 7 | Yes | 13 | No |
| 362/21+98 | 18" CMP | Stone Headwall | 32 | 8 | Yes | 16 | Yes |
| 362/25+05 | 18" CMP | Tp 4B Inlet | 33 | 6 | Yes | 11 | Yes |
| 362/27+22 | 18" CMP | Tp 4A Inlet | 34 | 8 | Yes | 15 | No |
| 362/30+33 | 18" CMP | Tp 4B Inlet | 35 | 10 | Yes | 18 | No |
| 362/33+54 | 18" CMP | Tp 4B Inlet | 36 | 6 | Yes | 11 | Yes |
| 362/34+78 | 18" CMP | Tp 4B Inlet | 37 | 8 | Yes | 15 | No |
| 362/39+30 | 24" CMP | Stone Headwall | 38 | 15 | Yes | 28 | Yes |
| 362/42+80 | 18" CMP | Tp 4B Inlet | 39 | 7 | Yes | 14 | No |
| 362/46+93 | 18" CMP | Tp 4B Inlet | 40 | 14 | Yes | 27 | No |
| 363/00+25 | 18" CMP | Tp 4B Inlet | 41 | 6 | Yes | 12 | Yes |
| 363/07+27 | 18" CMP | Stone Headwall | 42 | 10 | Yes | 18 | Yes |
| 363/10+27 | 24" CMP | Stone Headwall | 43 | 3 | Yes | 6 | Yes |
| 363/14+75 | 18" CMP | Tp 4B Inlet | 44 | 3 | Yes | 6 | Yes |
| 363/18+43 | 18" CMP | Tp 4B Inlet | 45 | 3 | Yes | 5 | Yes |
| 363/23+91 | 18" CMP | Stone Headwall | 46 | 3 | Yes | 6 | Yes |
| 363/27+91 | 18" CMP | Tp 4B Inlet | 47 | 3 | Yes | 6 | Yes |
| 363/32+58 | 24" CMP | Tp 4B Inlet | 48 | 25 | Yes | 48 | No |
| 363/35+89 | 24" CMP | Stone Headwall | 49 | 28 | Yes | 53 | No |
| 363/41+18 | 18" CMP | Stone Headwall | 50 | 15 | Yes | 28 | No |
| 363/44+08 | 24" CMP | Tp 4B Inlet | 51 | 17 | Yes | 33 | No |
| 363/47+57 | 18" CMP | Conc. Headwall | 52 | 15 | Yes | 28 | No |
| 363/51+50 | 18" CMP | Tp 4B Inlet | 53 | 15 | Yes | 28 | No |
| 364/09+85 | 18" CMP | Tp 4C Inlet | 54 | 7 | Yes | 13 | Yes |
| 364/13+88 | 18" CMP | Tp 4B Inlet | 55 | 7 | Yes | 13 | No |
| 364/15+45 | 4 x 3 RCBC | | 56 | 58 | Yes | 109 | Yes |
| 364/18+30 | 18" CMP | Tp 4B Inlet | 57 | 8 | Yes | 15 | No |
| 364/20+54 | 18" CMP | Tp 4B Inlet | 58 | 5 | Yes | 10 | Yes |
| 364/23+65 | 18" CMP | Tp 4B Inlet | 59 | 4 | Yes | 8 | Yes |
| 364/38+00 | 18" CMP | Tp 4B Inlet | 60 | 1 | Yes | 2 | Yes |
| 364/41+10 | 18" CMP | Tp 4C Inlet | 61 | 3 | Yes | 6 | Yes |
| 364/45+75 | 24" CMP | Tp 4C Inlet | 62 | 10 | Yes | 19 | Yes |
| 364/51+00 | 18" CMP | Tp 4B Inlet | 63 | 10 | Yes | 18 | Yes |
| 365/00+28 | 36" CMP | Tp 4B Inlet | 64 | 26 | Yes | 48 | No |
| 365/03+43 | 18" CMP | Tp 4B Inlet | 65 | 10 | Yes | 20 | No |
| 365/06+86 | 18" CMP | Conc. Headwall | 66 | 9 | Yes | 17 | No |
| 365/10+48 | 18" CMP | Tp 4C Inlet | 67 | 12 | Yes | 22 | No |
| 365/14+00 | 18" CMP | Conc. Headwall | 68 | 11 | Yes | 21 | No |
| 365/17+25 | 18" CMP | Conc. Headwall | 69 | 7 | Yes | 13 | Yes |
| 365/19+01 | 18" CMP | Tp 4C Inlet | 70 | 9 | Yes | 16 | No |
| 365/22+49 | 18" CMP | Tp 4C Inlet | 71 | 7 | Yes | 13 | Yes |
| 365/25+00 | 18" CMP | Tp 4C Inlet | 72 | 8 | Yes | 16 | No |
| 365/28+46 | 24" CMP | Tp 4C Inlet | 73 | 5 | Yes | 9 | Yes |
| 365/32+93 | 18" CMP | 2 x 2 CB | 74 | 10 | Yes | 18 | No |
| 365/34+07 | 18" CMP | Conc. Headwall | 75 | 5 | Yes | 10 | Yes |
| 365/38+05 | 2 x 2 RCBC | Stone Headwall | 76 | 8 | Yes | 16 | Yes |
| 365/39+55 | 18" CMP | Tp 4C Inlet | 77 | 3 | Yes | 6 | Yes |

Pipe Culvert Analysis

Federal Highway Administration
Eastern Federal Lands Highway Division
Project PRA-BLRI 2P14

| Station | Pipe | Inlet Structure | Str. No. | Q10 (cfs) | Adequate Capacity for 10 Year Storm Event | Q50 (cfs) | Adequate Capacity for 50 Year Storm Event |
|-----------|------------|-----------------|----------|-----------|---|-----------|---|
| 365/43+10 | 18" CMP | Tp 4C Inlet | 78 | 5 | Yes | 10 | Yes |
| 365/48+47 | 24" CMP | Stone Headwall | 79 | 13 | Yes | 24 | No |
| 366/03+48 | 18" CMP | Tp 4B Inlet | 80 | 6 | Yes | 11 | Yes |
| 366/06+00 | 18" CMP | Tp 4C Inlet | 81 | 6 | Yes | 11 | Yes |
| 366/07+60 | 18" CMP | Conc. Headwall | 82 | 8 | Yes | 15 | No |
| 366/09+48 | 24" CMP | Stone Headwall | 83 | 12 | Yes | 22 | No |
| 366/13+84 | 18" CMP | Tp 4C Inlet | 84 | 7 | Yes | 14 | No |
| 366/17+00 | 18" CMP | Tp 4A Inlet | 85 | 7 | Yes | 14 | No |
| 366/20+00 | 30" CMP | Stone Headwall | 86 | 7 | Yes | 14 | Yes |
| 366/23+60 | 18" CMP | Tp 4B Inlet | 87 | 7 | Yes | 14 | Yes |
| 366/26+50 | 18" CMP | Tp 4B Inlet | 88 | 7 | Yes | 14 | No |
| 366/29+89 | 4 x 3 RCBC | Stone Headwall | 89 | 74 | Yes | 140 | Yes |
| 366/35+66 | 30" CMP | Stone Headwall | 90 | 43 | Yes | 82 | No |
| 366/39+98 | 18" CMP | Tp 4B Inlet | 91 | 7 | Yes | 13 | No |
| 366/42+00 | 18" CMP | Tp 4B Inlet | 92 | 6 | Yes | 12 | Yes |
| 366/46+19 | 30" CMP | Stone Headwall | 93 | 48 | Yes | 91 | No |
| 366/47+62 | 18" CMP | Stone Headwall | 94 | 9 | Yes | 18 | No |
| 366/51+64 | 24" CMP | Tp 4B Inlet | 95 | 31 | No | 58 | No |
| 366/53+48 | 30" CMP | Stone Headwall | 96 | 53 | Yes | 99 | No |
| 367/01+46 | 18" CMP | Stone Headwall | 97 | 6 | Yes | 11 | No |
| 367/04+51 | 30" CMP | Stone Headwall | 98 | 53 | Yes | 99 | No |
| 367/08+89 | 18" CMP | Tp 4C Inlet | 99 | 11 | Yes | 20 | No |
| 367/11+48 | 24" CMP | Stone Headwall | 100 | 19 | Yes | 35 | No |
| 367/15+20 | 18" CMP | Tp 4C Inlet | 101 | 11 | Yes | 20 | No |
| 367/18+40 | 18" CMP | Tp 4C Inlet | 102 | 11 | Yes | 20 | No |
| 367/22+40 | 18" CMP | Tp 4A Inlet | 103 | 11 | Yes | 20 | No |
| 367/24+30 | 18" CMP | Tp 4A Inlet | 104 | 11 | Yes | 20 | No |
| 367/27+36 | 18" CMP | Tp 4A Inlet | 105 | 11 | Yes | 20 | No |
| 367/29+13 | 24" CMP | Stone Headwall | 106 | 19 | Yes | 35 | No |
| 367/32+06 | 18" CMP | Stone Headwall | 107 | 11 | Yes | 22 | No |
| 367/36+40 | 18" CMP | Stone Headwall | 108 | 11 | Yes | 22 | No |
| 367/39+08 | 18" CMP | Stone Headwall | 109 | 11 | Yes | 20 | No |
| 367/41+13 | 36" CMP | Stone Headwall | 110 | 48 | Yes | 91 | No |
| 367/43+34 | 18" CMP | Tp 4A Inlet | 111 | 9 | Yes | 17 | No |
| 367/45+04 | 4 x 3 RCBC | Stone Headwall | 112 | 70 | Yes | 133 | Yes |
| 367/47+87 | 18" CMP | Tp 4A Inlet | 113 | 9 | Yes | 17 | No |
| 367/51+34 | 18" CMP | Stone Headwall | 114 | 9 | Yes | 17 | No |
| 368/01+87 | 18" CMP | Tp 4A Inlet | 115 | 9 | Yes | 17 | No |
| 368/06+58 | 18" CMP | Stone Headwall | 116 | 9 | Yes | 17 | No |
| 368/15+25 | 18" CMP | Stone Headwall | 117 | 7 | Yes | 13 | No |
| 368/19+31 | 24" CMP | Stone Headwall | 118 | 14 | Yes | 26 | Yes |
| 368/23+82 | 24" CMP | Stone Headwall | 119 | 14 | Yes | 26 | Yes |
| 368/28+40 | 24" CMP | Tp 4C Inlet | 120 | 12 | Yes | 23 | Yes |
| 368/32+35 | 24" CMP | Stone Headwall | 121 | 9 | Yes | 17 | Yes |
| 368/34+52 | 24" CMP | Stone Headwall | 122 | 7 | Yes | 13 | Yes |
| 368/37+89 | 18" CMP | Stone Headwall | 123 | 9 | No | 17 | No |
| 368/43+18 | 18" CMP | Stone Headwall | 124 | 9 | Yes | 17 | No |
| 368/47+48 | 4 x 3 RCBC | Stone Headwall | 125 | 58 | Yes | 110 | Yes |
| 369/03+77 | 24" CMP | Stone Headwall | 126 | 9 | Yes | 17 | Yes |
| 369/07+72 | 3 x 3 RCBC | Stone Headwall | 127 | 22 | Yes | 42 | Yes |
| 369/12+97 | 3 x 3 RCBC | Stone Headwall | 128 | 37 | Yes | 70 | Yes |
| 369/22+11 | 4 x 3 RCBC | Stone Headwall | 129 | 72 | Yes | 136 | Yes |
| 369/26+96 | 18" CMP | Stone Headwall | 130 | 8 | Yes | 15 | No |
| 369/33+49 | 18" CMP | Stone Headwall | 131 | 9 | Yes | 16 | No |
| 369/40+96 | 3 x 3 RCBC | Stone Headwall | 133 | 39 | Yes | 74 | Yes |
| 369/42+95 | 24" CMP | Stone Headwall | 134 | 12 | Yes | 23 | Yes |
| 369/52+83 | 18" CMP | Stone Headwall | 135 | 10 | Yes | 19 | No |
| 369/56+45 | 18" CMP | Stone Headwall | 136 | 8 | Yes | 15 | Yes |
| 370/05+52 | 18" CMP | Stone Headwall | 137 | 8 | Yes | 15 | No |
| 370/13+93 | 3 x 4 RCBC | Stone Headwall | 138 | 65 | Yes | 123 | Yes |
| 370/18+56 | 3 x 4 RCBC | Stone Headwall | 139 | 78 | Yes | 147 | Yes |
| 370/22+64 | 18" CMP | Stone Headwall | 140 | 8 | Yes | 15 | Yes |
| 370/28+60 | 24" CMP | Stone Headwall | 141 | 12 | Yes | 24 | Yes |
| 370/31+50 | 18" CMP | Tp 4B Inlet | 142 | 7 | Yes | 14 | Yes |
| 370/33+40 | 24" CMP | Stone Headwall | 143 | 12 | Yes | 24 | Yes |
| 370/40+80 | 24" CMP | Stone Headwall | 144 | 15 | Yes | 28 | Yes |
| 370/45+75 | 18" CMP | Stone Headwall | 145 | 15 | Yes | 29 | No |
| 370/49+56 | 30" CMP | Stone Headwall | 146 | 16 | Yes | 30 | No |
| 371/02+50 | 18" CMP | Tp 4A Inlet | 147 | 8 | Yes | 15 | Yes |
| 371/06+32 | 24" CMP | Tp 4A Inlet | 148 | 11 | Yes | 20 | Yes |
| 371/11+22 | 18" CMP | Stone Headwall | 149 | 8 | Yes | 15 | Yes |
| 371/14+07 | 18" CMP | Stone Headwall | 150 | 8 | Yes | 15 | No |
| 371/20+07 | 4 x 4 RCBC | Stone Headwall | 151 | 129 | Yes | 243 | Yes |
| 371/23+56 | 24" CMP | Stone Headwall | 152 | 7 | Yes | 14 | Yes |
| 371/26+25 | 30" CMP | Stone Headwall | 153 | 17 | Yes | 32 | Yes |
| 371/30+30 | 4 x 4 RCBC | Stone Headwall | 154 | 134 | Yes | 252 | Yes |
| 371/34+20 | 18" CMP | Tp 4A Inlet | 155 | 11 | Yes | 20 | No |
| 371/37+25 | 18" CMP | Conc. Headwall | 156 | 12 | Yes | 22 | No |
| 371/40+49 | 36" CMP | 3 X 3 CB | 157 | 47 | Yes | 88 | No |

Pipe Culvert Analysis

Federal Highway Administration
 Eastern Federal Lands Highway Division
 Project PRA-BLRI 2P14

| Station | Pipe | Inlet Structure | Str. No. | Q10 (cfs) | Adequate Capacity for 10 Year Storm Event | Q50 (cfs) | Adequate Capacity for 50 Year Storm Event |
|-----------|-----------------|-----------------|----------|-----------|---|-----------|---|
| 371/42+56 | 18" CMP | Stone Headwall | 158 | 6 | Yes | 11 | Yes |
| 371/43+92 | 30" CMP | Stone Headwall | 159 | 12 | Yes | 22 | Yes |
| 371/47+50 | 18" CMP | Conc. Headwall | 160 | 5 | Yes | 9 | Yes |
| 371/51+24 | 18" CMP | Stone Headwall | 161 | 5 | Yes | 9 | Yes |
| 372/00+75 | 24" CMP | 4.5 X 3 CB | 162 | 8 | Yes | 14 | Yes |
| 372/05+40 | 18" CMP | Conc. Headwall | 163 | 5 | Yes | 9 | Yes |
| 372/11+88 | 18" CMP | Tp 4A Inlet | 164 | 12 | Yes | 22 | No |
| 372/14+33 | 18" CMP | Tp 4B Inlet | 165 | 9 | Yes | 17 | Yes |
| 372/17+50 | 24" CMP | Stone Headwall | 166 | 13 | Yes | 25 | No |
| 372/19+50 | 24" CMP | Conc. Headwall | 167 | 25 | Yes | 48 | No |
| 372/23+70 | 18" CMP | Tp 4A Inlet | 168 | 26 | No | 50 | No |
| 372/26+54 | 18" CMP | Tp 4B Inlet | 169 | 8 | Yes | 15 | No |
| 372/29+45 | 18" CMP | Stone Headwall | 170 | 8 | Yes | 15 | No |
| 372/32+69 | 18" CMP | Tp 4B Inlet | 171 | 9 | Yes | 17 | No |
| 372/36+18 | 24" CMP | Stone Headwall | 172 | 10 | Yes | 19 | Yes |
| 372/39+52 | 24" CMP | Stone Headwall | 173 | 16 | Yes | 29 | No |
| 372/43+00 | 24" CMP | Tp 4A Inlet | 174 | 10 | Yes | 18 | Yes |
| 372/46+16 | 24" CMP | 3 X 3 CB | 175 | 21 | Yes | 39 | No |
| 372/49+45 | 24" CMP | Conc. Headwall | 176 | 11 | Yes | 21 | Yes |
| 373/00+26 | 18" CMP | Stone Headwall | 177 | 10 | Yes | 18 | No |
| 373/03+43 | 24" CMP | Tp 4A Inlet | 178 | 13 | Yes | 25 | No |
| 373/07+39 | 24" CMP | 3 X 3 CB | 179 | 9 | Yes | 17 | Yes |
| 373/17+84 | 18" CMP | Tp 4A Inlet | 180 | 24 | No | 45 | No |
| 373/21+05 | 30" CMP | 3 X 3 CB | 181 | 17 | Yes | 32 | Yes |
| 373/24+39 | 18" CMP | Tp 4A Inlet | 182 | 8 | Yes | 15 | No |
| 373/27+35 | 18" CMP | Stone Headwall | 183 | 6 | Yes | 12 | Yes |
| 373/30+35 | 18" CMP | Tp 4A Inlet | 184 | 6 | Yes | 12 | Yes |
| 373/34+67 | 18" CMP | Tp 4A Inlet | 185 | 8 | Yes | 15 | No |
| 373/36+17 | 24" CMP | Stone Headwall | 186 | 16 | Yes | 30 | No |
| 373/45+37 | 36" CMP | Stone Headwall | 187 | 46 | Yes | 86 | No |
| 373/50+00 | 24" CMP | Stone Headwall | 188 | 15 | Yes | 28 | No |
| 374/05+42 | 2 x 2 RCBC | Stone Headwall | 189 | 75 | Yes | 142 | Yes |
| 374/10+80 | 24" CMP | 3 X 3 CB | 190 | 15 | Yes | 29 | Yes |
| 374/12+79 | 24" CMP | 3 X 3 CB | 191 | 19 | Yes | 36 | No |
| 374/15+67 | 24" CMP | 3 X 3 CB | 192 | 20 | Yes | 37 | No |
| 374/19+20 | 18" CMP | Tp 4B Inlet | 193 | 13 | Yes | 25 | No |
| 374/31+19 | 5 x 5 Stone Box | | 194 | 346 | Yes | 623 | No |
| 374/36+94 | 3 x 3 RCBC | Stone Headwall | 195 | 59 | Yes | 111 | Yes |
| 374/43+83 | 24" CMP | 3 X 3 CB | 196 | 35 | No | 66 | No |
| 374/46+78 | 24" CMP | 3 X 3 CB | 197 | 24 | Yes | 46 | No |
| 374/48+12 | 24" CMP | 3 X 3 CB | 198 | 6 | Yes | 12 | Yes |
| 374/52+80 | 24" CMP | Stone Headwall | 199 | 12 | Yes | 24 | No |
| 374/55+23 | 18" CMP | Tp 4B Inlet | 200 | 6 | Yes | 11 | Yes |

Blue Ridge Parkway 10-Year Hydraulic Analysis

Project: Blue Ridge Parkway 10-Year Hydraulics Analysis By KC Date 12/8/2004
 Project No. CT052885 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 39+15.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 43+32.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 50+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 359 52+25.00
Description 24 in
Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 4.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 4.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 8.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 1.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.80 FT |

| |
|-------------------|
| RESULTS |
| Adequate Capacity |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 03+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 08+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | 1.10 |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 11+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 13+97.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 1.48 |
| Headwater | HW | 2.22 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 2.42 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 17+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 21+42.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 21.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 27.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.43 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 25+20.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 34+92.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 40+26.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 1.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 49+95.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 53+51.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 10+37.00
 Description 15 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 0.50 acre |
| Q ₅ | cfs |
| Q ₁₀ | 1.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 2.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 1.00 CFS |
| Flow per Barrel | Q/N | 1.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.63 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 15 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project:
Project No.

Blue Ridge Parkway Hydraulics Analysis
CT052885

By KC
Checked PBW

Date 12/8/2004
Date 3/6/2006

Location
Station
Description
Number of Barrels

Blue Ridge Parkway
361 24+43.00
24 in
1

| | |
|------------------|-----------|
| Drainage Area | 4.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 4.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 8.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 1.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.80 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 26+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 30+12.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 34.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 45.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 86.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 45.00 CFS |
| Flow per Barrel | Q/N | 45.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 4.75 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.25 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 37+51.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 39+35.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 1.40 |
| Headwater | HW | 3.50 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | 0.77 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 42+66.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 46+58.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 + |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 49+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 52+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 03+21.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 1.08 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 05+79.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 08+68.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 12+50.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 0.68 |
| Headwater | HW | 1.36 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.95 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 14+86.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 18+93.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| Headwater | HW/D | 1.03 |
| Roadway Overtopping | HW | 1.55 FT |
| | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 21+98.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 25+05.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 27+22.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 + |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|---------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No.: CT052885

By: KC Date: 12/8/2004
 Checked: PBW Date: 3/6/2006

Location: Blue Ridge Parkway
 Station: 362 30+33.00
 Description: 18 in
 Number of Barrels: 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| Headwater | HW/D | 1.50 |
| Roadway Overtopping | HW | 2.25 FT |
| | OT | 3.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|-------------------|
| RESULTS | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 33+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 34+78.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| Headwater | HW/D | 1.20 + |
| Roadway Overtopping | HW | 1.80 FT |
| | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 39+30.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 22.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 42+80.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 46+93.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 22.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 27.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 + |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 00+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 + |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 07+27.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 10+27.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 1.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 14+75.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.63 |
| Headwater | HW | 0.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 18+43.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 2.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 5.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.63 |
| Headwater | HW | 0.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 23+91.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 27+91.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.63 + |
| Headwater | HW | 0.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 32+58.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 43.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 25.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 48.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 25.00 CFS |
| Flow per Barrel | Q/N | 25.00 CFS |
| | HW/D | 1.87 |
| Headwater | HW | 3.74 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 35+89.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 49.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 28.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 53.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 53.00 CFS |
| Flow per Barrel | Q/N | 53.00 CFS |
| | HW/D | 2.15 |
| Headwater | HW | 4.30 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.77 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 41+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.47 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 44+08.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 28.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 17.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 33.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 47+57.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 51+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 09+85.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 12.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.00 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 13+88.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 15+45.00
 Description 4x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 113.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 58.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 109.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 58.00 CFS |
| Flow per Barrel | Q/N | 58.00 CFS |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.90 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | FT |
| Headwater | HW | 3.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 18+30.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 20+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 23+65.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 4.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 8.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.74 |
| Headwater | HW | 1.11 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.70 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 38+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 0.40 acre |
| Q ₅ | cfs |
| Q ₁₀ | 1.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 2.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 1.00 CFS |
| Flow per Barrel | Q/N | 1.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 41+10.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.62 |
| Headwater | HW | 0.93 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 45+75.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.70 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.15 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 51+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 00+28.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 34.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 26.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 48.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 26.00 CFS |
| Flow per Barrel | Q/N | 26.00 CFS |
| | HW/D | 0.83 |
| Headwater | HW | 2.49 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 2.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 36 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 03+43.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 + |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 06+86.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 10+48.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 14+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 17+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 19+01.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 22+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 + |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 25+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 28+46.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.56 |
| Headwater | HW | 1.12 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 32+93.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 34+07.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC
 Checked PBW
 Date 12/8/2004
 Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 38+05.00
 Description 2x2 RCBC
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| Headwater | HW | 1.76 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.00 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 39+55.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 3.00 CFS |
| Flow per Barrel | Q/N | 3.00 CFS |
| | HW/D | 0.63 |
| Headwater | HW | 0.95 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 43+10.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 0.80 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 48+47.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 03+48.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 06+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.60 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 07+60.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 11/23/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 09+48.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 13+84.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 17+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 20+00.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 0.50 + |
| Headwater | HW | 1.25 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 11/23/2004
 By KC Date 12/8/2004

Location Blue Ridge Parkway
 Station 366 23+60.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 + |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.00 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 26+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 + |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 29+89.00
 Description 4 x 3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 165.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 74.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 140.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 74.00 CFS |
| Flow per Barrel | Q/N | 74.00 CFS |
| Headwater | HW | 6.50 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 2.67 FT |

| | |
|----------------|----------|
| RESULTS | Adequate |
|----------------|----------|

| | | |
|---------------------|------|----------|
| Redesign | Size | |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | FT |

Note: Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 35+66.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 87.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 43.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 82.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 43.00 CFS |
| Flow per Barrel | Q/N | 43.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 2.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 39+98.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 + |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 42+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 + |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 46+19.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 86.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 48.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 48.00 CFS |
| Flow per Barrel | Q/N | 48.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 2.25 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 47+62.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 + |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 51+64.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 58.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 31.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 58.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 31.00 CFS |
| Flow per Barrel | Q/N | 31.00 CFS |
| | HW/D | 2.60 + |
| Headwater | HW | 5.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 2.25 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.91 |
| Headwater | HW | 2.73 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 53+48.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 107.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 53.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 53.00 CFS |
| Flow per Barrel | Q/N | 53.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 2.40 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 01+46.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 + |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 0.90 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 04+51.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 109.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 53.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 99.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 53.00 CFS |
| Flow per Barrel | Q/N | 53.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | 2.40 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 08+89.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 11+48.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 29.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 35.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 367 15+20.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.35 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 18+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|---------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 22+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.35 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 24+30.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 27+36.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 29+13.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 29.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 35.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 32+06.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 36+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 39+08.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 41+13.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 94.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 48.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 48.00 CFS |
| Flow per Barrel | Q/N | 48.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.25 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 36 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 43+34.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 45+04.00
 Description 4x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 153.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 70.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 133.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 70.00 CFS |
| Flow per Barrel | Q/N | 70.00 CFS |
| Headwater | HW | 1.35 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 2.10 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 47+87.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 51+34.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 01+87.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 06+58.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 15+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 19+31.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 26.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.27 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 23+82.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 26.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.27 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 28+40.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 32+35.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 0.80 |
| Headwater | HW | 1.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 34+52.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 0.68 |
| Headwater | HW | 1.36 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 0.95 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 37+89.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.31 |
| Headwater | HW | 1.97 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.60 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 24 in |
| | HW/D | 7.75 |
| Headwater | HW | 15.50 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.20 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 43+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 + |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC
 Checked PBW

Date 12/8/2004
 Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 47+48.00
 Description 4x3 RCBC
 Number of Barrels 1

| | | |
|------------------|--------|------|
| Drainage Area | 101.00 | acre |
| Q ₅ | | cfs |
| Q ₁₀ | 58.00 | cfs |
| Q ₂₅ | | cfs |
| Q ₅₀ | | cfs |
| Q ₁₀₀ | 110.00 | cfs |

| | | | |
|---------------------|---------------------|-------|-----|
| Total Flow | Q _{Design} | 58.00 | CFS |
| Flow per Barrel | Q/N | 58.00 | CFS |
| Headwater | HW | 4.00 | FT |
| Roadway Overtopping | OT | 25.00 | FT |
| | dc | 1.80 | FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 25.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 03+77.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 0.80 |
| Headwater | HW | 1.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 07+72.00
 Description 3x3 RCBC
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 37.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 22.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 42.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| Headwater | HW | 1.90 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.30 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC
 Checked PBW

Date 12/8/2004
 Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 12+97.00
 Description 3x3 RCBC
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 73.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 52.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 98.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 52.00 CFS |
| Flow per Barrel | Q/N | 52.00 CFS |
| Headwater | HW | 4.00 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 2.11 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | 3.50 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 22+11.00
 Description 4x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 120.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 72.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 136.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 72.00 CFS |
| Flow per Barrel | Q/N | 72.00 CFS |
| Headwater | HW | 4.20 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 2.30 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 26+96.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 + |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 33+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 + |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 42+95.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.99 |
| Headwater | HW | 1.98 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 52+83.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 56+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 05+52.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 + |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB
 Checked PBW

Date 3/6/2006
 Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 13+93.00
 Description 4x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 125.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 65.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 123.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 65.00 CFS |
| Flow per Barrel | Q/N | 65.00 CFS |
| Headwater | HW | 3.70 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 2.00 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 370 18+56.00
Description 4x4 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 190.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 130.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 245.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 245.00 CFS |
| Flow per Barrel | Q/N | 245.00 CFS |
| Headwater | HW | 20.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.89 FT |

| |
|-----------------------------|
| RESULTS |
| Redesign 4x6 RCBC needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 4x6 RCBC |
| Headwater | HW | 3.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.74 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 22+64.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 370 28+60.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 31+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 1.03 |
| Headwater | HW | 1.55 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 33+40.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 40+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 1.10 + |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 45+75.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 22.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.49 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 49+56.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 25.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 16.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 30.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 0.79 + |
| Headwater | HW | 1.98 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 02+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 12.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 06+32.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 0.90 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 11+22.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.10 FT |

| | |
|---------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 14+07.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 20+07.00
 Description 4x4 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 297.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 129.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 243.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 129.00 CFS |
| Flow per Barrel | Q/N | 129.00 CFS |
| Headwater | HW | 6.20 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 3.30 FT |

| | |
|----------------|-------------------------------|
| RESULTS | Adequate Capacity 0 needed |
|----------------|-------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 23+56.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 7.00 CFS |
| Flow per Barrel | Q/N | 7.00 CFS |
| | HW/D | 0.68 + |
| Headwater | HW | 1.36 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.95 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 26+25.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 26.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 17.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 32.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 2.13 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By CTB Date 6/6/2006
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 371 30+30.00
Description 4x4 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 258.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 134.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 252.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 134.00 CFS |
| Flow per Barrel | Q/N | 134.00 CFS |
| Headwater | HW | 6.40 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.30 FT |

| |
|-------------------------------|
| RESULTS |
| Adequate Capacity 0 needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 34+20.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 37+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 + |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 40+49.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 84.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 47.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 88.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 47.00 CFS |
| Flow per Barrel | Q/N | 47.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.25 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 36 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 42+56.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 43+92.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.68 |
| Headwater | HW | 1.69 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.59 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 47+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 51+24.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 + |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 00+75.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 0.73 + |
| Headwater | HW | 1.45 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 05+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 11+88.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|---------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 14+33.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 17+50.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 25.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 7/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 19+50.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 42.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 25.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 48.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 25.00 CFS |
| Flow per Barrel | Q/N | 25.00 CFS |
| | HW/D | 1.87 + |
| Headwater | HW | 3.74 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

| |
|--------------------------------------|
| RESULTS |
| Adequate Capacity 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 23+70.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 45.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 26.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 50.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 26.00 CFS |
| Flow per Barrel | Q/N | 26.00 CFS |
| | HW/D | 5.50 |
| Headwater | HW | 8.25 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.50 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 26+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 29+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 32+69.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 36+18.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.70 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.15 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 39+52.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 24.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 16.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis By KC Date 12/8/2004
 Project No. CT052885 PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 43+00.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.70 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.15 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 46+16.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 26.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 21.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 39.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 21.00 CFS |
| Flow per Barrel | Q/N | 21.00 CFS |
| | HW/D | 1.50 + |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | 1.67 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 49+45.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 0.90 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 00+26.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.30 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 03+43.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 25.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 07+39.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 0.80 |
| Headwater | HW | 1.60 FT |
| Roadway Overtopping | OT | 22.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 22.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 17+84.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 31.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 24.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 45.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 5.00 |
| Headwater | HW | 7.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.75 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.77 |
| Headwater | HW | 2.31 FT |
| Roadway Overtopping | OT | 5.50 FT |
| | dc | 1.51 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 21+05.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 26.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 17.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 32.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 0.83 |
| Headwater | HW | 2.08 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | 1.45 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 24+39.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 27+35.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 30+35.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 34+67.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 36+17.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 24.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 16.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 30.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.90 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 45+37.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 66.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 46.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 86.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 46.00 CFS |
| Flow per Barrel | Q/N | 46.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.25 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 50+00.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.40 FT |

| | |
|---------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 05+42.00
 Description 2' x 2' RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 140.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 82.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 155.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 82.00 CFS |
| Flow per Barrel | Q/N | 82.00 CFS |
| Headwater | HW | 5.00 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 2.03 FT |

| | |
|---------|------------------|
| RESULTS | |
| | Redesign |
| | 5x10 RCBC needed |

| | | |
|---------------------|------|-----------|
| Redesign | Size | 5x10 RCBC |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.28 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 10+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | 1.40 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 12+79.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 30.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 36.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 15+67.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 31.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 20.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 37.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.60 FT |

| |
|--------------------------------------|
| RESULTS |
| Adequate Capacity 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 19+20.00
 Description 18 in
 Number of Barrels 1

| | | |
|------------------|-------|------|
| Drainage Area | 20.00 | acre |
| Q ₅ | | cfs |
| Q ₁₀ | 13.00 | cfs |
| Q ₂₅ | | cfs |
| Q ₅₀ | 25.00 | cfs |
| Q ₁₀₀ | | cfs |

| | | | |
|---------------------|---------------------|-------|-----|
| Total Flow | Q _{Design} | 13.00 | CFS |
| Flow per Barrel | Q/N | 13.00 | CFS |
| | HW/D | 2.10 | |
| Headwater | HW | 3.15 | FT |
| Roadway Overtopping | OT | 3.50 | FT |
| | dc | 1.40 | FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | | |
|---------------------|------|------|----|
| Redesign | Size | in | |
| | HW/D | | |
| Headwater | HW | 0.00 | FT |
| Roadway Overtopping | OT | 3.50 | FT |
| | dc | | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 374 31+19.00
Description 5x5 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 675.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 346.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 623.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 623.00 CFS |
| Flow per Barrel | Q/N | 623.00 CFS |
| Headwater | HW | 20.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 7.86 FT |

RESULTS

Adequate Capacity
5x10 RCBC needed

| | | |
|---------------------|------|-----------|
| Redesign | Size | 5x10 RCBC |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.95 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 36+94.00
 Description 3x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 112.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 78.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 148.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 148.00 CFS |
| Flow per Barrel | Q/N | 148.00 CFS |
| Headwater | HW | 20.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.24 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 3x6 RCBC needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 3x6 RCBC |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.67 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 43+83.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 57.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 36.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 68.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 36.00 CFS |
| Flow per Barrel | Q/N | 36.00 CFS |
| | HW/D | 3.00 + |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 2.00 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.02 |
| Headwater | HW | 3.06 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 46+78.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 42.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 24.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 46.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 48+12.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.62 |
| Headwater | HW | 1.24 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.80 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 52+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 55+23.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Blue Ridge Parkway 50-Year Hydraulic Analysis

Project: Blue Ridge Parkway 50-Year Hydraulics Analysis By KC Date 12/8/2004
 Project No. CT052885 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 39+15.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 21.00 CFS |
| Flow per Barrel | Q/N | 21.00 CFS |
| | HW/D | 4.00 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.70 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.50 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 43+32.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.74 |
| Headwater | HW | 1.11 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 0.70 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 50+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 359 52+25.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 4.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 4.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 8.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 0.73 |
| Headwater | HW | 1.45 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 03+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 23.00 CFS |
| Flow per Barrel | Q/N | 23.00 CFS |
| | HW/D | 1.67 |
| Headwater | HW | 3.34 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 08+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 11+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 13+97.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 29.00 CFS |
| Flow per Barrel | Q/N | 29.00 CFS |
| | HW/D | 6.80 |
| Headwater | HW | 10.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.87 |
| Headwater | HW | 2.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 17+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 2.70 |
| Headwater | HW | 4.05 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.49 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 21+42.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 21.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 27.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 27.00 CFS |
| Flow per Barrel | Q/N | 27.00 CFS |
| | HW/D | 6.00 |
| Headwater | HW | 9.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.80 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.85 |
| Headwater | HW | 2.54 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 25+20.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 34+92.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.74 |
| Headwater | HW | 1.11 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 0.70 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 40+26.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 1.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 49+95.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.74 |
| Headwater | HW | 1.11 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 0.70 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 360 53+51.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 1.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 2.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 4.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 4.00 CFS |
| Flow per Barrel | Q/N | 4.00 CFS |
| | HW/D | 0.74 |
| Headwater | HW | 1.11 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 0.70 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 10+37.00
 Description 15 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 0.50 acre |
| Q ₅ | cfs |
| Q ₁₀ | 1.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 2.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.63 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 0.60 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 15 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 24+43.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 4.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 4.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 8.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 0.73 |
| Headwater | HW | 1.45 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 26+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 30+12.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 34.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 45.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 86.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 86.00 CFS |
| Flow per Barrel | Q/N | 86.00 CFS |
| | HW/D | 5.25 |
| Headwater | HW | 13.13 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.20 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 1.58 |
| Headwater | HW | 5.53 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 37+51.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 39+35.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 29.00 CFS |
| Flow per Barrel | Q/N | 29.00 CFS |
| | HW/D | 0.77 - |
| Headwater | HW | 1.93 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | 1.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 42+66.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 46+58.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 + |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 49+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 361 52+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 362 03+21.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 05+79.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 08+68.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 12+50.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.27 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 14+86.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 21.00 CFS |
| Flow per Barrel | Q/N | 21.00 CFS |
| | HW/D | 4.00 + |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.70 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.50 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 18+93.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 21+98.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 2.70 |
| Headwater | HW | 4.05 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.49 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 25+05.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 27+22.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 30+33.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 3.25 |
| Headwater | HW | 4.88 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.62 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.52 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 33+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 34+78.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 362 39+30.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 22.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 28.00 CFS |
| Flow per Barrel | Q/N | 28.00 CFS |
| | HW/D | 2.15 |
| Headwater | HW | 4.30 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.77 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 036 42+80.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 362 46+93.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 22.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 27.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 27.00 CFS |
| Flow per Barrel | Q/N | 27.00 CFS |
| | HW/D | 6.00 + |
| Headwater | HW | 9.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.80 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 2.00 |
| Headwater | HW | 4.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.76 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 00+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 + |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 07+27.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 3.25 |
| Headwater | HW | 4.88 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.62 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 10+27.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.62 |
| Headwater | HW | 1.24 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 14+75.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 18+43.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 2.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 5.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 5.00 CFS |
| Flow per Barrel | Q/N | 5.00 CFS |
| | HW/D | 0.85 |
| Headwater | HW | 1.28 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.80 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 23+91.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 27+91.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 + |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.90 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 32+58.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 43.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 25.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 48.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 48.00 CFS |
| Flow per Barrel | Q/N | 48.00 CFS |
| | HW/D | 5.00 |
| Headwater | HW | 10.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.30 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 35+89.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 49.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 28.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 53.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 53.00 CFS |
| Flow per Barrel | Q/N | 53.00 CFS |
| | HW/D | 5.75 |
| Headwater | HW | 11.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.40 |
| Headwater | HW | 4.20 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.27 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 41+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 28.00 CFS |
| Flow per Barrel | Q/N | 28.00 CFS |
| | HW/D | 6.00 |
| Headwater | HW | 9.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.85 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.86 |
| Headwater | HW | 2.58 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 363 44+08.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 28.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 17.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 33.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 33.00 CFS |
| Flow per Barrel | Q/N | 33.00 CFS |
| | HW/D | 2.65 |
| Headwater | HW | 5.30 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.98 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.90 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 47+57.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 28.00 CFS |
| Flow per Barrel | Q/N | 28.00 CFS |
| | HW/D | 6.00 + |
| Headwater | HW | 9.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.85 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.86 |
| Headwater | HW | 2.58 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 363 51+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 28.00 CFS |
| Flow per Barrel | Q/N | 28.00 CFS |
| | HW/D | 6.00 + |
| Headwater | HW | 9.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.85 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.86 |
| Headwater | HW | 2.58 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 09+85.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 12.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 13+88.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By CTB Date 3/6/2006
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 364 15+45.00
Description 4 x 3 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 113.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 58.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 109.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 109.00 CFS |
| Flow per Barrel | Q/N | 109.00 CFS |
| Headwater | HW | 7.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.00 FT |

| | |
|---------|-----------------------------|
| RESULTS | Redesign 4X4 RCBC needed |
|---------|-----------------------------|

| | | |
|---------------------|------|------------|
| Redesign | Size | 4 x 4 RCBC |
| Headwater | HW | 5.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.00 FT |

Note: Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 18+30.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 20+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.30 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 23+65.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 4.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 8.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 8.00 CFS |
| Flow per Barrel | Q/N | 8.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 1.80 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.10 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 38+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 0.40 acre |
| Q ₅ | cfs |
| Q ₁₀ | 1.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 2.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 2.00 CFS |
| Flow per Barrel | Q/N | 2.00 CFS |
| | HW/D | 0.50 |
| Headwater | HW | 0.75 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 0.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 41+10.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.95 |
| Headwater | HW | 1.43 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 45+75.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 364 51+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 00+28.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 34.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 26.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 48.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 48.00 CFS |
| Flow per Barrel | Q/N | 48.00 CFS |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 2.25 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 0.77 |
| Headwater | HW | 3.08 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 2.10 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 03+43.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 + |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 06+86.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 365 10+48.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.73 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 0.97 |
| Headwater | HW | 2.43 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.57 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 14+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 21.00 CFS |
| Flow per Barrel | Q/N | 21.00 CFS |
| | HW/D | 4.00 + |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.70 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.50 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 17+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 19+01.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 2.70 |
| Headwater | HW | 4.05 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.49 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 22+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 + |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 25+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 2.70 |
| Headwater | HW | 4.05 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.49 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 28+46.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 0.80 |
| Headwater | HW | 1.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.00 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 32+93.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 3.25 |
| Headwater | HW | 4.88 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.62 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.52 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 34+07.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 1.30 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By CTB Date 3/6/2006
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 365 38+05.00
Description 2 x 2 RCBC
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.30 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 39+55.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 3.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 3.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 6.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 6.00 CFS |
| Flow per Barrel | Q/N | 6.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.46 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 0.90 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 43+10.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 6.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 10.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 10.00 CFS |
| Flow per Barrel | Q/N | 10.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 2.25 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 365 48+47.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.75 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.80 |
| Headwater | HW | 2.40 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 03+48.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 06+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| Headwater | HW/D | 1.65 |
| Roadway Overtopping | HW | 2.48 FT |
| | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 07+60.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 11/23/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 09+48.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 1.60 |
| Headwater | HW | 3.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.70 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.90 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 13+84.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 366 17+00.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 20+00.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.83 + |
| Headwater | HW | 2.08 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 11/23/2004
 By KC Date 12/8/2004

Location Blue Ridge Parkway
 Station 366 23+60.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 + |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 26+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 + |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 366 29+89.00
Description 4 x 3 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 165.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 74.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 140.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 140.00 CFS |
| Flow per Barrel | Q/N | 140.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 4.08 FT |

| | |
|---------|----------|
| RESULTS | Adequate |
|---------|----------|

| | | |
|---------------------|------|----------------|
| Redesign | Size | 3.5 x 3.5 RCBC |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.68 FT |

Note: Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 35+66.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 87.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 43.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 82.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 82.00 CFS |
| Flow per Barrel | Q/N | 82.00 CFS |
| | HW/D | 4.90 |
| Headwater | HW | 12.25 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 2.90 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 36 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 36 in |
| | HW/D | 2.41 |
| Headwater | HW | 7.23 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 2.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 39+98.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 + |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 42+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 + |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.20 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 46+19.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 86.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 48.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 91.00 CFS |
| Flow per Barrel | Q/N | 91.00 CFS |
| | HW/D | 5.90 |
| Headwater | HW | 14.75 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 42 in |
| | HW/D | 1.68 |
| Headwater | HW | 5.88 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 2.95 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 366 47+62.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 3.25 + |
| Headwater | HW | 4.88 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.62 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.52 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 366 51+64.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 58.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 31.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 58.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 58.00 CFS |
| Flow per Barrel | Q/N | 58.00 CFS |
| | HW/D | 6.00 + |
| Headwater | HW | 12.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 2.50 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 54 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 54 in |
| | HW/D | 0.73 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 2.35 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 53+48.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 107.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 53.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 91.00 CFS |
| Flow per Barrel | Q/N | 91.00 CFS |
| | HW/D | 5.90 |
| Headwater | HW | 14.75 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 1.20 |
| Headwater | HW | 4.80 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 2.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 01+46.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.40 + |
| Headwater | HW | 2.10 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 04+51.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 109.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 53.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 99.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 99.00 CFS |
| Flow per Barrel | Q/N | 99.00 CFS |
| | HW/D | 7.00 |
| Headwater | HW | 17.50 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | 3.20 FT |

| | |
|---------------------|--------------|
| RESULTS | |
| | Redesign |
| Inadequate Redesign | " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 08+89.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 + |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 11+48.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 29.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 35.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 35.00 CFS |
| Flow per Barrel | Q/N | 35.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.00 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 0.76 |
| Headwater | HW | 2.66 FT |
| Roadway Overtopping | OT | 6.50 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 15+20.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 18+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 22+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 24+30.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 27+36.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 5.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 29+13.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 29.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 35.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 35.00 CFS |
| Flow per Barrel | Q/N | 35.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.00 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 0.76 |
| Headwater | HW | 2.66 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 32+06.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 + |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.73 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.60 |
| Headwater | HW | 3.20 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 36+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 + |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.73 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.60 |
| Headwater | HW | 3.20 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 39+08.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.67 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 41+13.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 94.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 48.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 91.00 CFS |
| Flow per Barrel | Q/N | 91.00 CFS |
| | HW/D | 2.72 |
| Headwater | HW | 8.16 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.00 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 1.20 |
| Headwater | HW | 4.80 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 43+34.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.50 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 3/6/2006
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 45+04.00
 Description 4 x 3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 153.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 70.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 133.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 133.00 CFS |
| Flow per Barrel | Q/N | 133.00 CFS |
| Headwater | HW | 11.40 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.25 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | 4x4 RCBC |
| Headwater | HW | 6.60 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.25 FT |

Note: Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 47+87.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 51+34.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 01+87.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.50 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 06+58.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.50 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 368 15+25.00
Description 18 in
Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 19+31.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 26.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 26.00 CFS |
| Flow per Barrel | Q/N | 26.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 23+82.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 26.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 26.00 CFS |
| Flow per Barrel | Q/N | 26.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 28+40.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 23.00 CFS |
| Flow per Barrel | Q/N | 23.00 CFS |
| | HW/D | 1.67 |
| Headwater | HW | 3.34 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 32+35.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 34+52.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.25 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 37+89.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.51 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 24 in |
| | HW/D | 1.12 |
| Headwater | HW | 2.24 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 43+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 + |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 03+77.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 3/6/2006
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 07+72.00
 Description 3 x 3 RCBC
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 37.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 22.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 42.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 42.00 CFS |
| Flow per Barrel | Q/N | 42.00 CFS |
| Headwater | HW | 3.24 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.80 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | FT |

Note: Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 12+97.00
 Description 3x3 RCBC
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 73.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 52.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 98.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 98.00 CFS |
| Flow per Barrel | Q/N | 98.00 CFS |
| Headwater | HW | 12.00 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.22 FT |

| | |
|---------|-----------------------------|
| RESULTS | Redesign 4X3 RCBC needed |
|---------|-----------------------------|

| | | | |
|---------------------|------|----------|----------|
| Redesign | Size | 4x3 RCBC | FT |
| Headwater | HW | | 6.54 FT |
| Roadway Overtopping | OT | | 15.00 FT |
| | dc | | 2.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 3/6/2006
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 22+11.00
 Description 4 x 3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 120.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 72.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 136.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 136.00 CFS |
| Flow per Barrel | Q/N | 136.00 CFS |
| Headwater | HW | 11.40 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 3.30 FT |

| | |
|---------|-----------------------------|
| RESULTS | Redesign 4X4 RCBC needed |
|---------|-----------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | 4X4 RCBC |
| Headwater | HW | 6.44 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 3.30 FT |

Note: Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 26+96.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 33+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 2.70 + |
| Headwater | HW | 4.05 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.49 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 42+95.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 23.00 CFS |
| Flow per Barrel | Q/N | 23.00 CFS |
| | HW/D | 1.67 |
| Headwater | HW | 3.34 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 52+83.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 3.50 |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.64 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 56+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 05+52.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 13+93.00
 Description 4x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 125.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 65.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 123.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 123.00 CFS |
| Flow per Barrel | Q/N | 123.00 CFS |
| Headwater | HW | 9.60 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-------------------|
| RESULTS | Adequate Capacity |
|----------------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 18+56.00
 Description 4x4 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 190.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 130.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 245.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 245.00 CFS |
| Flow per Barrel | Q/N | 245.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.89 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 4x6 RCBC needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 4x6 RCBC |
| Headwater | HW | 3.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.74 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 22+64.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| Headwater | HW/D | 2.40 |
| Roadway Overtopping | HW | 3.60 FT |
| | OT | 5.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.29 |
| Headwater | HW | 2.58 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 28+60.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 31+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 33+40.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.75 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 17+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 20+00.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.83 + |
| Headwater | HW | 2.08 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.30 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis By CTB Date 11/23/2004
 Project No. CT052885 By KC Date 12/8/2004

Location Blue Ridge Parkway
 Station 366 23+60.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 + |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|-------------------|
| RESULTS | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 26+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 + |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.43 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 0.98 |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.27 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 366 29+89.00
Description 4 x 3 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 165.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 74.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 140.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 140.00 CFS |
| Flow per Barrel | Q/N | 140.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 4.08 FT |

| | |
|---------|----------|
| RESULTS | Adequate |
|---------|----------|

| | | |
|---------------------|------|----------------|
| Redesign | Size | 3.5 x 3.5 RCBC |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.68 FT |

Note: Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 35+66.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 87.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 43.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 82.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 82.00 CFS |
| Flow per Barrel | Q/N | 82.00 CFS |
| | HW/D | 4.90 |
| Headwater | HW | 12.25 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 2.90 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 36 in |
| | HW/D | 2.41 |
| Headwater | HW | 7.23 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 2.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 39+98.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 + |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 42+00.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 + |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.20 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 46+19.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 86.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 48.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 91.00 CFS |
| Flow per Barrel | Q/N | 91.00 CFS |
| | HW/D | 5.90 |
| Headwater | HW | 14.75 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 42 in |
| | HW/D | 1.68 |
| Headwater | HW | 5.88 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 2.95 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 366 47+62.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 3.25 + |
| Headwater | HW | 4.88 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.62 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.52 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 51+64.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 58.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 31.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 58.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 58.00 CFS |
| Flow per Barrel | Q/N | 58.00 CFS |
| Headwater | HW/D | 6.00 + |
| Roadway Overtopping | HW | 12.00 FT |
| | OT | 3.00 FT |
| | dc | 2.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 54 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 54 in |
| | HW/D | 0.73 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 2.35 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 366 53+48.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 107.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 53.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 91.00 CFS |
| Flow per Barrel | Q/N | 91.00 CFS |
| | HW/D | 5.90 |
| Headwater | HW | 14.75 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 1.20 |
| Headwater | HW | 4.80 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 2.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 01+46.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.40 + |
| Headwater | HW | 2.10 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-------------------|
| RESULTS | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 04+51.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 109.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 53.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 99.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 99.00 CFS |
| Flow per Barrel | Q/N | 99.00 CFS |
| | HW/D | 7.00 |
| Headwater | HW | 17.50 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | 3.20 FT |

| | |
|---------------------|--------------|
| RESULTS | |
| | Redesign |
| Inadequate Redesign | " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 08+89.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 + |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 11+48.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 29.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 35.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 35.00 CFS |
| Flow per Barrel | Q/N | 35.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.00 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 0.76 |
| Headwater | HW | 2.66 FT |
| Roadway Overtopping | OT | 6.50 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 15+20.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 367 18+40.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| Headwater | HW/D | 3.75 |
| Roadway Overtopping | HW | 5.63 FT |
| | OT | 3.00 FT |
| | dc | 1.67 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 22+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 24+30.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 27+36.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 5.50 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 367 29+13.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 29.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 35.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 35.00 CFS |
| Flow per Barrel | Q/N | 35.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 6.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.00 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 0.76 |
| Headwater | HW | 2.66 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 367 32+06.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 + |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.73 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.60 |
| Headwater | HW | 3.20 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 36+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 + |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.73 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.60 |
| Headwater | HW | 3.20 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 39+08.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.67 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 41+13.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 94.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 48.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 91.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 91.00 CFS |
| Flow per Barrel | Q/N | 91.00 CFS |
| | HW/D | 2.72 |
| Headwater | HW | 8.16 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 1.20 |
| Headwater | HW | 4.80 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 43+34.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.50 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By CTB Date 3/6/2006
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 367 45+04.00
Description 4 x 3 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 153.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 70.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 133.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 133.00 CFS |
| Flow per Barrel | Q/N | 133.00 CFS |
| Headwater | HW | 11.40 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.25 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | 4x4 RCBC |
| Headwater | HW | 6.60 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.25 FT |

Note: Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 47+87.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 367 51+34.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 01+87.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 368 06+58.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.50 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 15+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 2.10 |
| Headwater | HW | 3.15 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 19+31.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 26.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 26.00 CFS |
| Flow per Barrel | Q/N | 26.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 23+82.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 14.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 26.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 26.00 CFS |
| Flow per Barrel | Q/N | 26.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 1.75 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 28+40.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 23.00 CFS |
| Flow per Barrel | Q/N | 23.00 CFS |
| | HW/D | 1.67 |
| Headwater | HW | 3.34 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 32+35.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 34+52.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 9.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 13.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 13.00 CFS |
| Flow per Barrel | Q/N | 13.00 CFS |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.25 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 37+89.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.51 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 24 in |
| | HW/D | 1.12 |
| Headwater | HW | 2.24 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 368 43+18.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 + |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.00 |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 03+77.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 3/6/2006
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 07+72.00
 Description 3 x 3 RCBC
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 37.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 22.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 42.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 42.00 CFS |
| Flow per Barrel | Q/N | 42.00 CFS |
| Headwater | HW | 3.24 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 1.80 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
|---------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | FT |

Note: Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 369 12+97.00
Description 3x3 RCBC
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 73.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 52.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 98.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 98.00 CFS |
| Flow per Barrel | Q/N | 98.00 CFS |
| Headwater | HW | 12.00 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.22 FT |

| | |
|---------|-----------------------------|
| RESULTS | Redesign 4X3 RCBC needed |
|---------|-----------------------------|

| | | | |
|---------------------|------|----------|----------|
| Redesign | Size | 4x3 RCBC | FT |
| Headwater | HW | | 6.54 FT |
| Roadway Overtopping | OT | | 15.00 FT |
| | dc | | 2.70 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 3/6/2006
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 22+11.00
 Description 4 x 3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 120.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 72.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 136.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 136.00 CFS |
| Flow per Barrel | Q/N | 136.00 CFS |
| Headwater | HW | 11.40 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 3.30 FT |

| | |
|----------------|-----------------------------|
| RESULTS | |
| | Redesign 4X4 RCBC needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 4X4 RCBC |
| Headwater | HW | 6.44 FT |
| Roadway Overtopping | OT | 9.00 FT |
| | dc | 3.30 FT |

Note: Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 26+96.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 33+49.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 16.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 16.00 CFS |
| Flow per Barrel | Q/N | 16.00 CFS |
| | HW/D | 2.70 + |
| Headwater | HW | 4.05 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.49 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.15 |
| Headwater | HW | 2.30 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.90 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 42+95.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 23.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 23.00 CFS |
| Flow per Barrel | Q/N | 23.00 CFS |
| | HW/D | 1.67 |
| Headwater | HW | 3.34 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 52+83.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 3.50 |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.64 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 369 56+45.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 18 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 05+52.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 + |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 13+93.00
 Description 4x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 125.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 65.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 123.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 123.00 CFS |
| Flow per Barrel | Q/N | 123.00 CFS |
| Headwater | HW | 9.60 FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 3.00 FT |

| | |
|----------------|-------------------|
| RESULTS | Adequate Capacity |
|----------------|-------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | FT |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 18+56.00
 Description 4x4 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 190.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 130.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 245.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 245.00 CFS |
| Flow per Barrel | Q/N | 245.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.89 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 4x6 RCBC needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 4x6 RCBC |
| Headwater | HW | 3.50 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 3.74 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 370 22+64.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.47 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.29 |
| Headwater | HW | 2.58 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 28+60.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 31+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 2.25 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.43 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 33+40.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 18.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.75 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 40+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 28.00 CFS |
| Flow per Barrel | Q/N | 28.00 CFS |
| | HW/D | 2.15 + |
| Headwater | HW | 4.30 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.77 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 45+75.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 22.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 29.00 CFS |
| Flow per Barrel | Q/N | 29.00 CFS |
| | HW/D | 7.00 + |
| Headwater | HW | 10.50 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.90 FT |

| |
|-----------------------------|
| RESULTS |
| Redesign 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.59 |
| Headwater | HW | 3.98 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.10 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 370 49+56.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 25.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 16.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 30.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 30.00 CFS |
| Flow per Barrel | Q/N | 30.00 CFS |
| | HW/D | 0.88 + |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.90 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 02+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 12.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 06+32.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 11+22.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 371 14+07.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC
 Checked PBW

Date 12/8/2004
 Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 20+07.00
 Description 4x4 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 297.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 129.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 243.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 243.00 CFS |
| Flow per Barrel | Q/N | 243.00 CFS |
| Headwater | HW | 18.00 FT |
| Roadway Overtopping | OT | 20.00 FT |
| | dc | 4.75 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 5x4 RCBC needed |

| | | | |
|---------------------|------|----------|----------|
| Redesign | Size | 5x4 RCBC | FT |
| Headwater | HW | | 11.20 FT |
| Roadway Overtopping | OT | | 20.00 FT |
| | dc | | 4.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 23+56.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 7.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.98 + |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.27 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 26+25.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 26.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 17.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 32.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 32.00 CFS |
| Flow per Barrel | Q/N | 32.00 CFS |
| | HW/D | 1.39 |
| Headwater | HW | 3.48 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.90 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By ctb Date 3/6/2006
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 371 30+30.00
Description 4x4 RCBC
Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 258.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 134.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 252.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 252.00 CFS |
| Flow per Barrel | Q/N | 252.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 15.00 FT |
| | dc | 4.75 FT |

| | |
|---------|-----------------------------|
| RESULTS | Redesign 5x4 RCBC needed |
|---------|-----------------------------|

| | | | |
|---------------------|------|----------|----------|
| Redesign | Size | 5x4 RCBC | FT |
| Headwater | HW | | 6.72 FT |
| Roadway Overtopping | OT | | 15.00 FT |
| | dc | | 4.30 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 371 34+20.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 16.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 20.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 20.00 CFS |
| Flow per Barrel | Q/N | 20.00 CFS |
| | HW/D | 3.75 + |
| Headwater | HW | 5.63 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.67 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.40 |
| Headwater | HW | 2.80 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 37+25.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 + |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.73 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.60 |
| Headwater | HW | 3.20 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 40+49.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 84.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 47.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 88.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 88.00 CFS |
| Flow per Barrel | Q/N | 88.00 CFS |
| | HW/D | 2.60 |
| Headwater | HW | 7.80 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.98 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 1.17 |
| Headwater | HW | 4.68 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.80 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 42+56.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.35 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 43+92.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 2.43 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.57 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 30 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 47+50.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 371 51+24.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 + |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 8.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 00+75.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 14.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 14.00 CFS |
| Flow per Barrel | Q/N | 14.00 CFS |
| | HW/D | 0.98 + |
| Headwater | HW | 1.96 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.27 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 05+40.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 5.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 5.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 9.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|----------|
| Total Flow | Q _{Design} | 9.00 CFS |
| Flow per Barrel | Q/N | 9.00 CFS |
| | HW/D | 1.30 |
| Headwater | HW | 1.95 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.20 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 11+88.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 22.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 22.00 CFS |
| Flow per Barrel | Q/N | 22.00 CFS |
| | HW/D | 4.50 |
| Headwater | HW | 6.75 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.73 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 0.97 |
| Headwater | HW | 2.43 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.57 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 14+33.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 1.50 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 17+50.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 25.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 25.00 CFS |
| Flow per Barrel | Q/N | 25.00 CFS |
| | HW/D | 1.87 |
| Headwater | HW | 3.74 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.08 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 7/7/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 19+50.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 42.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 25.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 48.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 48.00 CFS |
| Flow per Barrel | Q/N | 48.00 CFS |
| | HW/D | 5.00 + |
| Headwater | HW | 10.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.30 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 0.96 |
| Headwater | HW | 3.36 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.20 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 23+70.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 45.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 26.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 50.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 50.00 CFS |
| Flow per Barrel | Q/N | 50.00 CFS |
| | HW/D | 10.00 |
| Headwater | HW | 15.00 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.30 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 42 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 42 in |
| | HW/D | 0.98 |
| Headwater | HW | 3.41 FT |
| Roadway Overtopping | OT | 7.00 FT |
| | dc | 2.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 26+54.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 372 29+45.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 32+69.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 3.00 |
| Headwater | HW | 4.50 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 36+18.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 19.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 19.00 CFS |
| Flow per Barrel | Q/N | 19.00 CFS |
| | HW/D | 1.35 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 39+52.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 24.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 16.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 29.00 CFS |
| Flow per Barrel | Q/N | 29.00 CFS |
| | HW/D | 2.20 |
| Headwater | HW | 4.40 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.82 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.87 |
| Headwater | HW | 2.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 43+00.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.52 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 372 46+16.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 26.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 21.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 39.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 39.00 CFS |
| Flow per Barrel | Q/N | 39.00 CFS |
| | HW/D | 3.55 + |
| Headwater | HW | 7.10 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | 2.17 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 36 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 36 in |
| | HW/D | 1.09 |
| Headwater | HW | 3.26 FT |
| Roadway Overtopping | OT | 12.00 FT |
| | dc | 2.03 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By ctb Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 372 49+45.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 17.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 11.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 21.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 21.00 CFS |
| Flow per Barrel | Q/N | 21.00 CFS |
| | HW/D | 1.50 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 00+26.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 14.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 10.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 18.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 18.00 CFS |
| Flow per Barrel | Q/N | 18.00 CFS |
| | HW/D | 3.25 |
| Headwater | HW | 4.88 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.62 FT |

| |
|-----------------------------|
| RESULTS |
| Redesign 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.52 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 373 03+43.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 25.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 25.00 CFS |
| Flow per Barrel | Q/N | 25.00 CFS |
| | HW/D | 1.87 |
| Headwater | HW | 3.74 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.75 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.08 |
| Headwater | HW | 2.70 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.60 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 07+39.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 13.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 9.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 17.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 17.00 CFS |
| Flow per Barrel | Q/N | 17.00 CFS |
| | HW/D | 1.25 |
| Headwater | HW | 2.50 FT |
| Roadway Overtopping | OT | 22.00 FT |
| | dc | 1.50 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 22.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 17+84.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 31.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 24.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 45.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 45.00 CFS |
| Flow per Barrel | Q/N | 45.00 CFS |
| | HW/D | 10.00 |
| Headwater | HW | 15.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.25 FT |

| |
|-----------------------------|
| RESULTS |
| Redesign 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.95 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By CTB Date 4/8/2005
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 21+05.00
 Description 30 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 26.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 17.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 32.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 32.00 CFS |
| Flow per Barrel | Q/N | 32.00 CFS |
| | HW/D | 1.35 |
| Headwater | HW | 3.38 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | 1.95 FT |

| | |
|---------|-------------------|
| RESULTS | Adequate Capacity |
| | 30 " CMP needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 13.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 24+39.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 10.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.28 |
| Headwater | HW | 2.56 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.52 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 27+35.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 30+35.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 1.90 |
| Headwater | HW | 2.85 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.37 FT |

| | |
|----------------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|----------------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 373 34+67.00
Description 18 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 11.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 8.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 15.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 15.00 CFS |
| Flow per Barrel | Q/N | 15.00 CFS |
| | HW/D | 2.40 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.47 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 24 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 24 in |
| | HW/D | 1.10 |
| Headwater | HW | 2.20 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.40 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 36+17.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 24.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 16.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 30.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 30.00 CFS |
| Flow per Barrel | Q/N | 30.00 CFS |
| | HW/D | 2.35 |
| Headwater | HW | 4.70 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.85 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.25 |
| Headwater | HW | 3.13 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.85 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 45+37.00
 Description 36 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 66.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 46.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 86.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 86.00 CFS |
| Flow per Barrel | Q/N | 86.00 CFS |
| Headwater | HW/D | 2.50 |
| Roadway Overtopping | HW | 7.50 FT |
| | OT | 4.00 FT |
| | dc | 2.92 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 1.14 |
| Headwater | HW | 4.56 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.78 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 373 50+00.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 23.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 28.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 28.00 CFS |
| Flow per Barrel | Q/N | 28.00 CFS |
| | HW/D | 2.15 |
| Headwater | HW | 4.30 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.77 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 0.86 |
| Headwater | HW | 2.58 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.70 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 05+42.00
 Description 2' x 2' RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 140.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 82.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 155.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 155.00 CFS |
| Flow per Barrel | Q/N | 155.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 3.11 FT |

| | |
|---------|------------------|
| RESULTS | |
| | Redesign |
| | 5x10 RCBC needed |

| | | |
|---------------------|------|-----------|
| Redesign | Size | 5x10 RCBC |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 10.00 FT |
| | dc | 1.96 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 10+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 15.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 29.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 29.00 CFS |
| Flow per Barrel | Q/N | 29.00 CFS |
| | HW/D | 2.20 |
| Headwater | HW | 4.40 FT |
| Roadway Overtopping | OT | 4.50 FT |
| | dc | 1.82 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 2.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
Project No. CT052885

By KC Date 12/8/2004
Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
Station 374 12+79.00
Description 24 in
Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 30.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 19.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 36.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 36.00 CFS |
| Flow per Barrel | Q/N | 36.00 CFS |
| | HW/D | 3.18 |
| Headwater | HW | 6.36 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.05 FT |

| |
|-----------------|
| RESULTS |
| Redesign |
| 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.00 |
| Headwater | HW | 3.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 1.95 FT |

Note: Calculated for CMP
Assumed Inlet Controls
Use Design Frequency of 50 year storm for mainline
Use Design Frequency of 25 year storm for sideroads
Use Hydraulic Design of Highway Culverts
HW/D Taken From Nomograph
OT From Field Measurements
dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 15+67.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 31.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 20.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 37.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 37.00 CFS |
| Flow per Barrel | Q/N | 37.00 CFS |
| | HW/D | 3.30 |
| Headwater | HW | 6.60 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 2.10 FT |

| | |
|----------------|-----------------|
| RESULTS | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.02 |
| Headwater | HW | 3.06 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.95 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 19+20.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 20.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 13.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 25.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 25.00 CFS |
| Flow per Barrel | Q/N | 25.00 CFS |
| | HW/D | 5.50 |
| Headwater | HW | 8.25 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.76 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.07 |
| Headwater | HW | 2.68 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 31+19.00
 Description 5x5 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 675.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 346.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 623.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 623.00 CFS |
| Flow per Barrel | Q/N | 623.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 7.86 FT |

| | |
|----------------|-------------------|
| RESULTS | |
| | Adequate Capacity |
| | 5x10 RCBC needed |

| | | |
|---------------------|------|-----------|
| Redesign | Size | 5x10 RCBC |
| Headwater | HW | 5.25 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.95 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 36+94.00
 Description 3x3 RCBC
 Number of Barrels 1

| | |
|------------------|-------------|
| Drainage Area | 112.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 78.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 148.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|------------|
| Total Flow | Q _{Design} | 148.00 CFS |
| Flow per Barrel | Q/N | 148.00 CFS |
| Headwater | HW | FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 4.24 FT |

| | |
|---------|-----------------|
| RESULTS | |
| | Redesign |
| | 3x6 RCBC needed |

| | | |
|---------------------|------|----------|
| Redesign | Size | 3x6 RCBC |
| Headwater | HW | 2.00 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.67 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 43+83.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 57.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 36.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 68.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 68.00 CFS |
| Flow per Barrel | Q/N | 68.00 CFS |
| | HW/D | 6.00 + |
| Headwater | HW | 12.00 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 2.60 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 48 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 48 in |
| | HW/D | 0.98 |
| Headwater | HW | 3.92 FT |
| Roadway Overtopping | OT | 5.00 FT |
| | dc | 2.50 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 46+78.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 42.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 24.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 46.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 46.00 CFS |
| Flow per Barrel | Q/N | 46.00 CFS |
| | HW/D | 4.60 |
| Headwater | HW | 9.20 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.53 FT |

| | |
|----------------|-----------------|
| RESULTS | |
| | Redesign |
| | 36 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 36 in |
| | HW/D | 1.20 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 6.00 FT |
| | dc | 2.25 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 48+12.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 8.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 12.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 12.00 CFS |
| Flow per Barrel | Q/N | 12.00 CFS |
| | HW/D | 0.97 |
| Headwater | HW | 1.94 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | 1.20 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 24 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 4.00 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 52+80.00
 Description 24 in
 Number of Barrels 1

| | |
|------------------|------------|
| Drainage Area | 15.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 12.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 24.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 24.00 CFS |
| Flow per Barrel | Q/N | 24.00 CFS |
| | HW/D | 1.80 |
| Headwater | HW | 3.60 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.75 FT |

| | |
|---------|-----------------|
| RESULTS | Redesign |
| | 30 " CMP needed |

| | | |
|---------------------|------|---------|
| Redesign | Size | 30 in |
| | HW/D | 1.02 |
| Headwater | HW | 2.55 FT |
| Roadway Overtopping | OT | 3.50 FT |
| | dc | 1.75 FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts

Project: Blue Ridge Parkway Hydraulics Analysis
 Project No. CT052885

By KC Date 12/8/2004
 Checked PBW Date 3/6/2006

Location Blue Ridge Parkway
 Station 374 55+23.00
 Description 18 in
 Number of Barrels 1

| | |
|------------------|-----------|
| Drainage Area | 7.00 acre |
| Q ₅ | cfs |
| Q ₁₀ | 6.00 cfs |
| Q ₂₅ | cfs |
| Q ₅₀ | 11.00 cfs |
| Q ₁₀₀ | cfs |

| | | |
|---------------------|---------------------|-----------|
| Total Flow | Q _{Design} | 11.00 CFS |
| Flow per Barrel | Q/N | 11.00 CFS |
| | HW/D | 1.65 |
| Headwater | HW | 2.48 FT |
| Roadway Overtopping | OT | 3.00 FT |
| | dc | 1.35 FT |

| | |
|---------|--------------------------------------|
| RESULTS | Adequate Capacity 18 " CMP needed |
|---------|--------------------------------------|

| | | |
|---------------------|------|---------|
| Redesign | Size | in |
| | HW/D | |
| Headwater | HW | 0.00 FT |
| Roadway Overtopping | OT | 1.50 FT |
| | dc | FT |

Note: Calculated for CMP
 Assumed Inlet Controls
 Use Design Frequency of 50 year storm for mainline
 Use Design Frequency of 25 year storm for sideroads
 Use Hydraulic Design of Highway Culverts
 HW/D Taken From Nomograph
 OT From Field Measurements
 dc (Critical Depth) From Critical Depth Chart

Conclusions

The hydraulic analyses indicate that of the 183 pipe culverts along Blue Ridge Parkway, six of the culverts lack the capacity to convey the 10-year storm. Of the pipe culverts along the Parkway, 101 are unable to convey the 50-year storm. Of the 16 box culverts along the Parkway, only one, the 5-foot by 5-foot box culvert located at 374/31+19, lacks the capacity to convey the 50-year event. The storm drain pipes located along Craggy Gardens Picnic Area Access Road that were known to lack adequate capacity were redesigned based on field conditions.

The size of pipe culverts attached to a reverse drop inlet or grate inlet or an outlet that could not be located during field visits, were assumed. Therefore, if an assumed pipe culvert diameter conflicts with the actual size in the field, then the findings in this report are not applicable to that culvert.

Recommendations

Inlets should be reconditioned and concrete inlet tops rehabilitated or replaced, as necessary. Pipe culverts and box culverts should also be reconditioned, as directed. Obtrusive sediment, debris, and vegetation should be removed as necessary around inlet structures and pipe outlets to restore positive drainage. Removal of vegetative growth around stone headwalls will also allow for a thorough investigation of the integrity of the headwalls.

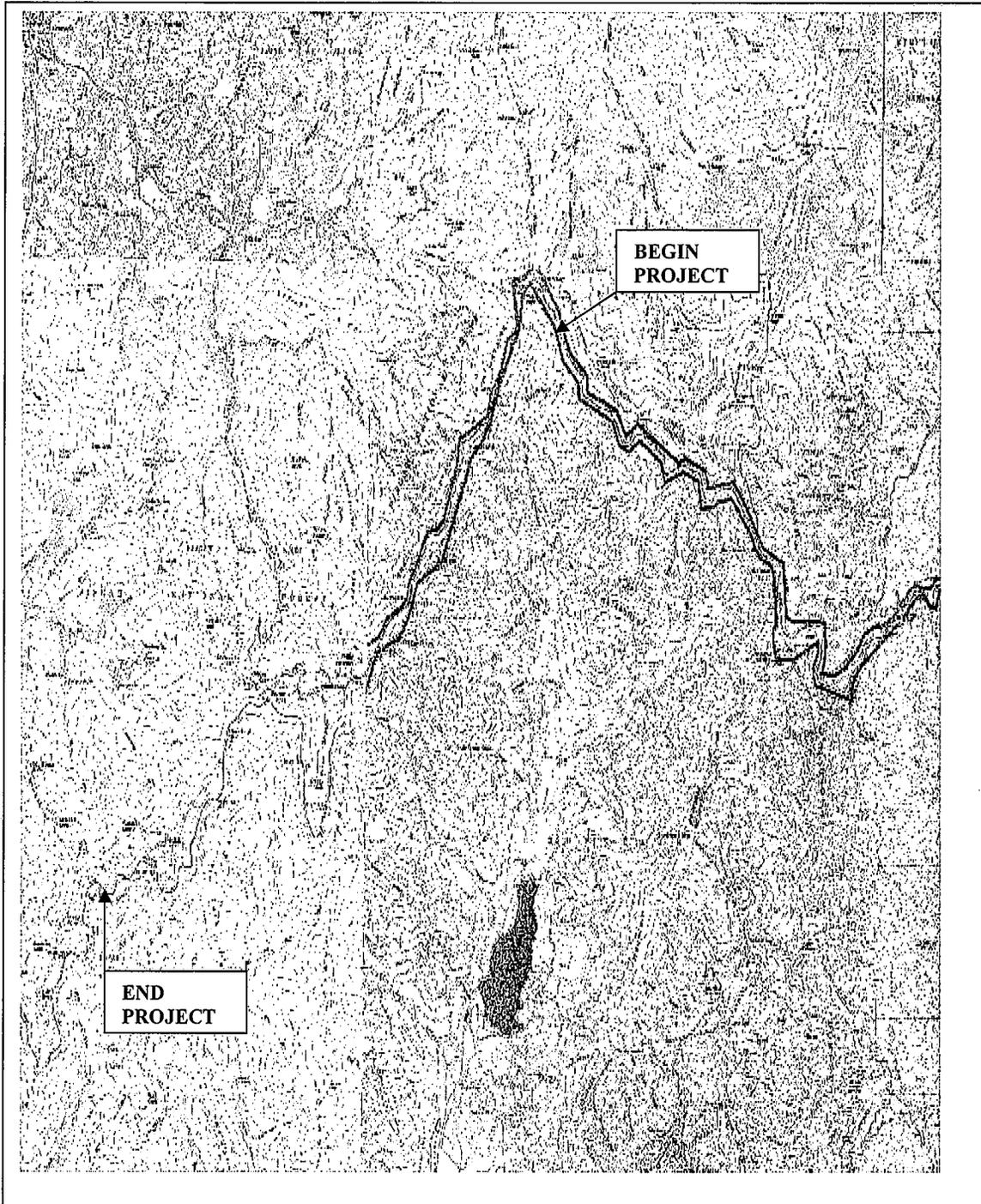
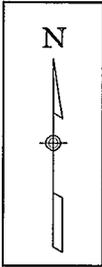
Asphalt-lined channels should be reconditioned, which includes removal of existing asphalt, regraded, as necessary, and repaved. Stone-lined waterways should also be reconditioned, and grass waterways should be cleared of obtrusive ground clutter.

Care should be taken to preserve the historical value of stone headwalls and culverts. Corrugated metal pipes in need of replacement should be replaced with reinforced concrete pipe if the slope of the pipe is less than 10 percent or with corrugated aluminum pipe (AASHTO M-196) if the slope of the pipe is greater than 10 percent.

ARCADIS

Appendix A

Topographic Site Maps



Map Source: www.topozone.com

Compilation of Knoxville, Craggy Pinnacle, Montreat, Mt. Mitchell – TN quadrangles

Not To Scale



ARCADIS

1210 Premier Drive, Suite 200
Chattanooga, TN 37421
Tel: 423/756-7193 Fax: 423/756-7197

**TOPOGRAPHIC SITE MAP
REHABILITATION OF BLUE RIDGE
PARKWAY BETWEEN MILEPOST 359.8
AND MILEPOST 375.3**

PROJECT NO.
PRA BLRI 2P14

APPENDIX
A

DATE
3/29/04

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Appendix B

USGS Water Resources
Investigations Report 01-4207

Estimating the Magnitude and Frequency of Floods in Rural Basins of North Carolina—Revised

By Benjamin F. Pope, Gary D. Tasker, and Jeanne C. Robbins

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 01-4207

Prepared in cooperation with the
North Carolina Department of Transportation

Raleigh, North Carolina
2001



U.S. DEPARTMENT OF THE INTERIOR
GALE A. NORTON, Secretary

U.S. GEOLOGICAL SURVEY
CHARLES G. GROAT, Director

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PREFACE

This report revises and supersedes U.S. Geological Survey Water-Resources Investigations Report 99-4114. The revised flood-discharge values are listed in table 2 (Q2, Q5, Q10, Q25, Q50, Q100, Q200, and Q500). The revised flood discharges, for all recurrence intervals, vary by as much as 17 percent from the earlier published values, with 80 percent of all values within 7 percent of the earlier published data. Differences in the values for the 100-, 200-, and 500-year discharges are greater than in the values for the 2-, 5-, 10-, 25-, and 50-year discharges, 80 percent of which are within 3 percent of the earlier published values.

The revised *t*-year discharges were used to update the regional regression equations and the region-of-influence data base, as indicated in revised text tables 5, 6, and 7 and in appendix table 1. The maximum difference in computed results for the regional regression equations was noted for the Coastal Plain equations, where application of the revised equations to small drainage areas, less than 10 square miles, resulted in discharges that are about 3 to 9 percent greater than those values obtained using equations from the previous report. Computed flood discharges using the revised Blue Ridge-Piedmont

equations generally were within about 2 percent of the values from the previously published equations, except for results for drainage areas less than 10 square miles, which ranged from about 3 to 7 percent less than the previously published values. Application of the revised regression equations to the Sand Hills hydrologic area shows results in discharges that are up to 3 percent less than those computed using the equations published in the earlier report. The average error of prediction for the revised equations was nearly the same as for the earlier published Blue Ridge-Piedmont equations, lower for the Coastal Plain equations, and higher for the Sand Hills equations.

As in the previous report, the root mean square error (RMSE) for the region-of-influence method was only marginally better than the RMSE reported for the regional regression equations, resulting in neither method being clearly superior. The revised computer program for computing the estimates of flood-frequency discharges, using either the regional regression equations or the region-of-influence method, and the associated site-specific errors of prediction are available at the North Carolina District Web site <http://nc.water.usgs.gov/reports/wri014207>.

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CONVERSION FACTORS and ABBREVIATIONS/ACRONYMS

| | Multiply | By | To obtain |
|---------------|--|---------|------------------------|
| <i>Length</i> | | | |
| | mile (mi) | 1.609 | kilometer |
| <i>Area</i> | | | |
| | square mile (mi ²) | 2.590 | square kilometer |
| <i>Flow</i> | | | |
| | foot per mile (ft/mi) | 0.1894 | meter per kilometer |
| | cubic foot per second (ft ³ /s) | 0.02832 | cubic meter per second |

Abbreviations/Acronyms:

| | |
|--------|-------------------------------------|
| BRP | Blue Ridge-Piedmont hydrologic area |
| BSLOPE | basin slope |
| CP | Coastal Plain hydrologic area |
| CSLOPE | channel slope |
| DA | drainage area |
| DEM | digital elevation model |
| GIS | geographic information system |
| L | channel length |
| REG | region variable |
| RMSE | root mean square error |
| SH | Sand Hills hydrologic area |
| SHAPE | basin shape |
| USGS | U.S. Geological Survey |

Estimating the Magnitude and Frequency of Floods in Rural Basins of North Carolina—Revised

By Benjamin F. Pope, Gary D. Tasker, and Jeanne C. Robbins

ABSTRACT

A statewide study was conducted to develop two methods for estimating the magnitude and frequency of floods in rural ungaged basins in North Carolina. Flood-frequency estimates for gaged sites in North Carolina were computed by fitting the annual peak flows for each site to a log-Pearson Type III distribution. As part of the computation of flood-frequency estimates for gaged sites, new values for generalized skew coefficients were developed. Basin characteristics for these gaged sites were computed by using a geographic information system and automated computer algorithms. Flood-frequency estimates and basin characteristics for 317 gaged sites were combined to form the data base that was used for this analysis.

Regional regression analysis, using generalized least-squares regression, was used to develop a set of predictive equations that can be used to estimate the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence interval discharges for rural ungaged basins in the Blue Ridge-Piedmont, Coastal Plain, and Sand Hills hydrologic areas. The predictive equations are all functions of drainage area. Average errors of prediction for these regression equations range from 36 to 65 percent.

A region-of-influence method also was developed that interactively estimates recurrence interval discharges for rural ungaged basins in the Blue Ridge-Piedmont and Coastal Plain hydrologic areas of North Carolina. Regression techniques are used to develop a unique relation

between flood discharge and basin characteristics for a subset of gaged sites with similar basin characteristics. This, then, can be used to estimate flood discharges at ungaged sites. Because the computations required for this method are somewhat complex, a computer application was developed that performs the computations and compares the predictive errors for this method. The computer application also includes the option of using the regression equations to compute estimated flood discharges and errors of prediction specific to each ungaged site.

Root mean square errors, computed for each recurrence interval and hydrologic area, are generally only slightly lower for the region-of-influence method than for the regression equations and do not provide sufficient basis for recommending one method over the other. In addition, the region-of-influence method is a new method that is still being improved. As a result, the regional regression equations are considered to be the primary method for computing flood-frequency estimates at ungaged sites.

INTRODUCTION

Reliable estimates of the magnitude and frequency of floods are needed by State and local designers and managers. The design of highway and railroad stream crossings, delineation of flood plains and flood-prone areas, management of water-control structures, and management of water supplies are all activities that require estimates of the frequency distribution of flood events. Such estimates can be computed directly by using statistical methods at gaged

sites that have at least 10 years of annual peak record; the longer the record of annual peak flows, the more reliable the estimate. It is not feasible, however, to collect 10 years of annual peak record for every location where an estimate of the flood-frequency distribution is needed, nor is it reasonable to wait 10 years for an estimate once a site has been identified.

Estimates that are derived solely from gage records do not provide sufficient spatial coverage to satisfy the need for reliable estimates of the magnitude and frequency of floods. Traditionally, to meet this need, annual peak records at gaged sites have been regionalized, or extended in space. By this process, flood-frequency estimates at gaged sites are related to measurable basin characteristics so that reliable flood-frequency estimates can be made at ungaged sites. In response to the need to improve the accuracy of estimates of flood discharges for ungaged rural basins, the U.S. Geological Survey (USGS), in cooperation with the North Carolina Department of Transportation, initiated an investigation in 1996 to further define the relation between flood discharges of selected recurrence intervals and selected basin characteristics for rural North Carolina basins.

In the past, regionalization was achieved by means of regional regression analysis. Data from gaged sites were used to define a set of relations between selected recurrence interval discharges and drainage area. Once defined, these relations were then used to estimate discharges at selected recurrence intervals for ungaged sites. Often the area of study was subdivided into regions of similar hydrology in order to improve the predictive ability of the equations. Gunter and others (1987) used this approach to develop regional relations for estimating the magnitude and frequency of floods in rural North Carolina basins.

Recently, however, a different approach to regionalization has been developed. This new approach, known as the region-of-influence method, interactively estimates recurrence interval discharges for ungaged sites based on data from gaged sites with similar basin characteristics. For each ungaged site selected, a subset of gaged sites having similar basin characteristics is selected from the entire data base of rural gaged sites. Regression techniques are used to develop a unique relation between flood discharge and basin characteristics for this subset of gaged sites. This relation is then used to estimate flood discharges at the ungaged site. Although computationally intensive, the region-of-influence method is easily automated and

performed by a computer application that is discussed later in this report. Because only gaged sites with similar basin characteristics are used to estimate flows at ungaged sites, there is less chance of extrapolation beyond the limits of the explanatory data. Tests of this approach in Texas (Tasker and Slade, 1994) and in Arkansas (Hodge and Tasker, 1995) yielded estimates with lower prediction errors than those produced by using traditional regional regression techniques.

Gunter and others (1987) contains annual peak-flow data collected from gages throughout North Carolina through the 1984 water year¹, whereas this report contains peak-flow data collected through the 1996 water year. Thus, gaged sites that have continued in operation since 1984 have as much as 12 additional years of peak-flow data available for computation of flood-frequency estimates. The 12 intervening years (1985-96) include several years of pronounced drought (1985-88) as well as years in which maximum peaks of record were recorded (1992-93, 1996) for North Carolina streams. In addition, 64 gaged sites that were not used in Gunter and others (1987) are now available for analysis.

Purpose and Scope

This report describes the development, application, and evaluation of two methods for estimating the magnitude and frequency of floods at ungaged, unregulated, rural basins in North Carolina—(1) the regional regression method and (2) the region-of-influence method. A comparison of these two methods, based on their predictive ability and ease of application, also is presented. In order to compare the two methods on an equal basis, each method was applied to the same available data. The regional regression and region-of-influence methods of estimation were applied to the current data base of 317 sites with at least 10 years of unregulated peak-flow record and evaluated.

Approach

A set of eight basin characteristics was computed and compiled for each of 366 gaged rural sites in North Carolina that have peak-flow record. Sites that have

¹Water year is the period October 1 through September 30 and is identified by the year in which it ends.

flows affected by regulation or channelization were identified, and where possible, records for such sites were divided into periods of unregulated and regulated flows. Weighted regional average skew values were used to compute flood-frequency estimates for 317 sites with at least 10 years of unregulated peak-flow record. Flood-frequency estimates and the computed basin characteristics for these 317 sites were combined to form the data base used in the regional analyses.

Generalized least-squares regression analysis was used to develop predictive equations relating the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence interval flood discharges to selected basin characteristics for rural basins throughout North Carolina. In addition, a region-of-influence method was developed that interactively estimates the recurrence interval flood discharges for ungaged rural basins in the Blue Ridge-Piedmont and Coastal Plain hydrologic areas.

Computation and compilation of basin characteristics and of the selected recurrence interval discharges are described in the following sections. All aspects of each analysis, including the initial exploratory multiple regression analysis using ordinary least-squares regression, final regional regression using generalized least-squares regression, and the region-of-influence analysis, are described. Finally, a comparison of the results of each method is presented.

Data Compilation

The first step in the regionalization of flood-frequency estimates is the compilation of a list of all gaged sites with annual peak-flow record. Such sites are either continuous-record sites or crest-stage sites. At continuous-record sites, the water-surface elevation, or stage, of the stream is recorded at fixed intervals, typically ranging from 5 to 60 minutes. At crest-stage sites, only the crest, or highest, stages that occur between site visits, usually 6 to 8 weeks, are recorded. Regardless of the type of gage, measurements of discharge are determined throughout the range of recorded stages, and a relation between stage and discharge is developed for the gaged site. Using this stage-discharge relation, or rating, discharges for all recorded stages are determined. The highest peak discharge that occurs during a given year is the annual peak for the year, and the list of annual peaks is the annual peak-flow record. The three hydrologic areas identified and described by Gunter and others (1987),

consisting of (1) the combined Blue Ridge and Piedmont physiographic provinces, (2) the Coastal Plain Province, and (3) a subdivision of the Coastal Plain Province known as the Sand Hills, also were used in this study (fig. 1).

An initial list of 366 rural sites with annual peak-flow record was compiled (fig. 1; table 1, p. 19-30). Records for these sites were then examined to determine the extent of available basin characteristic data and to identify sites with flows affected by channelization or regulation. The only consistently available basin characteristics for most sites were drainage area and location. A complete evaluation of all possible relations between flood discharges and other characteristics of rural basins requires a more complete set of basin characteristics. The computation and compilation of the required basin characteristics for all of the 366 initial sites are described in the following section.

Examination of the flow records for the 366 sites revealed 19 sites with record containing only regulated/channelized flows, 27 sites with record that could be divided into periods of unregulated/unchannelized and regulated/channelized flows, and 320 sites with records unaffected by any known regulation/channelization. Of the 347 sites with at least some period of unregulated flow record, 317 sites had the requisite 10 or more years of record for computation of flood-frequency estimates (table 1). Flood-frequency estimates for these sites were computed and combined with the basin characteristics to form the data base that was used for the regional analyses (table 2, p. 31-42). This data base contained 222 sites in the Blue Ridge-Piedmont hydrologic area, 80 sites in the Coastal Plain hydrologic area, and 15 sites in the Sand Hills hydrologic area (table 2). Of the 46 sites with regulated flow records, flood-frequency estimates were computed for 42 sites with periods of regulated flow longer than 10 years but were not included in either regional analysis.

Acknowledgments

The authors gratefully acknowledge the assistance and support of Mr. Archie Hankins of the North Carolina Department of Transportation. The peak-flow data used in the analyses described herein were collected throughout North Carolina at stream gages operated in cooperation with a variety of Federal, State, and local agencies. The authors also would like to recognize the dedicated work of the USGS field

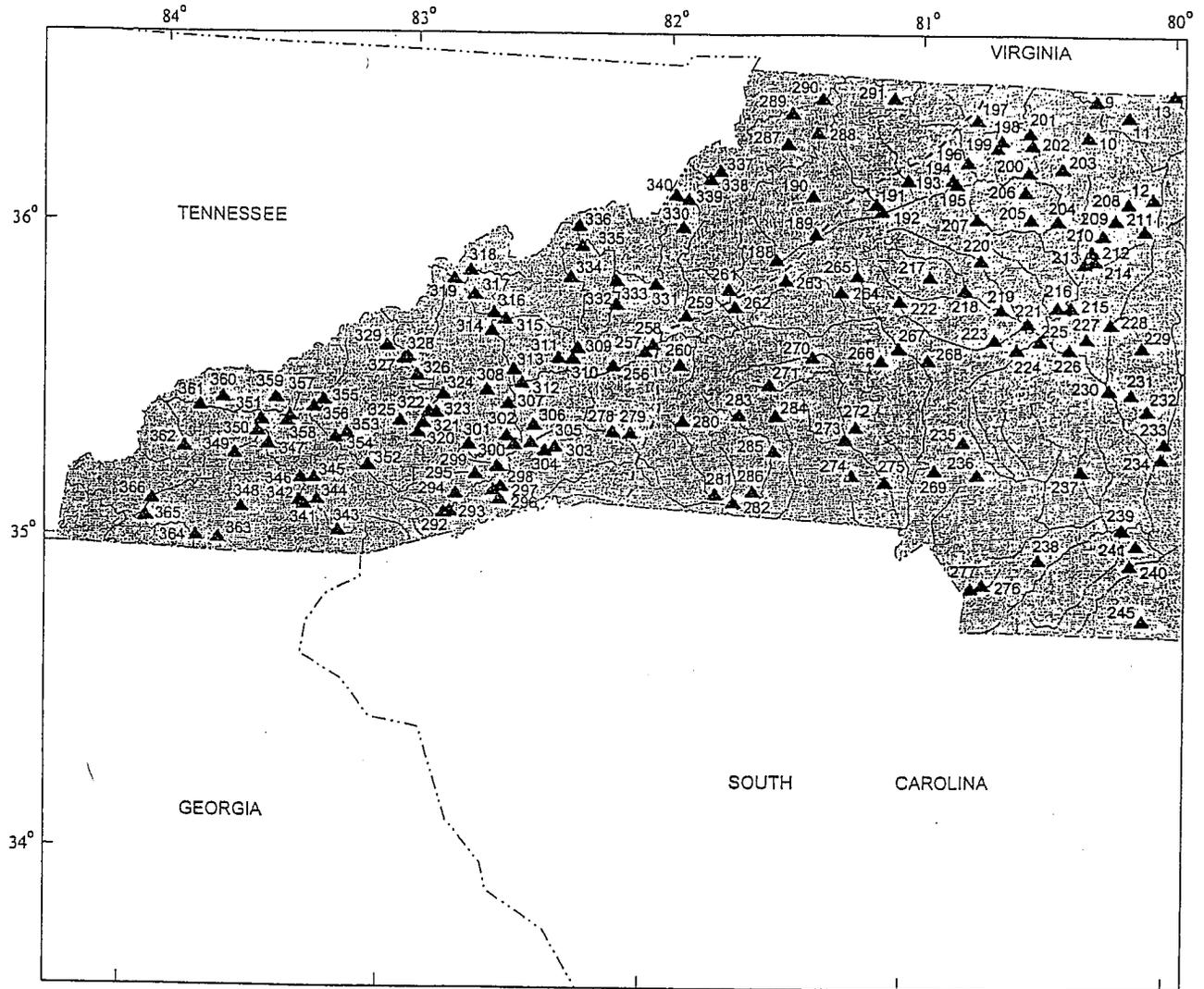
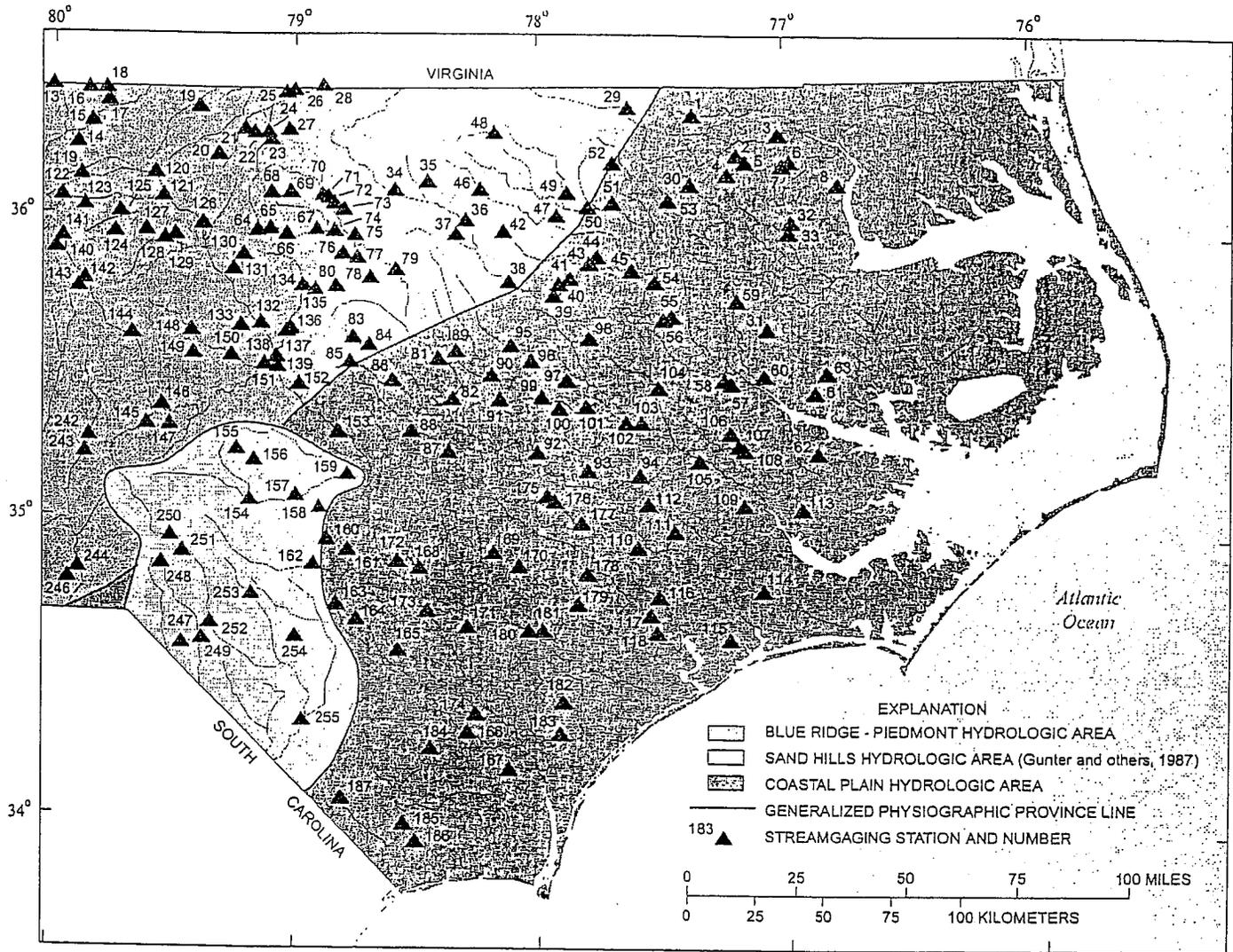


Figure 1. Locations of gaged rural sites in North Carolina.



office staff in collecting, processing, and storing the peak-flow data necessary for the completion of this report.

BASIN CHARACTERISTICS

The annual peak-flow data that were used in this study were collected at gages in rural basins from all areas of the State, representing the wide range of physical and climatic conditions that occur in North Carolina. Eight parameters that characterize the size, shape, relief, and climate of rural basins in North Carolina were computed and compiled for each site used in the study. Physical basin characteristics include drainage area (DA), channel length (L), channel slope (CSLOPE), basin slope (BSLOPE), and basin shape (SHAPE) (table 3). The primary climatic characteristics relevant to flood frequency in each basin are the intensity, duration, and amount of storm rainfall, as well as other meteorologic inputs that control evaporation and transpiration. Lichty and Liscum (1978) suggested the use of a regional climate factor, CF_t , where $t = 2$ -, 25-, and 100-year recurrence intervals, that integrates long-term rainfall and pan evaporation information and represents the effect of these climatic influences on flood frequency. In this study, a refined version of CF_t , as developed and described by Lichty and Karlinger (1990), was used to characterize climatic effects of flood frequency. Climate factors, CF_t , for each site were computed by using a computer algorithm that used the maps of climate factor isolines presented in Lichty and Karlinger (1990) and the latitude and longitude of a site to interpolate values for the three climate factors, CF_2 , CF_{25} , and CF_{100} .

The hydrologic area for each site was determined by examining drainage boundary maps. The appropriate integer value for each site was then assigned to the region variable (REG) (table 3).

Other than drainage area, the physical basin characteristics selected for use in this study were not readily available for most of the basins in the study. In previous studies, drainage area was the primary explanatory variable; thus, there was no prior need to measure or compute the other characteristics. As a result, the other physical basin characteristics had to be computed and compiled. Because of the large number of sites involved and the need for consistent, unbiased methodology in making measurements and computations, a geographic information system (GIS)

Table 3. Basin characteristics that were used in the North Carolina flood-frequency regionalization study

[mi², square mile; mi, mile; ft/mi, foot per mile; ----, a dimensionless characteristic]

| Basin characteristic | Unit of measure | Definition |
|--------------------------|-----------------|--|
| Physical characteristics | | |
| DA | mi ² | Drainage area, measured area contained within basin divides. |
| L | mi | Channel length, measured from gage site upstream along main channel to basin divide. |
| CSLOPE | ft/mi | Channel slope, computed between points at 10- and 85-percent of the length, measured from the gage site. |
| BSLOPE | ft/mi | Basin slope, mean value of slope measured along several flow paths from basin divide to channel. |
| SHAPE | ---- | Shape, computed by dividing drainage area by the square of channel length (DA/L^2). |
| Climatic characteristics | | |
| CF_2 | ---- | 2-year recurrence interval climate factor |
| CF_{25} | ---- | 25-year recurrence interval climate factor |
| CF_{100} | ---- | 100-year recurrence interval climate factor |
| Regional identifiers | | |
| BRP | ---- | 1, if site is in Blue Ridge-Piedmont; 0, if not. |
| CP | ---- | 1, if site is in Coastal Plain; 0, if not. |
| SH | ---- | 1, if site is in Sand Hills; 0, if not. |
| REG | ---- | 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills. |

was used to compute the required physical basin characteristics.

In order to use GIS to develop basin characteristics, a digital elevation model (DEM) was created by combining individual data sets. These data sets included the U.S. Environmental Protection Agency River File 3 (McKay and others, 1994), USGS digital line graph contour lines (U.S. Geological Survey, 1989), and the National Oceanic and Atmospheric Administration shoreline data set (National Oceanic and Atmospheric Administration,

1999). Known drainage basin boundaries were overlain onto the DEM, and a combination of computer and visual interpolation techniques were used to define boundaries between the 366 gage sites and the known drainage boundaries.

Once the DEM was constructed and basin boundaries were delineated for all sites, a set of computer algorithms was developed to automatically compute drainage area, L, CSLOPE, BSLOPE, and SHAPE. Although GIS-computed drainage area was computed, the values used for DA were the drainage areas compiled from site records that were hand-computed and checked when the sites were established. The percent difference between GIS-computed drainage area and DA was automatically computed and used to verify the delineation of basin boundaries and the automated computations. Sites with greater than 10-percent difference between the computed drainage area and DA were flagged and re-examined. Errors in boundary delineation were corrected by comparing USGS 7.5-minute topographic maps with the original hand-delineated basin boundary and by using manual techniques to match the GIS basin boundary to the original. After adjusting basin boundaries, basin characteristics were recomputed and rechecked until satisfactory results were obtained. Several sites with drainage areas less than about 1 square mile (mi²) did not meet the criteria of less than 10-percent difference between computed drainage area and DA because the resolution of the GIS data and computational methods were about one-tenth of a square mile. These sites were examined manually to determine if the automated delineation of basin boundaries was consistent with the hand-drawn boundaries; if not, the boundaries were adjusted accordingly and basin characteristics were recomputed.

ESTIMATION OF FLOOD MAGNITUDE AND FREQUENCY AT GAGED SITES

Flood-frequency estimates for a given stream site are typically presented as a set of exceedance probabilities or, alternatively, recurrence intervals along with the associated discharges. Exceedance probability is defined as the probability of exceeding a specified discharge in a 1-year period and is expressed as decimal fractions less than 1.0 or as percentages less than 100. A discharge with an exceedance probability of 0.10 has a 10-percent chance of being exceeded in

any given year. Recurrence interval is defined as the number of years, on average, during which the specified discharge is expected to be exceeded one time and is expressed as number of years. A discharge with a 10-year recurrence interval is one that, on average, will be exceeded once every 10 years. Recurrence interval and exceedance probability are the mathematical inverses of one another; thus, a discharge with an exceedance probability of 0.10 has a recurrence interval of 1/0.10 or 10 years. Conversely, a discharge with a recurrence interval of 10 years has an exceedance probability of one-tenth or 0.10. It is important to remember that recurrence intervals, regardless of length, always refer to the average number of occurrences over a long period of time; for example, a 10-year flood discharge is one that might occur about 10 times in a 100-year period, rather than exactly once every 10 years.

Flood-frequency estimates for gaged sites are computed by fitting the series of annual peak flows to some known statistical distribution. For the purposes of this study, estimates of flood-flow frequency are computed by fitting the logarithms (base 10) of the annual peak flows to a log-Pearson Type III distribution, following the guidelines and using the computational methods described in Bulletin 17B of the Hydrology Subcommittee of the Interagency Advisory Committee on Water Data (1982). The equation for fitting the log-Pearson Type III distribution to an observed series of annual peak flows is as follows:

$$\text{Log} Q_t = \bar{X} + KS, \quad (1)$$

where

- Q_t is the t -year recurrence interval discharge in cubic feet per second,
- \bar{X} is the mean of the log-transformed annual peak flows,
- K is a factor dependent on recurrence interval and the skew coefficient of the log-transformed annual peak flows, and
- S is the standard deviation of the log-transformed annual peak flows.

Values for K for a wide range of recurrence intervals and skew coefficients are published in Appendix 3 of Bulletin 17B (Hydrology Subcommittee of the Interagency Advisory Committee on Water Data, 1982).

Fitting the log-Pearson Type III distribution to the general case of a long, well-distributed series of annual peak flows is fairly straightforward. Often, however, a series of peak flows may include low or high outliers, which are extremely low or high peak flows that depart significantly from the trend in the data. The gage record also may frequently include information about maximum peak flows that occurred outside of the period of regularly collected, or systematic, record. Such peak flows, known as historic peaks, are often the maximum peak flows known to have occurred during an extended period of time, longer than the period of collected record. The interpretation of outliers and historic peak information in the fitting process can greatly affect the final flood-frequency estimate. Bulletin 17B (Hydrology Subcommittee of the Interagency Advisory Committee on Water Data, 1982) provides guidelines for detecting and interpreting these data points and provides computational methods for making appropriate corrections to the distribution to account for their presence. In some cases, high or low outliers are excluded from the record, so that the number of systematic peaks may not be equal to the number of years in the period of record.

Statistical measures, such as mean, standard deviation, or skew coefficient, can be described in terms of the sample or computed measure and the population or true measure. In terms of annual peak flows, the period of collected record can be thought of as a sample, or small portion, of the entire record, or population. Statistical measures computed from the sample record are estimates of what the measure would be if the entire population were known and used to compute the given measure. The accuracy of these estimates depends on the nature of the specific measure and the given sample of the population.

Skew coefficient measures the symmetry of the distribution of a set of peak flows about the median of the distribution. A peak-flow distribution with the mean equal to the median is said to have zero skew. A positively skewed distribution has a mean that exceeds the median typically as a result of one or more extremely high peak flows. A negatively skewed distribution has a mean that is less than the median typically because of one or more extremely low peak flows.

The computed skew coefficient for the peak-flow record of a given station is very sensitive to extreme events; therefore, the sample skew coefficient for short

records may not provide an accurate estimate of the population skew. This is problematic because the K -factor in equation 1 for a given recurrence interval is dependent only on skew coefficient; therefore, an inaccurate skew coefficient will result in a flood-frequency estimate that is not representative of the true, or population, value.

A more accurate estimate of skew coefficient at a site can be obtained by using a weighted average of the sample skew coefficient estimate with a generalized, or regional, skew coefficient. A generalized skew coefficient is obtained by combining skew estimates from nearby, similar sites. A nationwide generalized skew study was conducted for the study documented in Bulletin 17B (Hydrology Subcommittee of the Interagency Advisory Committee on Water Data, 1982). Skew coefficients for long-term gage sites from all over the Nation were computed and used to produce a map of isolines of generalized skew. Gunter and others (1987) used this nationwide generalized skew in their flood-frequency computations. In addition, the USGS in North Carolina has computed other unpublished flood-frequency estimates by using the nationwide generalized skew.

During preliminary computations of flood-frequency estimates for inclusion in the regression analyses, a number of inconsistencies were noted between the computed values of sample skew coefficients at long-term gaging sites in North Carolina and the values obtained from the national generalized skew study. Inconsistencies at long-term sites are of concern because if generalized skew coefficients for a region are accurate estimates of the population skew, then the computed values of sample skew at long-term sites should approach the generalized values. Instead, it was noted that while sample skew coefficients at long-term North Carolina sites were somewhat consistent among themselves, they did not agree with the generalized values obtained from the nationwide generalized skew study. This anecdotal evidence, when considered along with the age and lack of resolution of the national study, was deemed sufficient cause to develop new generalized skew estimates for rural gaging sites in North Carolina.

Bulletin 17B (Hydrology Subcommittee of the Interagency Advisory Committee on Water Data, 1982) describes three methods for performing generalized skew studies using skew coefficients computed from long-term gaging stations—(1) plot computed skew

coefficients on a map and construct skew isolines, (2) use regression techniques to develop a skew prediction equation that would relate station skew coefficients to some set of basin characteristics, or (3) use the arithmetic mean of computed skew coefficients from long-term sites in the area. For the purposes of this report, a modification of the second method initially was decided to be the most likely method to produce satisfactory results. However, rather than using ordinary least-squares regression, a weighted least-squares regression technique was used to determine the relation between the sample skew coefficient and selected basin characteristics. Sample skew estimates were weighted according to their respective record length; sites with long records were assigned greater weight than those with short records. The use of this regression technique in this study made it possible for data from all 347 sites with unregulated flows to be used in developing the estimate.

Multiple regression analysis, using ordinary least-squares regression, was used to determine the best set of basin characteristics to use as explanatory, or independent, variables in the weighted least-squares predictive model. Initial analyses were somewhat disappointing; no combination of basin characteristics accounted for a significant amount of the variance in computed skew. Lacking any significant statewide relationship between sample skew and basin characteristics, three location variables—BRP, CP, and SH, one for each of the three hydrologic areas, Blue Ridge-Piedmont, Coastal Plain, and Sand Hills—were added to the analysis. For a given site, the location variable representing the region of the site was set at 1, and the other two location variables were set at 0 (table 3). When these variables were added to the multiple regression analysis, results were only marginally better. None of the exploratory multiple regression models yielded significant relations between sample skew and the basin characteristics.

Given the lack of satisfactory results in this attempt to develop predictive equations relating skew to a set of basin characteristics, it was decided to apply a modified version of the second method in Bulletin 17B (Hydrology Subcommittee of the Interagency Advisory Committee on Water Data, 1982). A regional regression prediction equation was developed using weighted least-squares regression (Tasker and Stedinger, 1986). Weights were assigned, according to record length, to the computed skews for each site. Because the only

statistically significant explanatory variable in the regression analysis was an indicator variable for the Sand Hills hydrologic area, the regression equation predicts one value for all sites in the Sand Hills area and another value for all sites in the remaining hydrologic areas. These predictions are essentially a weighted average of the sites in each of the two areas and, therefore, can be considered a modified version of the third method as well. The two weighted regional average skew values, along with the standard error of prediction and the mean square error of prediction associated with each estimate (table 4), were determined by the methods described in Tasker and Stedinger (1986).

Table 4. Generalized skew coefficient and associated mean square error for rural North Carolina gaging sites

| Hydrologic area | Generalized skew coefficient | Standard error | Mean square error |
|---------------------------------------|------------------------------|----------------|-------------------|
| Blue Ridge-Piedmont and Coastal Plain | 0.195 | 0.194 | 0.038 |
| Sand Hills | 0.252 | 0.250 | 0.062 |

As described previously, a weighted skew coefficient is used in order to improve the accuracy of the skew coefficient used to fit peak-flow records to a log-Pearson Type III distribution. The weighted skew coefficient for a given site is computed as the weighted average of the generalized skew coefficient and the site's computed skew coefficient, with weights assigned according to the mean square error of each component skew value. Flood-frequency estimates for all sites with unregulated flow records were computed by using the weighted skew method. Flood-frequency estimates for sites with regulated flow record were computed by fitting the recorded regulated peak flows to the log-Pearson Type III distribution. Computed sample skew coefficients for the regulated flow record were used because regulated peak-flow records typically are not representative of regional or generalized conditions. Although flood-frequency estimates for regulated sites are presented in this report, more detailed, site-specific analyses of flood frequency at many regulated sites are available from the U.S. Army Corps of Engineers.

ESTIMATION OF FLOOD MAGNITUDE AND FREQUENCY AT UNGAGED SITES

Two regional analyses were used to develop methods for estimating flood discharges for ungaged rural basins in North Carolina. The first analysis, a traditional regional regression, required the use of generalized least-squares regression to define a set of predictive equations that relate peak discharges for the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals to selected basin characteristics for unregulated rural basins in each of three hydrologic areas of North Carolina (fig. 1). The second analysis, the region-of-influence method, required the development of a computer application to derive, for any given ungaged rural site in the Blue Ridge-Piedmont or Coastal Plain hydrologic areas, unique predictive relations between the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence interval discharges and selected basin characteristics. Just as in the traditional regional regression, generalized least-squares regression is used to develop these predictive relations; however, in the region-of-influence analysis, regression techniques are applied to only a selected subset of gaged sites, rather than the entire data base of gaged sites.

Regional Regression Analysis

Ordinary least-squares regression with flood discharge as the dependent variable was used in exploratory analyses to determine the best regression models for all combinations of the eight basin characteristics that were used as explanatory variables. An additional goal of the exploratory analysis was to determine if the subdivision of the State into three hydrologic areas is supported by current data.

Initially, the regionalization scheme used by Gunter and others (1987), which divided the State into the Blue Ridge-Piedmont, Coastal Plain, and Sand Hills hydrologic areas, was assumed to still be valid. Multiple regression analysis, using Mallows' Cp (Stedinger and Tasker, 1985), adjusted coefficient of determination, and hydrologic judgment as criteria, resulted in one-variable and two-variable models relating flood discharge to basin characteristics for each of the three hydrologic areas. The most significant one-variable models for all three regions included drainage area only. The most significant two-variable

models included drainage area and the 25-year climate factor for the Blue Ridge-Piedmont and Sand Hills hydrologic areas; while the best two-variable models for Coastal Plain sites consisted of drainage area and channel length.

The validity of the regionalization scheme was examined by performing additional ordinary least-squares regression analyses by using the two-variable models determined previously and comparing the coefficients and intercepts for each region's model to those for the rest of the State. In each case, the coefficients and intercepts for each region's model differed from those of the model using the remaining sites in the State. Additionally, a further test was conducted by introducing the location variable (table 3) for each region into the regression model. Each of these variables was set either at 1, if the site was in a particular region, or 0, if not. A five-variable ordinary least-squares regression model, including all available sites and using (1) drainage area, (2) climate factor, (3) location variable, (4) the product of the location variable with drainage area, and (5) the product of the location variable with climate factor as explanatory variables, was constructed for each recurrence interval discharge in each of the three hydrologic area. For a given region's model, a significant coefficient for the location variable indicates a difference in the intercept between sites in that region and sites in the rest of the State; a significant coefficient for either of the terms that are products of a location variable and another variable indicates a difference in the coefficients of the basin characteristic in that term between sites in that region and the rest of the State. In this particular test, a 95-percent confidence level was defined as significant. All three regional models had significant coefficients for at least one of the location variables or location variable product terms. Given the results of these regression tests, the regionalization scheme used by Gunter and others (1987) was accepted.

Ordinary least-squares regression is an appropriate and efficient regression model for use when flow estimates that are used as response variables are independent of each other (no correlation exists between pairs of sites) and when the reliability and variability of flow estimates that are used as response variables are approximately equal. The flow estimates that were used in this regression were generated from peak-flow records at gaging stations in all parts of North Carolina with periods of record ranging from

10 to 101 years. Records from gaging stations on the same stream within the same basin or even in adjacent basins may be highly correlated because the peak flows resulted from the same rainfall events, similar antecedent conditions, and similar basin characteristics. However, records from other sites, in basins remote from each other, have varying degrees of correlation. In general, correlation between pairs of sites can be described as a function of distance between sites. Additionally, the reliability of flow estimates that were used as response variables in this regression is, in general, a function of record length and, as such, cannot be considered equal for all sites in the regression. Variability of the flow estimates, characterized by the standard deviation of the peak-flow record that was used to compute the flow estimate, depends in large part on characteristics of the basin and also cannot be considered equal for all sites used in the regression. For these reasons, ordinary least-squares regression was used only as an exploratory technique in this analysis to identify the best potential regression models and to evaluate the proposed regionalization scheme. The final regression equations were developed by using generalized least-squares regression techniques.

Generalized least-squares regression, as described by Stedinger and Tasker (1985), is a regression technique that takes into account the correlation between, as well as differences in the variability and reliability of, the flow estimates used as dependent, or response, variables. These factors are accounted for in generalized least-squares regression by assigning different weights to each observation of the response variable used in the regression, based on its contribution to the total variance of the sample-flow statistic used as the response variable. In contrast, ordinary least-squares regression assumes equal reliability and variability in flow estimates at all sites and no cross-correlation between flow records at all sites, so that each flow estimate has equal variance and is assigned equal weight in the regression.

The use of generalized least-squares regression techniques to model the relations between peak discharges and basin characteristics of North Carolina rural basins requires estimates of the cross-correlation coefficients and standard deviation of the peak-flow records that were used to compute peak discharges for the selected recurrence intervals. For each of the three hydrologic areas, a scatter-plot of sample correlation coefficients versus distance between sites was constructed for site pairs with long periods (at least

30 years) of concurrent record. A graphical 'best-fit' line to these points was used to define the relation between cross-correlation coefficient and distance between sites. This relation was then used to populate a cross-correlation matrix for the sites contained in each area. Variability of each peak-flow estimate is measured by the standard deviation of the peak-flow record used to compute that estimate. For each hydrologic area, a generalized least-squares regression of the sample standard deviations against drainage area was used to obtain estimates of the standard deviations of the peak-flow records at each site. These regression estimates of the standard deviations were used to assign weights to flow estimates because they are independent of the sample standard deviation estimates used to compute the flow estimate. Finally, length of record at each peak-flow site was used as a direct measure of the relative reliability of the flow estimates computed from those records.

Generalized least-squares regression was used to evaluate the 1- and 2-variable models suggested by preliminary ordinary least-squares regression for each of the three hydrologic areas in North Carolina. The final regression models in all of the regions relate peak discharge to drainage area for each recurrence interval (table 5). The 2-variable model for each region was tested by using generalized least-squares regression, and in each case, the addition of a second variable did not substantially improve the predictive ability of the model.

Table 5. North Carolina rural flood-frequency equations
[DA, drainage area, in square miles. Result will be in cubic feet per second]

| Rural flood recurrence interval (years) | Hydrologic area | | |
|---|---------------------------|--------------------------|--------------------------|
| | Blue Ridge-Piedmont | Coastal Plain | Sand Hills |
| 2 | 135 DA ^{0.702} | 64.7 DA ^{0.673} | 33.5 DA ^{0.712} |
| 5 | 242 DA ^{0.677} | 129 DA ^{0.635} | 55.5 DA ^{0.701} |
| 10 | 334 DA ^{0.662} | 188 DA ^{0.615} | 72.9 DA ^{0.697} |
| 25 | 476 DA ^{0.645} | 281 DA ^{0.593} | 98.1 DA ^{0.693} |
| 50 | 602 DA ^{0.635} | 367 DA ^{0.579} | 120 DA ^{0.691} |
| 100 | 745 DA ^{0.625} | 468 DA ^{0.566} | 143 DA ^{0.688} |
| 200 | 908 DA ^{0.616} | 586 DA ^{0.554} | 170 DA ^{0.686} |
| 500 | 1,160 DA ^{0.605} | 773 DA ^{0.539} | 210 DA ^{0.684} |

Uncertainty in a flow estimate that was predicted for an ungaged site by using the regression equations can be measured by the standard error of prediction, S_p , which is computed as the square root of the mean square error of prediction, MSEp. The MSEp is the sum of two components—the mean square error resulting from the model, γ^2 , and the sampling mean square error, $MSE_{s,i}$, which results from estimating model parameters from samples of the population. The mean square model error, γ^2 , is a characteristic of the model and is a constant for all sites. The mean square sample error, $MSE_{s,i}$, for a given site, however, depends on the values of the explanatory variables (DA) used to develop the flow estimate at that site. The standard error of prediction for a site, i , is computed as:

$$S_{p,i} = (\gamma^2 + MSE_{s,i})^{\frac{1}{2}}, \quad (2)$$

and, therefore, varies from site to site. If the values of the explanatory variables for the gage sites used in the regression are assumed to be a representative sample of all sites in the region, then the average accuracy of prediction for the regression model can be determined by computing the average standard error of prediction:

$$S_p = \left\{ \gamma^2 + \frac{1}{n} \sum_{i=1}^n MSE_{s,i} \right\}^{\frac{1}{2}}. \quad (3)$$

The standard error of the model ($SE_{(model)}$) can be converted from log (base 10) units to percent error by using the transformation formula,

$$\%SE_{(model)} = 100(10^{2.3026(\gamma^2)} - 1)^{\frac{1}{2}}. \quad (4)$$

Similarly, the average standard error of prediction can be transformed from log (base 10) units to percent error by substituting S_p^2 for γ^2 in equation 4. Computation of $S_{p,i}$ for a given ungaged site, i , involves fairly complex matrix algebra. Computational procedures and the required matrices are provided in the Appendix.

The standard errors of the model, which measure how well the regression model fits the data used to construct it, ranged from about 34 percent to just over 57 percent. This error term is comparable to errors often cited and referred to as 'model error' or 'standard error of estimate' in earlier studies in which ordinary least-squares regression was used to develop predictive equations. The average standard errors of prediction, which provide a better overall measure of a model's predictive ability, ranged from about 36 percent to about 65 percent (table 6). Another measure of predictive ability is equivalent years of record (Hardison, 1971). Equivalent years of record are the number of years of peak-flow record needed to provide an estimate by using log-Pearson Type III techniques that would be equal in accuracy to an estimate made by using regional methods (table 6).

Table 6. Average predictive errors, in percent, and equivalent years of record associated with North Carolina rural flood-frequency equations

| Rural flood recurrence interval (years) | Hydrologic area | | | | | |
|---|--------------------------------|----------------------------------|--------------------------------|----------------------------------|--------------------------------|----------------------------------|
| | Blue Ridge-Piedmont | | Coastal Plain | | Sand Hills | |
| | Average error of prediction | Equivalent years of record | Average error of prediction | Equivalent years of record | Average error of prediction | Equivalent years of record |
| 2 | 41.2 | 2.0 | 37.9 | 2.9 | 38.4 | 2.1 |
| 5 | 41.2 | 3.0 | 35.9 | 4.9 | 42.6 | 2.7 |
| 10 | 42.0 | 4.1 | 36.3 | 6.7 | 45.6 | 3.4 |
| 25 | 43.6 | 5.4 | 38.0 | 8.8 | 49.8 | 4.2 |
| 50 | 45.9 | 6.4 | 39.8 | 10.1 | 53.1 | 4.6 |
| 100 | 47.0 | 7.2 | 42.0 | 11.1 | 56.6 | 5.0 |
| 200 | 48.9 | 7.9 | 44.2 | 11.9 | 60.2 | 5.4 |
| 500 | 51.6 | 8.7 | 47.3 | 12.7 | 65.1 | 5.7 |

Region-of-Influence Analysis

The region-of-influence method (Tasker and Slade, 1994) estimates flood discharges at ungaged basins by deriving, for a given ungaged rural site, regression relations between the flood discharges and basin characteristics of a unique subset of gaged sites. This unique subset of gaged sites for a given ungaged site, first suggested by Acreman and Wiltshire (1987), was described by Burn (1990a, b) as the region of influence for an ungaged site, hence the name of the method. The unique subset of gaged sites is defined as the N 'nearest' gages to the ungaged site, where distance between sites i and j is defined by the Euclidean distance metric:

$$d_{ij} = \left(\sum_{k=1}^p \left(\frac{x_{ik} - x_{jk}}{sd(X_k)} \right)^2 \right)^{\frac{1}{2}}, \quad (5)$$

where

d_{ij} is the distance between sites i and j in terms of basin characteristics,

p is the number of basin characteristics used to calculate d_{ij} ,

X_k is the k th basin characteristic,

$sd(X_k)$ is the sample standard deviation for X_k , and

x_{ik} is the value of X_k at the i th site.

This distance metric is directly analogous to the more familiar equation for distance, D , between two points, (x_1, y_1) and (x_2, y_2) in a 2-dimensional rectangular coordinate system:

$$D = [(x_2 - x_1)^2 + (y_2 - y_1)^2]^{\frac{1}{2}}, \quad (6)$$

where the only difference is the use of sample standard deviation to standardize the different basin characteristics and the slight notational difference of using an additional subscript k rather than changing variable symbols (x, y) .

The distances, d_{ij} 's, between a given ungaged site and all the gaged sites are computed and ranked; the N gaging stations with the smallest d_{ij} compose the region of influence for that gaging station. Once determined, generalized least-squares regression techniques are used to develop the unique predictive relations between flood discharge and basin

characteristics and estimates of the selected recurrence interval discharge at the ungaged site computed.

The number, p , and identity of the basin characteristics that are used to compute d_{ij} and the number of gaged sites, N , that compose the region of influence are specific to a given set of flood-discharge estimates and basin characteristics. In order to adapt the region-of-influence method to that data set, these parameters must be determined. In addition to these parameters, the set of basin characteristics also must be chosen for use as explanatory variables in the generalized least-squares regression models developed for each region. There is a subtle but important distinction between the two sets of basin characteristics—the first is used to define a region of influence; the second serves as variables in the unique predictive equations that are developed for that region of influence. These two sets of characteristics need not be identical but are in some cases. In other cases, such as in North Carolina, the set of characteristics used as variables is a subset of the set of characteristics used to define the region of influence.

Selection of the number of gaged sites, N , and the number and identity of the basin characteristics that will define the region of influence for North Carolina was done by trial and error, using a computed root mean square error (RMSE) as the criterion. RMSE was computed by removing one site at a time from the data base and using the remaining sites to compute an estimate of the flow characteristic. Once completed for every site, the RMSE was computed as the square root of the arithmetic mean of the differences between the estimated and computed values at each site. The results of the exploratory multiple regression analyses performed as part of the traditional regional regression analysis were used to provide some insight in selecting initial sets of basin characteristics. The strong evidence for using separate hydrologic areas in the traditional regression analysis led to the decision to restrict a site's region of influence to its hydrologic area. As a result, 15 sites in the Sand Hills region (fig. 1) were not enough to support a valid region-of-influence analysis. For any ungaged site identified as a Sand Hills site, the same set of 15 sites would compose the region of influence, and the unique predictive equation developed would be the same equation developed by using traditional regional regression techniques, as described in previous sections of this report.

Combinations of defining variables that were tested include DA and CF₂₅; DA and REG; DA, CF₂₅,

and REG; and DA, CF₂₅, L, and REG. Each set of defining variables was tested by using values of 25, 30, and 35 for N. For all variable combinations, N = 30 provided the best results; and the combination of variables that minimized RMSE for all recurrence intervals was DA, CF₂₅, and REG. For these initial tests, DA and CF₂₅ were used as explanatory variables in the unique regression relations. Subsequent testing, after the defining variables and N were determined, indicated that CF₂₅ was not significant as an explanatory variable. As a result, only DA is used as an explanatory variable in the final version of the region-of-influence method.

After determining the best combination of variables to define the region of influence and the optimal value for N, the computer application for the region of influence was completed. Equation 5 is used to determine the region of influence for an ungaged site, given the required input variables. Unique predictive equations for the ungaged site are then developed, using a generalized least-squares regression of the sites within the region of influence, and the predicted flood-discharge estimates are computed. In addition, because generalized least-squares regression was used to develop the predictive equations, $S_{p,i}$ the site-specific standard error of prediction is computed for each estimated recurrence interval discharge.

Comparison of Results

Application of the regional regression equations requires one less variable than application of the

region-of-influence method. However, the additional variable, latitude and longitude of the ungaged site, is simple to determine, so that the variable requirements of the methods are nearly equal. The regional regression equations are easily evaluated manually, the region-of-influence method, however, is computationally intensive but is made simpler by the use of a computer application that performs the complex computations.

The average RMSE was computed for each area and recurrence interval (table 7), providing a measure of the predictive ability of the model or method. Average RMSE was computed as the square root of the arithmetic mean of the differences between the flood-frequency estimate determined using the log-Pearson Type III and the flood-frequency estimate computed using either the regression equations or the region-of-influence method. RMSE for the region-of-influence method is slightly less than for the traditional regression equations in all cases. A site-specific comparison of predictive error also is possible by using $S_{p,i}$. As discussed previously, the region-of-influence method reports the site-specific standard error of prediction, $S_{p,i}$. The $S_{p,i}$ is not typically computed when evaluating the traditional regression equations manually because of the complexity of the computations involved. Automation of the equations eliminates this concern, and the $S_{p,i}$ is reported along with the flood-discharge estimate for any given site, allowing for comparison of predictive results on a site-by-site basis.

Table 7. Root mean square error, in percent, for the regional regression and region-of-influence methods, presented by hydrologic area and recurrence interval [n.a., not applicable]

| Recurrence interval | Hydrologic area | | | | | |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | Blue Ridge-Piedmont | | Coastal Plain | | Sand Hills | |
| | Regional regression | Region of influence | Regional regression | Region of influence | Regional regression | Region of influence |
| 2 | 43.9 | 42.9 | 39.3 | 34.4 | 40.9 | n.a. |
| 5 | 45.4 | 43.3 | 38.6 | 34.6 | 46.1 | n.a. |
| 10 | 47.4 | 44.7 | 40.5 | 37.1 | 50.3 | n.a. |
| 25 | 50.7 | 47.3 | 44.4 | 41.7 | 55.9 | n.a. |
| 50 | 53.4 | 49.5 | 47.9 | 45.6 | 60.3 | n.a. |
| 100 | 56.2 | 51.9 | 51.6 | 49.7 | 64.7 | n.a. |
| 200 | 59.2 | 54.4 | 55.7 | 53.9 | 69.3 | n.a. |
| 500 | 63.1 | 57.9 | 61.1 | 59.6 | 75.4 | n.a. |

In general, little difference was found in the ease of application or in average predictive abilities between the regional regression equations and the region-of-influence method. The region-of-influence method is a new technique and is still being improved. As a result, the region-of-influence method is considered a secondary or alternative method of determining flood-frequency estimates for ungaged rural sites in North Carolina.

Use of Computer Software

As part of the study described by this report, a computer software package was developed that computes (1) estimates of flood-frequency discharges using the region-of-influence method at ungaged rural sites in the Blue Ridge-Piedmont or Coastal Plain hydrologic areas of North Carolina, (2) estimates of flood-frequency discharges using the regional regression equations for ungaged rural sites in each of the three hydrologic areas of North Carolina, and (3) the associated site-specific errors of prediction, $S_{p,i}$, for each method. The complexity of the computations required for the region-of-influence method requires the use of the software for practical application of the method. The regional regression equations can be evaluated manually, but the software allows for easy evaluation of the complex computation of the $S_{p,i}$ for the regional regression method.

The computer software package includes an executable program file and four supporting data files. All five files are required for execution of the computer software. The software package and instructions for down loading, installation, and execution of the program currently are available at the North Carolina District home page on the World Wide Web at URL <<http://nc.water.usgs.gov/reports/wri014207>>.

APPLICATION OF METHODS

The methods presented in this report can be used to estimate the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence interval flood discharges at gaged and ungaged, unregulated, rural sites in North Carolina. Use of either the regional regression equations or the region-of-influence method requires estimates of the input variables. To apply these methods, first locate the ungaged site on a map and identify in which hydrologic area the site is located. An estimate of the latitude and longitude of the site is required for the region-of-influence method. Next, delineate the drainage

boundaries of the ungaged site and measure the drainage area contained within those boundaries. The corresponding regression equations (table 5) can then be applied to determine an estimate of the flood discharges for the recurrence interval of interest. Alternatively, the region-of-influence computer application can be initiated; it will query the user for an output file name, an identifier for the site of interest, the hydrologic area for the site, the drainage area of the site, and the latitude and longitude of the site. With this information, the computer application computes the climate factor, defines a region of influence, and produces the desired flood-discharge estimates, along with the standard error of prediction, $S_{p,i}$, specific to the ungaged site.

The computer application contains the regression equations and can be used to apply either method. Use of the computer application to evaluate the regression equation provides an automated computation of $S_{p,i}$ for the regression equations as well as for the region-of-influence method. If evaluated manually, $S_{p,i}$ can be computed only by using the rather complex computational procedures described previously and outlined in detail in the Appendix. Although average standard errors of prediction (table 6) give an idea of the relative accuracy of the methods; $S_{p,i}$ is the more precise measure of the accuracy of a specific prediction.

Flood-frequency estimates at gaged sites and ungaged sites on the same stream as a gaged site can be improved by combining the estimate determined by regional methods with the estimate determined by fitting the log-Pearson Type III distribution to the peak-flow record at the gaged site. At a gaged site, the best estimate of flood frequency can be determined by

$$Q_i(w) = \frac{Q_i(g)N + Q_i(r)EY}{N + EY}, \quad (7)$$

where

$Q_i(w)$ is the weighted discharge for recurrence interval t ;

$Q_i(g)$ is the discharge for recurrence interval t determined using peak-flow record from the gaged site;

$Q_i(r)$ is the discharge for recurrence interval t determined using regional methods;

N is the number of systematic peaks in the gaged sites record; and

EY is the equivalent years of record from table 6.

Flood estimates at an ungaged site that is on the same stream as a gaged site can be determined by using a combination of the regional estimate and the log-Pearson Type III estimate from the nearby gaged site. In order to make the appropriate adjustment, first compute the ratio,

$$R = \frac{Q_i(w)}{Q_i(r)}, \quad (8)$$

for the gaged site by using $Q_i(w)$ and $Q_i(r)$ as defined in the preceding paragraph. Next, a correction factor, R' , is computed as follows:

$$R' = R - \frac{\Delta DA(R-1)}{0.5DA_g}, \quad (9)$$

where ΔDA is the absolute value of the difference between the drainage areas of the gaged and ungaged sites, and DA_g is the drainage area of the gaged site. If $\Delta DA/DA_g$ is less than 0.5, then the corrected discharge for the ungaged site, $Q_i(\text{corr})$, can be computed by multiplying the correction factor, R' , by the regional estimate for the ungaged site, $Q_i(r)$. If $\Delta DA/DA_g$ is greater than 0.5, use the results of the regional methods without correction.

At times, flood-frequency estimates may be desired for an ungaged site that is between two gaged sites on the same stream. In this case, select the gaged site for which $\Delta DA/DA_g$ is less than 0.5, compute R' , and apply as described above. If $\Delta DA/DA_g$ is less than 0.5 for both gaged sites, compute R' for each. If both correction factors are greater than 1.0, use the larger R' ; if both correction factors are less than 1.0, use the smaller R' . If one correction factor is greater than 1.0 and the other smaller than 1.0, an average of the two correction factors should be used.

If the drainage basin for an ungaged site lies within more than one hydrologic area, the computed discharge should be adjusted according to the proportion of the total drainage area that lies within each hydrologic area. The adjusted discharge can be determined by the equation:

$$Q_i(\text{adjusted}) = Q_i(HA1) \times \frac{DA_1}{DA_{\text{total}}} + Q_i(HA2) \times \frac{DA_2}{DA_{\text{total}}}, \quad (10)$$

where $Q_i(\text{adjusted})$ is the adjusted discharge for the t -year recurrence interval; $Q_i(HA1)$ and $Q_i(HA2)$ are the discharges computed as if the entire drainage area were within the hydrologic areas, $HA1$ and $HA2$; DA_1 and DA_2 are portions of the total drainage area found in the respective hydrologic drainage areas; and DA_{total} is the total drainage area.

SUMMARY

Accurate and reliable estimates of the magnitude and frequency of floods are critical for such activities as bridge design, flood-plain delineation and management, water-supply management, and management of water-control structures, among others. Recognizing the need for accurate estimates of flood frequency at ungaged rural basins, the U.S. Geological Survey, in cooperation with the North Carolina Department of Transportation, conducted a study to further define the relation between flood discharges of selected recurrence intervals and selected physical and climatic characteristics of rural North Carolina basins. This study includes the development of two methods for regionalizing, or extending in space, flood-frequency estimates at gaged sites. In the first method, traditional regional regression analysis, a generalized least-squares regression analysis is used to develop a set of predictive equations for each of three hydrologic areas in North Carolina—the Blue Ridge-Piedmont, the Coastal Plain, and the Sand Hills. In the second method, the region-of-influence method, flood-frequency estimates for ungaged sites are predicted interactively, based on data from a subset of gaged sites with basin characteristics similar to those of the ungaged site. This report documents the development of both methods, using a data base of flood-discharge estimates and basin characteristics for 317 rural North Carolina gaged sites.

An initial set of 366 gaged sites was determined to have some annual peak-flow record; basin characteristics data were computed and compiled for all of these sites by using a GIS. While the development of the basin characteristics was ongoing, flow records were examined to determine which sites had flows that were affected by regulation or channelization. Of the 366 original sites, 19 sites had only regulated record and 27 sites had periods of unregulated flow record prior to regulation. After basin characteristics were developed and flow records were examined, preliminary computations of flood-frequency estimates

were begun. Results of these preliminary computations indicated the need for a generalized skew study for North Carolina basins to replace outdated generalized skews that were based on a nationwide study. After the generalized skew study, flood-frequency estimates for all sites with 10 or more years of record were computed. Flood-frequency estimates were computed for 317 rural, unregulated sites and for 42 rural, regulated sites. The sites with regulated record were excluded from further analysis.

Basin characteristics data and flood-frequency estimates for the 317 rural, unregulated sites were merged to form the data base that was used to develop the regional regression equations and the region-of-influence method. Of the 317 total sites, 222 were located in the Blue Ridge-Piedmont hydrologic area, 80 were located in the Coastal Plain hydrologic area, and 15 were located in the Sand Hills hydrologic area. Preliminary multiple regression analyses, using ordinary least-squares regression, were conducted to confirm the validity of the regionalization scheme and to identify the best combination of explanatory variables for inclusion in the generalized least-squares analysis.

Generalized least-squares analysis was used to develop a set of equations for each region that relates the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence interval flood discharges to drainage area. Model error and error of prediction for the equations ranged from about 40 percent for the lower recurrence interval equations to more than 50 percent, with two equations for the Sand Hills indicating more than 60 percent.

The region-of-influence method was adapted to the available flood-frequency and basin characteristics data for North Carolina. The drainage area, hydrologic area, and latitude and longitude of an ungaged site in either the Blue Ridge-Piedmont or Coastal Plain hydrologic areas of North Carolina are required to predict the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence interval flood discharges for a specified ungaged site. The Sand Hills hydrologic area did not have a sufficient number of sites to apply the region-of-influence method. Because of the complexity of the computations involved in the region-of-influence method, a computer application is required for the practical use of the method.

A brief comparison of the regional regression and region-of-influence methods, based on ease of

application and RMSE of prediction, resulted in neither method being clearly superior. Both require hydrologic area and drainage area as input variables; the region-of-influence method additionally requires latitude and longitude, but these coordinates are fairly simple to determine. The RMSE were, in general, lower for the region-of-influence method, but only slightly. The region-of-influence method is newly developed and still being refined. As a result, the regional regression equations are considered to be the primary method of estimating magnitude and frequency of floods for rural ungaged sites in North Carolina. The region-of-influence method can be considered an alternative method.

A computer application is available that automates the complex computations required by the region-of-influence method. This computer application includes the option to compute flood-frequency estimates using the predictive equations developed by the traditional regional regression analysis. The computer application also computes site-specific error of prediction for each method.

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Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|--|-----------|-----------|--------------------|----------------------------|
| 1 | 02053110 | Wildcat Swamp near Jackson | 36°25'48" | 77°22'24" | 1953-1971 | 19 |
| 2 | 02053170 | Cutawhiskie Creek near Woodland | 36°17'54" | 77°11'58" | 1953-1971 | 19 |
| 3 | 02053200 | Potocasi Creek near Union | 36°22'14" | 77°01'36" | 1929-1996 | 39 |
| 4 ^{nc} | 02053400 | Ahoskie Creek near Rich Square | 36°14'52" | 77°14'12" | 1965-1973 | 9 |
| 5 ^{nc} | 02053450 | Ahoskie Creek at Mintons Store | 36°16'46" | 77°09'28" | 1965-1973 | 9 |
| 6 | 02053500 | Ahoskie Creek at Ahoskie | 36°16'48" | 77°00'00" | 1940-1963 | 13 |
| 6 ^r | 02053500* | Ahoskie Creek at Ahoskie (channelized period) | 36°16'48" | 77°00'00" | 1964-1996 | 33 |
| 7 | 02053510 | Ahoskie Creek tributary at Poortown | 36°16'29" | 77°00'38" | 1964-1973 | 10 |
| 8 | 02053550 | Chinkapin Creek near Colerain | 36°11'52" | 76°47'14" | 1953-1971 | 19 |
| 9 | 02068500 | Dan River near Francisco | 36°30'53" | 80°18'11" | 1916-1938 | 13 |
| 9 ^r | 02068500* | Dan River near Francisco (regulated period) | 36°30'53" | 80°18'11" | 1939-1996 | 54 |
| 10 | 02068610 | Hog Rook Creek near Moores Springs | 36°23'53" | 80°19'46" | 1955-1971 | 15 |
| 11 | 02068660 | Little Snow Creek near Lawsonville | 36°27'54" | 80°10'28" | 1954-1971 | 18 |
| 12 | 02069030 | Belews Creek near Kernersville | 36°12'20" | 80°04'25" | 1954-1971 | 17 |
| 13 | 02070500 | Mayo River near Price | 36°32'05" | 79°59'30" | 1930-1996 | 45 |
| 14 | 02070810 | Jacobs Creek near Wentworth | 36°20'54" | 79°53'14" | 1954-1973 | 18 |
| 15 | 02071000 | Dan River near Wentworth | 36°24'45" | 79°49'35" | 1908-1996 | 57 |
| 16 | 02071410 | Matrimony Creek near Leaksville | 36°53'13" | 79°50'08" | 1958-1973 | 15 |
| 17 ^{nc} | 02071500 | Dan River at Leaksville | 36°29'00" | 79°46'00" | 1930-1949 | 9 |
| 18 | 02074000 | Smith River at Eden | 36°31'31" | 79°45'57" | 1940-1949 | 10 |
| 18 ^r | 02074000* | Smith River at Eden (regulated period) | 36°31'31" | 79°45'57" | 1950-1996 | 47 |
| 19 | 02075160 | Moon Creek near Yanceyville | 36°28'13" | 79°23'00" | 1954-1989 | 21 |
| 20 | 02075230 | South Country Line Creek near Hightowers | 36°19'29" | 79°18'20" | 1954-1976 | 23 |
| 21 | 02077200 | Hlyco Creek near Leasburg | 36°23'57" | 79°11'50" | 1965-1996 | 30 |
| 22 | 02077210 | Kilgore Creek tributary near Leasburg | 36°22'38" | 79°09'57" | 1954-1971 | 13 |
| 23 | 02077240 | Double Creek near Roseville | 36°21'44" | 79°05'48" | 1965-1982 | 16 |
| 24 | 02077250 | South Hlyco Creek near Roseville | 36°23'09" | 79°06'26" | 1967-1980 | 14 |
| 25 ^{r, nc} | 02077300 | Hlyco River at McGehees Mill | 36°31'02" | 79°01'42" | 1965-1973 | 9 |
| 26 ^r | 02077303 | Hlyco River below Afterbay Dam near McGehees Mill | 36°31'24" | 78°59'48" | 1974-1996 | 23 |
| 27 | 02077310 | Storys Creek near Roxboro | 36°23'48" | 79°01'14" | 1954-1971 | 18 |
| 28 ^r | 02077670 | Mayo Creek near Bethel Hill | 36°32'26" | 78°52'21" | 1978-1996 | 19 |
| 29 | 02080500 | Roanoke River at Roanoke Rapids | 36°27'37" | 77°38'04" | 1878-1949 | 38 |
| 29 ^r | 02080500* | Roanoke River at Roanoke Rapids (regulated period) | 36°27'37" | 77°38'04" | 1956-1996 | 41 |
| 30 | 02081000 | Roanoke River near Scotland Neck | 36°12'34" | 77°23'03" | 1940-1949 | 10 |
| 31 | 02081060 | Smithwick Creek tributary near Williamston | 35°43'51" | 77°04'42" | 1953-1971 | 19 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[inc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|---|-----------|-----------|--------------------|----------------------------|
| 32 | 02081110 | White Oak Swamp near Windsor | 36°04'46" | 76°58'36" | 1953-1971 | 14 |
| 33 ^{inc} | 0208111310 | Cashie River at Secondary Road 1257 near Windsor | 36°02'51" | 76°59'07" | 1988-1996 | 9 |
| 34 | 02081500 | Tar River near Tar River | 36°11'41" | 78°35'00" | 1940-1996 | 57 |
| 35 | 02081710 | Long Creek at Kittrell | 36°13'30" | 78°27'15" | 1954-1976 | 20 |
| 36 | 02081747 | Tar River at U.S. 401 at Louisburg | 36°05'34" | 78°17'48" | 1964-1996 | 33 |
| 37 | 02081800 | Cedar Creek near Louisburg | 36°03'14" | 78°20'24" | 1935-1975 | 22 |
| 38 ^{inc} | 02081935 | Tar River at Spring Hope | 35°55'42" | 78°08'53" | 1967-1971 | 5 |
| 39 | 02082000 | Tar River near Nashville | 35°50'57" | 77°55'51" | 1919-1970 | 42 |
| 40 | 02082500 | Sapony Creek near Nashville | 35°53'10" | 77°54'40" | 1951-1970 | 20 |
| 41 ^r | 02082506 | Tar River below Tar River Reservoir near Rocky Mount | 35°53'58" | 77°51'57" | 1973-1996 | 24 |
| 42 | 02082540 | Wildcat Branch near Mapleville | 36°03'29" | 78°08'39" | 1953-1976 | 11 |
| 43 ^r | 02082585 | Tar River at NC97 at Rocky Mount | 35°57'15" | 77°47'15" | 1977-1996 | 20 |
| 44 | 02082610 | Tar River near Rocky Mount | 35°58'38" | 77°45'35" | 1964-1973 | 10 |
| 45 | 02082630 | Harts Mill Run near Tarboro | 35°55'40" | 77°37'10" | 1953-1971 | 18 |
| 46 ^{inc} | 02082731 | Devils Cradle Creek near Alert at Secondary Road 1412 | 36°12'03" | 78°14'19" | 1993-1996 | 4 |
| 47 | 02082770 | Swift Creek at Hilliardston | 36°06'42" | 77°55'16" | 1924-1996 | 33 |
| 48 | 02082835 | Fishing Creek near Warrenton | 36°23'00" | 78°10'54" | 1954-1976 | 22 |
| 49 | 02082950 | Little Fishing Creek near White Oak | 36°11'08" | 77°52'34" | 1960-1996 | 37 |
| 50 ^{inc} | 02082955 | Fishing Creek near Glenview | 36°08'44" | 77°50'31" | 1967-1971 | 5 |
| 51 | 02083000 | Fishing Creek near Enfield | 36°09'03" | 77°41'35" | 1915-1996 | 82 |
| 52 | 02083090 | Beaverdam Swamp near Heathsville | 36°16'49" | 77°41'48" | 1953-1971 | 19 |
| 53 | 02083410 | Deep Creek near Scotland Neck | 36°09'26" | 77°28'24" | 1953-1973 | 21 |
| 54 | 02083500 | Tar River at Tarboro | 35°53'38" | 77°32'00" | 1897-1996 | 95 |
| 55 | 02083800 | Conetoe Creek near Bethel | 35°46'33" | 77°27'45" | 1957-1996 | 40 |
| 56 ^{inc} | 02083833 | Conetoe Creek (tributary 3) near Penny Hill | 35°46'00" | 77°29'26" | 1993-1996 | 4 |
| 57 ^{inc} | 02084160 | Chicod Creek at Secondary Road 1760 near Simpson | 35°33'47" | 77°13'43" | 1976-1981 | 6 |
| 57 ^r | 02084160* | Chicod Creek at Secondary Road 1760 near Simpson (channelized period) | 35°33'47" | 77°13'43" | 1982-1996 | 11 |
| 58 ^{inc} | 02084164 | Juniper Branch at Secondary Road 1766 near Simpson | 35°33'55" | 77°14'43" | 1976-1978 | 3 |
| 58 ^{r,inc} | 02084164* | Juniper Branch at Secondary Road 1766 near Simpson (channelized period) | 35°33'55" | 77°14'43" | 1979-1986 | 8 |
| 59 | 02084240 | Collie Swamp near Everetts | 35°49'34" | 77°12'03" | 1953-1976 | 24 |
| 60 | 02084500 | Herring Run near Washington | 35°34'03" | 77°01'09" | 1946-1980 | 30 |
| 61 | 02084520 | Upper Goose Creek near Yeatsville | 35°31'25" | 76°53'23" | 1953-1973 | 21 |
| 62 | 02084540 | Durham Creek at Edward | 35°19'25" | 76°52'26" | 1966-1992 | 27 |
| 63 | 02084570 | Acre Swamp near Pinetown | 35°35'02" | 76°50'23" | 1953-1969 | 17 |
| 64 ^{inc} | 02084909 | Sevenmile Creek near Efland | 36°03'56" | 79°08'39" | 1988-1996 | 9 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|---|-----------|-----------|--------------------|----------------------------|
| 65 | 02085000 | Eno River at Hillsborough | 36°04'18" | 79°05'49" | 1928–1996 | 54 |
| 66 | 02085020 | Stony Creek tributary near Hillsboro | 36°03'01" | 79°02'14" | 1953–1971 | 19 |
| 67 | 02085070 | Eno River near Durham | 36°04'20" | 78°54'30" | 1964–1996 | 33 |
| 68 | 02085190 | North Fork Little River tributary near Rougemont | 36°11'41" | 79°00'52" | 1954–1976 | 23 |
| 69 | 0208521324 | Little River at Secondary Road 1461 near Orange Factory | 36°08'30" | 78°55'10" | 1962–1996 | 35 |
| 70 | 02085500 | Flat River at Bahama | 36°10'57" | 78°52'44" | 1926–1996 | 71 |
| 71 | 02086000 | Dial Creek near Bahama | 36°10'36" | 78°51'24" | 1926–1991 | 47 |
| 72 ^r | 02086500 | Flat River at Dam near Bahama | 36°08'55" | 78°49'43" | 1928–1993 | 48 |
| 73 | 02086624 | Knap Of Reeds Creek near Butler | 36°07'40" | 78°48'55" | 1983–1995 | 13 |
| 74 ^{nc} | 02086849 | Ellerbe Creek near Gorman | 36°03'33" | 78°49'58" | 1983–1994 | 8 |
| 75 | 02087000 | Neuse River near Northside | 36°02'54" | 78°44'59" | 1928–1980 | 53 |
| 76 | 0208700780 | Lick Creek above Secondary Road 1814 near Oak Grove | 35°59'11" | 78°47'58" | 1983–1995 | 13 |
| 77 | 02087030 | Lick Creek near Durham | 35°58'50" | 78°44'19" | 1954–1971 | 18 |
| 78 | 02087140 | Lower Barton Creek tributary near Raleigh | 35°54'44" | 78°40'55" | 1954–1971 | 18 |
| 79 | 02087183 | Neuse River near Falls | 35°56'25" | 78°34'56" | 1945–1980 | 21 |
| 79 ^{r†} | 02087183* | Neuse River near Falls (regulated period) | 35°56'25" | 78°34'56" | 1981–1996 | 16 |
| 80 | 02087240 | Sturup Iron Creek tributary near Nelson | 35°53'06" | 78°49'37" | 1952–1973 | 20 |
| 81 | 02087500 | Neuse River near Clayton | 35°38'50" | 78°24'22" | 1919–1980 | 53 |
| 81 ^{r†} | 02087500* | Neuse River near Clayton (regulated period) | 35°38'50" | 78°24'22" | 1981–1996 | 16 |
| 82 | 02087570 | Neuse River at Smithfield | 35°30'46" | 78°21'00" | 1908–1980 | 48 |
| 82 ^{r†} | 02087570* | Neuse River at Smithfield (regulated period) | 35°30'46" | 78°21'00" | 1981–1990 | 10 |
| 83 | 02087580 | Swift Creek near Apex | 35°43'00" | 78°45'00" | 1954–1971 | 18 |
| 84 ^{nc} | 0208758850 | Swift Creek near McCullars Crossroads | 35°41'33" | 78°41'34" | 1992–1996 | 5 |
| 85 | 02087910 | Middle Creek near Holly Springs | 35°39'28" | 78°48'06" | 1954–1971 | 18 |
| 86 | 02088000 | Middle Creek near Clayton | 35°34'10" | 78°35'30" | 1940–1996 | 56 |
| 87 | 02088140 | Stone Creek near Newton Grove | 35°20'24" | 78°21'54" | 1953–1971 | 19 |
| 88 | 02088210 | Hannah Creek near Benson | 35°23'36" | 78°31'48" | 1953–1971 | 19 |
| 89 | 02088420 | Long Branch near Selma | 35°38'11" | 78°15'06" | 1953–1971 | 19 |
| 90 | 02088470 | Little River near Kenly | 35°35'20" | 78°11'18" | 1965–1989 | 25 |
| 91 | 02088500 | Little River near Princeton | 35°30'40" | 78°09'38" | 1919–1996 | 66 |
| 92 | 02089000 | Neuse River near Goldsboro | 35°20'14" | 77°59'51" | 1930–1980 | 51 |
| 92 ^{r†} | 02089000* | Neuse River near Goldsboro (regulated period) | 35°20'14" | 77°59'51" | 1984–1996 | 13 |
| 93 ^{nc} | 0208925200 | Bear Creek at Mays Store | 35°16'28" | 77°47'40" | 1988–1996 | 9 |
| 94 | 02089500 | Neuse River at Kinston | 35°15'29" | 77°35'09" | 1919–1980 | 53 |
| 94 ^{r†} | 02089500* | Neuse River at Kinston (regulated period) | 35°15'29" | 77°35'09" | 1981–1996 | 16 |

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[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|---|-----------|-----------|--------------------|----------------------------|
| 95 | 02090380 | Contentnea Creek near Lucama | 35°41'29" | 78°06'38" | 1965-1976 | 12 |
| 95* | 02090380* | Contentnea Creek near Lucama (regulated period) | 35°41'29" | 78°06'38" | 1977-1996 | 20 |
| 96 | 02090560 | Lee Swamp tributary near Lucama | 35°38'21" | 78°01'37" | 1953-1971 | 19 |
| 97 | 02090625 | Turner Swamp near Eureka | 35°34'14" | 77°52'47" | 1969-1987 | 19 |
| 98 | 02090780 | Whiteoak Swamp tributary near Wilson | 35°42'24" | 77°47'11" | 1953-1971 | 19 |
| 99 | 02090960 | Nahunia Swamp near Pikeville | 35°30'40" | 77°58'56" | 1953-1973 | 19 |
| 100 ^{nc} | 0209096970 | Moccasin Run near Paletown | 35°28'46" | 77°54'37" | 1989-1996 | 8 |
| 101 | 02091000 | Nahunia Swamp near Shine | 35°29'20" | 77°48'22" | 1955-1996 | 42 |
| 102 | 02091430 | Shepherd Run near Snow Hill | 35°26'06" | 77°38'42" | 1953-1971 | 19 |
| 103 | 02091500 | Contentnea Creek at Hookerton | 35°25'44" | 77°34'59" | 1928-1996 | 68 |
| 104 | 02091700 | Little Contentnea Creek near Farmville | 35°32'40" | 77°30'41" | 1957-1987 | 31 |
| 105 | 02091810 | Halfmoon Creek near Fort Barnwell | 35°17'58" | 77°21'14" | 1953-1975 | 12 |
| 106 | 02091970 | Creeping Swamp near Vanceboro | 35°23'30" | 77°13'46" | 1972-1985 | 14 |
| 107 | 02092000 | Swift Creek near Vanceboro | 35°20'42" | 77°11'45" | 1909-1989 | 39 |
| 108 | 02092020 | Palmetto Swamp near Vanceboro | 35°20'18" | 77°10'16" | 1953-1976 | 24 |
| 109 | 02092120 | Bachelor Creek near New Bern | 35°10'24" | 77°06'14" | 1953-1971 | 19 |
| 110 | 02092290 | Rattlesnake Branch near Comfort | 35°00'31" | 77°35'50" | 1953-1971 | 19 |
| 111 | 02092500 | Trent River near Trenton | 35°03'54" | 77°27'24" | 1928-1996 | 45 |
| 112 | 02092520 | Vine Swamp near Kinston | 35°09'29" | 77°33'16" | 1953-1971 | 19 |
| 113 | 02092620 | Upper Broad Creek tributary near Grantsboro | 35°08'06" | 76°56'31" | 1953-1973 | 21 |
| 114 | 02092720 | White Oak River at Belgrade | 34°53'30" | 77°14'02" | 1953-1973 | 21 |
| 115 | 02092780 | Bell Swamp near Hubert | 34°42'04" | 77°14'01" | 1953-1970 | 18 |
| 116 | 02093000 | New River near Gum Branch | 34°50'56" | 77°31'11" | 1908-1996 | 33 |
| 117 | 02093040 | Southwest Creek tributary near Jacksonville | 34°47'18" | 77°33'08" | 1954-1973 | 19 |
| 118 | 02093070 | Southwest Creek near Jacksonville | 34°43'56" | 77°32'02" | 1953-1973 | 20 |
| 119 | 02093290 | Haw River near Summerfield | 36°14'32" | 79°52'20" | 1954-1971 | 18 |
| 120 | 02093500 | Haw River near Benaja | 36°15'06" | 79°33'55" | 1916-1971 | 43 |
| 121 ^{nc} | 02093549 | Haw River at Allamahaw | 36°10'43" | 79°30'09" | 1968-1973 | 6 |
| 122 | 02093800 | Reedy Fork near Oak Ridge | 36°10'22" | 79°57'12" | 1956-1996 | 41 |
| 123 | 02094000 | Horsepen Creek at Battle Ground | 36°08'34" | 79°51'40" | 1926-1959 | 30 |
| 124 | 02095000 | South Buffalo Creek near Greensboro | 36°03'36" | 79°43'33" | 1929-1958 | 29 |
| 125 | 02095500 | North Buffalo Creek near Greensboro | 36°07'13" | 79°42'30" | 1929-1990 | 62 |
| 126 | 02096500 | Haw River at Haw River | 36°05'13" | 79°22'02" | 1929-1996 | 68 |
| 127 | 02096660 | Rock Creek near Whitsett | 36°04'49" | 78°47'45" | 1954-1971 | 17 |
| 128 | 02096700 | Big Alamance Creek near Elon College | 36°02'21" | 79°31'29" | 1945-1980 | 23 |

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| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|--|-----------|-----------|--------------------|----------------------------|
| 129 | 02096740 | Gun Branch near Alamance | 36°02'58" | 79°28'35" | 1954-1973 | 19 |
| 130 ^{nc} | 02096846 | Cane Creek near Orange Grove | 35°59'13" | 79°12'23" | 1989-1996 | 8 |
| 131 | 02096850 | Cane Creek near Teer | 35°56'34" | 79°14'46" | 1960-1973 | 14 |
| 132 | 02096960 | Haw River near Bynum | 35°45'48" | 79°08'02" | 1908-1996 | 69 |
| 133 | 02097010 | Robeson Creek near Pittsboro | 35°43'29" | 79°12'33" | 1954-1976 | 23 |
| 134 | 02097314 | New Hope Creek near Blands | 35°53'05" | 78°57'58" | 1983-1996 | 14 |
| 135 | 0209741955 | Northeast Creek at Secondary Road 1100 near Genlee | 35°52'20" | 78°54'49" | 1983-1996 | 12 |
| 136 | 02097910 | White Oak Creek near Wilsonville | 35°44'47" | 79°00'44" | 1954-1971 | 18 |
| 137 | 02098000 | New Hope River near Pittsboro | 35°44'12" | 79°01'36" | 1908-1973 | 24 |
| 138 ^r | 02098198 | Haw River below B. Everett Jordan Dam near Moncure | 35°39'11" | 79°04'03" | 1980-1992 | 13 |
| 139 ^{nc} | 02098200 | Haw River near Haywood | 35°39'01" | 79°03'59" | 1966-1972 | 7 |
| 140 | 02098500 | West Fork Deep River near High Point | 36°00'15" | 79°58'42" | 1924-1966 | 42 |
| 141 | 02099000 | East Fork Deep River near High Point | 36°02'15" | 79°56'46" | 1929-1994 | 66 |
| 142 | 02099500 | Deep River near Randleman | 35°54'06" | 79°51'05" | 1929-1996 | 66 |
| 143 ^{nc} | 02100000 | Muddy Creek near Archdale | 35°52'35" | 79°52'43" | 1935-1941 | 7 |
| 144 | 02100500 | Deep River at Ramseur | 35°43'34" | 79°39'20" | 1901-1996 | 73 |
| 145 | 02101000 | Bear Creek at Robbins | 35°26'03" | 79°35'39" | 1940-1971 | 32 |
| 146 | 02101030 | Falls Creek near Bennett | 35°33'20" | 79°29'56" | 1954-1973 | 20 |
| 147 | 02101480 | Sugar Creek near Tramway | 35°25'28" | 79°14'50" | 1954-1973 | 20 |
| 148 ^{nc} | 0210166029 | Rocky River near Crutchfield Crossroads | 35°48'25" | 79°31'41" | 1988-1996 | 9 |
| 149 | 02101800 | Tick Creek near Mount Vernon Springs | 35°39'37" | 79°24'08" | 1959-1996 | 26 |
| 150 | 02101890 | Bear Creek near Goldston | 35°37'33" | 79°17'54" | 1952-1971 | 19 |
| 151 | 02102000 | Deep River at Moncure | 35°37'38" | 79°06'58" | 1931-1996 | 66 |
| 152 ^{nc} | 02102192 | Buckhorn Creek near Corinth | 35°33'34" | 78°58'25" | 1973-1980 | 8 |
| 152 ^{*r} | 02102192* | Buckhorn Creek near Corinth (regulated period) | 35°33'34" | 78°58'25" | 1981-1996 | 16 |
| 153 | 02102500 | Cape Fear River at Lillington | 35°24'22" | 78°48'48" | 1924-1980 | 57 |
| 153 ^{*r} | 02102500* | Cape Fear River at Lillington (regulated period) | 35°24'22" | 78°48'48" | 1981-1996 | 16 |
| 154 | 02102908 | Flat Creek near Inverness | 35°10'54" | 79°10'40" | 1969-1996 | 28 |
| 155 | 02102910 | Dunhams Creek tributary near Carthage | 35°18'41" | 79°22'53" | 1954-1971 | 18 |
| 156 | 02102930 | Crane Creek near Vass | 35°17'53" | 79°16'19" | 1954-1971 | 18 |
| 157 | 02103000 | Little River at Manchester | 35°11'38" | 78°59'14" | 1939-1950 | 11 |
| 158 | 02103390 | South Prong Anderson Creek near Lillington | 35°15'31" | 78°55'27" | 1953-1971 | 19 |
| 159 | 02103500 | Little River at Linden | 35°15'46" | 78°46'35" | 1928-1971 | 44 |
| 160 | 02104000 | Cape Fear River at Fayetteville | 35°02'49" | 78°51'36" | 1889-1976 | 71 |
| 161 | 02104080 | Reese Creek near Fayetteville | 35°04'49" | 78°47'45" | 1953-1971 | 17 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|--|-----------|-----------|--------------------|----------------------------|
| 162 | 02104500 | Rockfish Creek near Hope Mills | 34°57'57" | 78°55'04" | 1939-1954 | 16 |
| 163 | 02105500 | Cape Fear River at William O. Huske Lock near Tarheel | 34°50'05" | 78°49'27" | 1938-1980 | 36 |
| 163*r | 02105500* | Cape Fear River at William O. Huske Lock near Tarheel (regulated period) | 34°50'05" | 78°49'27" | 1981-1996 | 15 |
| 164 | 02105570 | Browns Creek near Elizabethtown | 34°36'32" | 78°36'57" | 1953-1973 | 18 |
| 165 | 02105630 | Turnbull Creek near Elizabethtown | 34°41'32" | 78°35'02" | 1949-1971 | 19 |
| 166 | 02105769 | Cape Fear River at Lock 1 near Kelly | 34°24'15" | 78°17'38" | 1970-1980 | 11 |
| 166*r | 02105769* | Cape Fear River at Lock 1 near Kelly (regulated period) | 34°24'15" | 78°17'38" | 1981-1996 | 16 |
| 167 | 02105900 | Hood Creek near Leland | 34°16'43" | 78°07'34" | 1953-1996 | 24 |
| 168 | 02106000 | Little Coharie Creek near Roseboro | 34°57'13" | 78°29'17" | 1924-1991 | 41 |
| 169 | 02106240 | Turkey Creek near Turkey | 35°00'11" | 78°11'06" | 1953-1973 | 18 |
| 170 | 02106410 | Stewarts Creek tributary near Warsaw | 34°57'25" | 78°04'42" | 1955-1971 | 16 |
| 171 | 02106500 | Black River near Tomahawk | 34°45'17" | 78°17'21" | 1928-1996 | 45 |
| 172 | 02106910 | Big Swamp near Roseboro | 34°58'38" | 78°34'07" | 1953-1973 | 20 |
| 173 | 02107000 | South River near Parkersburg | 34°48'45" | 78°27'26" | 1952-1986 | 35 |
| 174 | 02107500 | Colly Creek near Kelly | 34°27'48" | 78°15'26" | 1908-1971 | 21 |
| 175 | 02107590 | Northeast Cape Fear River tributary near Mount Olive | 35°11'06" | 77°57'34" | 1954-1971 | 18 |
| 176 | 02107600 | Northeast Cape Fear River near Seven Springs | 35°10'20" | 77°55'56" | 1959-1975 | 17 |
| 177 | 02107620 | Mathews Creek near Pink Hill | 35°05'49" | 77°49'10" | 1953-1976 | 16 |
| 178 | 02107980 | Limestone Creek near Beulaville | 34°45'48" | 77°48'15" | 1953-1971 | 19 |
| 179 | 02108000 | Northeast Cape Fear River near Chinquapin | 34°49'40" | 77°50'00" | 1941-1996 | 56 |
| 180 | 02108500 | Rockfish Creek near Wallace | 34°44'32" | 78°02'22" | 1955-1981 | 27 |
| 181 | 02108548 | Little Rockfish Creek at Wallace | 34°44'02" | 77°58'03" | 1977-1992 | 16 |
| 182 | 02108610 | Pike Creek near Burgaw | 34°30'00" | 77°53'58" | 1953-1971 | 18 |
| 183 | 02108630 | Turkey Creek near Castle Hayne | 34°23'47" | 77°54'48" | 1953-1971 | 19 |
| 184 | 02108960 | Buckhead Branch near Bolton | 34°20'52" | 78°26'19" | 1953-1971 | 19 |
| 185 | 02109500 | Waccamaw River at Freeland | 34°05'43" | 78°32'55" | 1940-1996 | 57 |
| 186 | 02109640 | Wet Ash Swamp near Ash | 34°02'17" | 78°30'14" | 1953-1971 | 18 |
| 187 | 02110020 | Mill Branch near Tabor City | 34°10'59" | 78°48'08" | 1953-1971 | 18 |
| 188 | 02111000 | Yadkin River at Patterson | 35°59'29" | 81°33'30" | 1940-1996 | 56 |
| 189 | 02111180 | Elk Creek at Elkville | 36°04'16" | 81°24'13" | 1940-1996 | 31 |
| 190 | 02111340 | South Prong Lewis Fork Creek near North Wilkesboro | 36°11'23" | 81°24'40" | 1955-1971 | 16 |
| 191 | 02111500 | Reddies River at North Wilkesboro | 36°10'29" | 81°10'09" | 1940-1995 | 55 |
| 192 | 02112000 | Yadkin River at Wilkesboro | 36°09'09" | 81°08'45" | 1904-1961 | 48 |
| 192*r | 02112000* | Yadkin River at Wilkesboro (regulated period) | 36°09'09" | 81°08'45" | 1962-1996 | 35 |
| 193 | 02112120 | Roaring River near Roaring River | 36°14'59" | 81°02'39" | 1916-1996 | 32 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|---|-----------|-----------|--------------------|----------------------------|
| 194 | 02112247 | Elkin River at Elkin | 36°15'12" | 80°51'45" | 1971-1980 | 10 |
| 195 ^r | 02112250 | Yadkin River at Elkin | 36°14'30" | 80°50'49" | 1965-1995 | 31 |
| 196 | 02112360 | Mitchell River near State Road | 36°18'42" | 80°48'26" | 1940-1996 | 32 |
| 197 | 02112410 | Fisher River near Bottom | 36°26'35" | 80°46'12" | 1954-1971 | 16 |
| 198 | 02112500 | Fisher River near Dobson | 36°23'05" | 80°40'20" | 1922-1933 | 12 |
| 199 | 02113000 | Fisher River near Copeland | 36°21'26" | 80°41'10" | 1922-1996 | 74 |
| 200 ^r | 02113500 | Yadkin River at Siloam | 35°16'55" | 80°33'46" | 1977-1987 | 11 |
| 201 | 02113850 | Ararat River at Ararat | 36°24'16" | 80°33'43" | 1947-1996 | 32 |
| 202 | 02114010 | Ararat River at Dam near Pilot Mountain | 36°22'00" | 80°33'00" | 1938-1968 | 16 |
| 203 | 02114450 | Little Yadkin River at Dalton | 36°17'56" | 80°25'53" | 1961-1996 | 36 |
| 204 ^r | 02115360 | Yadkin River at Enon | 36°07'55" | 80°26'39" | 1965-1996 | 32 |
| 205 | 02115500 | Forbush Creek near Yadkinville | 36°08'13" | 80°33'09" | 1941-1971 | 31 |
| 206 | 02115520 | Logan Creek near Smithtown | 36°12'50" | 80°33'32" | 1954-1971 | 18 |
| 207 | 02115540 | South Deep Creek near Yadkinville | 36°08'00" | 80°46'00" | 1954-1966 | 13 |
| 208 ^{nc} | 02115730 | Mill Creek near Stanleyville | 36°10'49" | 80°16'19" | 1965-1972 | 6 |
| 209 ^{nc} | 02115740 | Mill Creek near Oldtown | 36°09'06" | 80°19'03" | 1965-1972 | 6 |
| 210 ^{nc} | 02115810 | Little Creek near Clemmons | 36°02'19" | 80°20'46" | 1965-1972 | 6 |
| 211 | 02115830 | Smith Creek near Kernersville | 36°06'19" | 80°06'19" | 1954-1971 | 18 |
| 212 | 02115856 | Salem Creek near Atwood | 36°02'10" | 80°18'35" | 1972-1982 | 11 |
| 213 | 02115860 | Muddy Creek near Muddy Creek | 36°00'01" | 80°20'25" | 1965-1991 | 19 |
| 214 | 02115900 | South Fork Muddy Creek near Clemmons | 36°00'22" | 80°18'07" | 1965-1991 | 19 |
| 215 | 02116500 | Yadkin River at Yadkin College | 35°51'23" | 80°23'14" | 1916-1961 | 33 |
| 215 ^r | 02116500* | Yadkin River at Yadkin College (regulated period) | 35°51'23" | 80°23'14" | 1962-1996 | 35 |
| 216 | 02117030 | Humpy Creek near Fork | 35°51'17" | 80°26'24" | 1969-1983 | 15 |
| 217 | 02117410 | McClelland Creek near Statesville | 35°57'04" | 80°56'46" | 1954-1976 | 22 |
| 218 | 02117500 | Rocky Creek at Turnersburg | 35°54'23" | 80°48'34" | 1941-1971 | 31 |
| 219 | 02118000 | South Yadkin River near Mocksville | 35°50'41" | 80°39'34" | 1930-1996 | 58 |
| 220 | 02118500 | Hunting Creek near Harmony | 36°00'00" | 80°44'44" | 1952-1996 | 45 |
| 221 | 02119000 | South Yadkin River at Cooleenec | 35°48'10" | 80°33'22" | 1916-1965 | 37 |
| 222 ^r | 02119400 | Third Creek near Stony Point | 35°52'04" | 81°04'00" | 1957-1969 | 13 |
| 223 | 02120500 | Third Creek at Cleveland | 35°45'00" | 80°41'00" | 1916-1954 | 14 |
| 223 ^r | 02120500* | Third Creek at Cleveland (regulated period) | 35°45'00" | 80°41'00" | 1955-1971 | 17 |
| 224 | 02120780 | Second Creek near Barber | 35°43'05" | 80°35'45" | 1980-1996 | 17 |
| 225 | 02120820 | Deal Branch near Salisbury | 35°44'43" | 80°30'25" | 1954-1971 | 15 |
| 226 | 02121000 | Yadkin River near Salisbury | 35°43'30" | 80°23'50" | 1896-1927 | 30 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|--|-----------|-----------|--------------------|----------------------------|
| 227 | 02121180 | North Potts Creek at Linwood | 35°45'28" | 80°19'24" | 1980-1990 | 11 |
| 228 | 02121500 | Abbotts Creek at Lexington | 35°48'23" | 80°14'05" | 1941-1995 | 23 |
| 229 | 02121940 | Fiat Swamp Creek near Lexington | 35°43'59" | 80°06'37" | 1954-1971 | 18 |
| 230 ^{nc} | 02122500 | Yadkin River at High Rock | 35°35'46" | 80°13'59" | 1916-1927 | 8 |
| 230 ^r | 02122500* | Yadkin River at High Rock (regulated period) | 35°35'46" | 80°13'59" | 1942-1961 | 19 |
| 231 | 02122560 | Cabin Creek near Jackson Hill | 35°34'57" | 80°09'12" | 1954-1971 | 17 |
| 232 | 02122720 | Beaverdam Creek tributary near Denton | 35°31'57" | 80°05'04" | 1954-1971 | 18 |
| 233 | 02123500 | Uwharrie River near Eldorado | 35°25'47" | 80°01'05" | 1928-1971 | 32 |
| 234 | 02123567 | Dutchmans Creek near Uwharrie | 35°22'05" | 80°01'49" | 1982-1995 | 12 |
| 235 | 02124060 | North Prong Clarke Creek near Huntersville | 35°25'13" | 80°47'54" | 1954-1973 | 20 |
| 236 | 02124130 | Mallard Creek near Charlotte | 35°19'05" | 80°44'16" | 1954-1971 | 18 |
| 237 | 02125000 | Big Bear Creek near Richfield | 35°20'02" | 80°20'09" | 1955-1996 | 42 |
| 238 | 02125410 | Chinkapin Creek near Monroe | 35°02'48" | 80°29'33" | 1953-1971 | 18 |
| 239 | 02126000 | Rocky River near Norwood | 35°08'54" | 80°10'33" | 1908-1996 | 67 |
| 240 | 02127000 | Brown Creek near Polkton | 35°02'10" | 80°08'42" | 1908-1971 | 36 |
| 241 | 02127390 | Palmetto Branch at Ansonville | 35°06'03" | 80°07'11" | 1953-1971 | 17 |
| 242 | 02128000 | Little River near Star | 35°23'11" | 79°49'56" | 1955-1996 | 41 |
| 243 | 02128260 | Cheek Creek near Pekin | 35°12'37" | 79°50'49" | 1954-1971 | 18 |
| 244 ^r | 02129000 | Pee Dee River near Rockingham | 34°56'46" | 79°52'11" | 1928-1996 | 69 |
| 245 | 02129440 | South Fork Jones Creek near Morven | 34°53'51" | 80°00'24" | 1954-1971 | 18 |
| 246 | 02129530 | Little Creek tributary near Pee Dee | 34°55'07" | 79°54'38" | 1955-1971 | 11 |
| 247 | 02132230 | Bridge Creek tributary at Johns | 34°42'12" | 79°26'34" | 1953-1973 | 18 |
| 248 ^{nc} | 0213228795 | Jordan Creek near Silver Hill | 34°58'12" | 79°31'35" | 1985-1993 | 9 |
| 249 | 02132320 | Big Shoe Heel Creek near Laurinburg | 34°45'01" | 79°23'12" | 1987-1996 | 10 |
| 250 | 02133500 | Drowning Creek near Hoffman | 35°03'38" | 79°29'39" | 1940-1996 | 57 |
| 251 | 02133590 | Beaverdam Creek near Aberdeen | 35°00'42" | 79°26'50" | 1953-1971 | 18 |
| 252 | 02133624 | Lumber River near Maxton | 34°46'22" | 79°19'55" | 1987-1996 | 10 |
| 253 | 02133960 | Raft Swamp near Red Springs | 34°52'16" | 79°10'12" | 1953-1971 | 15 |
| 254 | 02134380 | Tenmile Swamp near Lumberton | 34°43'34" | 78°59'31" | 1953-1973 | 18 |
| 255 | 02134500 | Lumber River at Boardman | 34°26'32" | 78°57'38" | 1901-1996 | 67 |
| 256 | 02137000 | Mill Creek at Old Fort | 35°37'59" | 82°11'14" | 1940-1975 | 15 |
| 257 | 02137727 | Catawba River near Pleasant Gardens | 35°41'09" | 82°03'40" | 1981-1996 | 16 |
| 258 | 02138000 | Catawba River near Marion | 35°42'26" | 82°02'00" | 1916-1981 | 40 |
| 259 | 02138500 | Linville River near Nebo | 35°47'41" | 81°53'25" | 1916-1996 | 74 |
| 260 | 02138680 | White Branch near Marion | 35°38'46" | 81°55'18" | 1955-1971 | 14 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[inc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|---|-----------|-----------|--------------------|----------------------------|
| 261 | 02140980 | Carroll Creek near Collettsville | 35°53'21" | 81°44'18" | 1955-1971 | 17 |
| 262 | 02140991 | Johns River at Arneys Store | 35°50'01" | 81°42'43" | 1986-1996 | 11 |
| 263 | 02141130 | Zacks Fork Creek near Lenoir | 35°55'32" | 81°31'13" | 1967-1976 | 10 |
| 264 | 02141890 | Duck Creek near Taylorsville | 35°53'34" | 81°18'09" | 1954-1971 | 18 |
| 265 | 02142000 | Lower Little River near All Healing Springs | 35°56'44" | 81°14'13" | 1954-1995 | 42 |
| 266 | 02142480 | Hagan Creek near Catawba | 35°40'20" | 81°08'12" | 1954-1971 | 15 |
| 267 ^r | 02142500 | Catawba River at Catawba | 35°43'00" | 81°03'59" | 1936-1962 | 30 |
| 268 | 0214253830 | Norwood Creek near Troutman | 35°40'48" | 80°56'44" | 1984-1996 | 13 |
| 269 | 02142900 | Long Creek near Paw Creek | 35°19'42" | 80°54'35" | 1966-1996 | 31 |
| 270 | 02143000 | Henry Fork near Henry River | 35°41'03" | 81°24'10" | 1916-1996 | 59 |
| 271 | 02143040 | Jacob Fork at Ramsey | 35°35'26" | 81°34'02" | 1962-1996 | 35 |
| 272 | 02143310 | Lithia Inn Branch near Lincolnton | 35°27'47" | 81°13'27" | 1954-1971 | 14 |
| 273 | 02143500 | Indian Creek near Laboratory | 35°25'20" | 81°15'52" | 1916-1996 | 45 |
| 274 | 02144000 | Long Creek near Bessemer City | 35°18'23" | 81°14'05" | 1954-1996 | 43 |
| 275 | 02145000 | South Fork Catawba River at Lowell | 35°17'10" | 81°06'00" | 1940-1996 | 42 |
| 276 | 02146890 | East Fork Twelve Mile Creek near Waxhaw | 34°57'46" | 80°42'40" | 1954-1972 | 18 |
| 277 | 02146900 | Twelve Mile Creek near Waxhaw | 34°57'08" | 80°45'21" | 1949-1996 | 36 |
| 278 ^r | 02148500 | Broad River near Chimney Rock | 35°25'29" | 82°10'54" | 1928-1958 | 31 |
| 279 | 02149000 | Cove Creek near Lake Lure | 35°25'24" | 82°06'42" | 1916-1996 | 45 |
| 280 | 02150420 | Camp Creek near Rutherfordton | 35°27'47" | 81°54'29" | 1955-1971 | 17 |
| 281 | 02151000 | Second Broad River at Cliffside | 35°14'08" | 81°45'57" | 1926-1996 | 71 |
| 282 | 02151500 | Broad River near Boiling Springs | 35°12'39" | 81°41'52" | 1926-1996 | 70 |
| 283 | 02152100 | First Broad River near Casar | 35°29'35" | 81°40'56" | 1960-1996 | 36 |
| 284 | 02152420 | Big Knob Creek near Fallston | 35°29'34" | 81°32'25" | 1953-1971 | 18 |
| 285 | 02152500 | First Broad River near Lawndale | 35°22'50" | 81°32'40" | 1916-1980 | 41 |
| 286 | 02152610 | Sugar Branch near Boiling Springs | 35°15'00" | 81°37'15" | 1954-1987 | 34 |
| 287 | 03160610 | Old Field Creek near West Jefferson | 36°21'29" | 81°31'46" | 1955-1971 | 17 |
| 288 | 03161000 | South Fork New River near Jefferson | 36°23'35" | 81°24'26" | 1916-1996 | 69 |
| 289 | 03162110 | Buffalo Creek at Warrensville | 36°27'22" | 81°30'51" | 1940-1971 | 17 |
| 290 | 03162500 | North Fork New River at Crumpler | 36°31'04" | 81°23'18" | 1878-1966 | 39 |
| 291 | 03162880 | Vile Creek near Sparta | 36°30'39" | 81°06'16" | 1955-1971 | 17 |
| 292 | 03439000 | French Broad River at Rosman | 35°08'32" | 82°49'28" | 1908-1996 | 62 |
| 293 | 03439500 | French Broad at Calvert | 35°08'55" | 82°47'57" | 1916-1955 | 31 |
| 294 | 03440000 | Catheys Creek near Brevard | 35°12'40" | 82°47'00" | 1945-1996 | 21 |
| 295 | 03441000 | Davidson River near Brevard | 35°16'23" | 82°42'21" | 1876-1996 | 73 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|---|-----------|-----------|--------------------|----------------------------|
| 296 | 03441440 | Little River above High Falls near Cedar Mountain | 35°11'32" | 82°36'49" | 1963–1990 | 28 |
| 297 | 03441500 | Little River near Penrose | 35°13'23" | 82°38'07" | 1916–1973 | 13 |
| 298 | 03442000 | Crab Creek near Penrose | 35°14'02" | 82°36'39" | 1916–1965 | 13 |
| 299 | 03443000 | French Broad River at Blantyre | 35°17'56" | 82°37'26" | 1875–1996 | 76 |
| 300 | 03444000 | Boylston Creek near Horseshoe | 35°22'10" | 82°33'50" | 1943–1973 | 13 |
| 301 | 03444500 | South Fork Mills River at The Pink Beds | 35°21'59" | 82°44'20" | 1927–1973 | 31 |
| 302 | 03446000 | Mills River near Mills River | 35°23'55" | 82°35'42" | 1876–1996 | 64 |
| 303 | 03446410 | Laurel Branch near Edneyville | 35°22'15" | 82°24'10" | 1955–1970 | 12 |
| 304 | 03446500 | Clear Creek near Hendersonville | 35°21'14" | 82°26'40" | 1910–1965 | 10 |
| 305 | 03447000 | Mud Creek at Naples | 35°22'52" | 82°29'54" | 1916–1955 | 17 |
| 306 | 03447500 | Cane Creek at Fletcher | 35°26'08" | 82°29'23" | 1916–1973 | 18 |
| 307 | 03448000 | French Broad River at Bent Creek | 35°30'07" | 82°35'33" | 1916–1986 | 52 |
| 308 | 03448500 | Hominy Creek at Candler | 35°32'28" | 82°40'35" | 1940–1978 | 35 |
| 309 ^{nc} | 0344894205 | North Fork Swannanoa River near Walkertown | 35°41'07" | 82°19'58" | 1990–1996 | 7 |
| 310 | 03449000 | North Fork Swannanoa River near Black Mountain | 35°39'11" | 82°21'04" | 1926–1952 | 27 |
| 310 ^{r,nc} | 03449000* | North Fork Swannanoa River near Black Mountain (regulated period) | 35°39'11" | 82°21'04" | 1953–1957 | 5 |
| 311 | 03450000 | Beetree Creek near Swannanoa | 35°39'11" | 82°24'20" | 1927–1996 | 61 |
| 312 | 03451000 | Swannanoa River at Biltmore | 35°34'06" | 82°32'42" | 1791–1979 | 51 |
| 312 ^r | 03451000* | Swannanoa River at Biltmore (regulated period) | 35°34'06" | 82°32'42" | 1980–1996 | 17 |
| 313 | 03451500 | French Broad River at Asheville | 35°36'33" | 82°34'43" | 1896–1996 | 101 |
| 314 | 03452000 | Sandymush Creek near Alexander | 35°43'49" | 82°40'11" | 1940–1955 | 13 |
| 315 | 03453000 | Ivy Creek near Marshall | 35°46'10" | 82°37'16" | 1876–1996 | 42 |
| 316 | 03453500 | French Broad River at Marshall | 35°47'10" | 82°39'39" | 1916–1996 | 54 |
| 317 | 03453880 | Brush Creek at Walnut | 35°50'40" | 82°44'30" | 1954–1971 | 17 |
| 318 | 03454000 | Big Laurel Creek near Stackhouse | 35°55'12" | 82°45'42" | 1935–1978 | 39 |
| 319 | 03454500 | French Broad River at Hot Springs | 35°53'23" | 82°49'16" | 1796–1978 | 15 |
| 320 | 03455500 | West Fork Pigeon River above Lake Logan near Hazelwood | 35°23'46" | 82°56'17" | 1955–1996 | 42 |
| 321 ^{r,nc} | 0345577330 | West Fork Pigeon River near Retreat | 35°25'36" | 82°55'12" | 1989–1996 | 8 |
| 322 ^r | 03456100 | West Fork Pigeon River at Bethel | 35°27'48" | 82°54'00" | 1955–1996 | 41 |
| 323 | 03456500 | East Fork Pigeon River near Canton | 35°27'42" | 82°52'13" | 1955–1996 | 42 |
| 324 | 03456991 | Pigeon River near Canton | 35°31'19" | 82°50'53" | 1810–1996 | 71 |
| 325 | 03457500 | Allen Creek near Hazelwood | 35°25'49" | 83°00'30" | 1950–1973 | 24 |
| 326 ^{nc} | 03458500 | Pigeon River nr Crabtree | 35°34'37" | 82°57'07" | 1922–1930 | 9 |
| 327 | 03459000 | Jonathan Creek near Cove Creek | 35°37'21" | 83°00'25" | 1931–1973 | 43 |
| 328 | 03459500 | Pigeon River near Hepco | 35°38'05" | 82°59'21" | 1876–1996 | 69 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|--|-----------|-----------|--------------------|----------------------------|
| 329 | 03460000 | Cataloochee Creek near Cataloochee | 35°40'02" | 83°04'22" | 1935-1996 | 52 |
| 330 | 03461910 | North Toe River at Newland | 36°05'01" | 81°55'45" | 1955-1973 | 19 |
| 331 | 03462000 | North Toe River at Altapass | 35°53'59" | 82°01'50" | 1935-1978 | 24 |
| 332 | 03463300 | South Toe River near Celo | 35°49'53" | 82°11'04" | 1958-1996 | 39 |
| 333 | 03463500 | South Toe River at Newdale | 35°54'22" | 82°11'19" | 1916-1978 | 18 |
| 334 | 03463910 | Phipps Creek near Burnsville | 35°54'40" | 82°22'10" | 1957-1973 | 14 |
| 335 | 03464000 | Cane River near Sioux | 36°00'52" | 82°19'40" | 1893-1978 | 38 |
| 336 | 03464500 | Nolichucky River at Poplar | 36°04'29" | 82°20'41" | 1926-1978 | 30 |
| 337 | 03478910 | Cove Creek at Sherwood | 36°15'50" | 81°47'03" | 1940-1972 | 18 |
| 338 | 03479000 | Watauga River near Sugar Grove | 36°14'18" | 81°49'22" | 1916-1996 | 57 |
| 339 | 03480540 | Peavine Branch near Banner Elk | 36°10'20" | 81°54'42" | 1953-1972 | 11 |
| 340 | 03481000 | Elk River near Elk Park | 36°11'01" | 81°57'45" | 1935-1978 | 21 |
| 341 | 03500000 | Little Tennessee River near Prentiss | 35°08'59" | 83°22'47" | 1899-1996 | 52 |
| 342 | 03500240 | Cartoogchaye Creek near Franklin | 35°09'31" | 83°23'40" | 1949-1996 | 35 |
| 343 ^r | 03500500 | Cullasaja River at Highlands | 35°04'14" | 83°13'57" | 1928-1971 | 44 |
| 344 | 03501000 | Cullasaja River at Cullasaja | 35°09'59" | 83°19'25" | 1908-1976 | 52 |
| 345 | 03501760 | Coon Creek near Franklin | 35°14'04" | 83°20'28" | 1957-1973 | 17 |
| 346 | 03502000 | Little Tennessee River at Iotla | 35°13'59" | 82°23'32" | 1899-1949 | 17 |
| 347 | 03503000 | Little Tennessee River at Needmore | 35°20'11" | 83°31'37" | 1899-1996 | 51 |
| 348 | 03504000 | Nantahala River near Rainbow Springs | 35°07'37" | 83°37'09" | 1940-1996 | 57 |
| 349 ^r | 03505500 | Nantahala River at Nantahala | 35°17'55" | 83°39'21" | 1943-1982 | 39 |
| 350 | 03506500 | Nantahala River at Almond | 35°22'32" | 83°33'59" | 1923-1941 | 17 |
| 351 | 03507000 | Little Tennessee River at Judson | 35°24'30" | 83°33'26" | 1897-1944 | 48 |
| 352 ^{nc} | 03508000 | Tuckasegee River at Tuckasegee | 35°16'55" | 83°07'37" | 1840-1940 | 6 |
| 352 ^r | 03508000* | Tuckasegee River at Tuckasegee (regulated period) | 35°16'55" | 83°07'37" | 1941-1976 | 37 |
| 353 | 03509000 | Scott Creek above Sylva | 35°23'02" | 83°12'51" | 1929-1995 | 48 |
| 354 | 03510500 | Tuckasegee River at Dillsboro | 35°22'00" | 83°15'37" | 1928-1940 | 13 |
| 354 ^r | 03510500* | Tuckasegee River at Dillsboro (regulated period) | 35°22'00" | 83°15'37" | 1941-1982 | 43 |
| 355 | 03511000 | Oconalufee River at Cherokee | 35°29'04" | 83°18'56" | 1867-1949 | 28 |
| 356 | 03512000 | Oconalufee River at Birdtown | 35°27'41" | 83°21'13" | 1946-1996 | 48 |
| 357 | 03513000 | Tuckasegee River at Bryson City | 35°25'40" | 83°26'51" | 1898-1940 | 43 |
| 357 ^r | 03513000* | Tuckasegee River at Bryson City (regulated period) | 35°25'40" | 83°26'51" | 1941-1995 | 55 |
| 358 | 03513410 | Jenkins Branch tributary at Bryson City | 35°24'50" | 83°27'20" | 1957-1971 | 13 |
| 359 | 03513500 | Noland Creek near Bryson City | 35°29'05" | 83°30'15" | 1936-1971 | 36 |
| 360 | 03514000 | Hazel Creek at Proctor | 35°28'38" | 83°42'58" | 1943-1952 | 10 |

Table 1. Map identification numbers and descriptions of gaged rural sites in North Carolina with annual peak-flow record—Continued

[inc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification and station number for sites having separate period of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization]

| Map identification number (fig. 1) | Station number | Station name | Latitude | Longitude | Period of analysis | Number of systematic peaks |
|------------------------------------|----------------|--|-----------|-----------|--------------------|----------------------------|
| 361 ^{inc} | 03515000 | Little Tennessee River at Fontana Dam | 35°26'45" | 83°48'20" | 1939-1944 | 6 |
| 361 ^{*r} | 03515000* | Little Tennessee River at Fontana Dam (regulated period) | 35°26'45" | 83°48'20" | 1945-1954 | 10 |
| 362 | 03516000 | Snowbird Creek near Robbinsville | 35°18'40" | 83°51'35" | 1943-1952 | 10 |
| 363 | 03546000 | Shooting Creek near Hayesville | 35°01'29" | 83°42'27" | 1923-1955 | 13 |
| 364 ^r | 03547000 | Hiwassee River below Chatuge Dam near Hayesville | 35°01'45" | 83°47'45" | 1943-1974 | 32 |
| 365 | 03548500 | Hiwassee River above Murphy | 35°04'49" | 84°00'10" | 1897-1941 | 44 |
| 365 ^{*r} | 03548500* | Hiwassee River above Murphy (regulated period) | 35°04'49" | 84°00'10" | 1942-1996 | 55 |
| 366 | 03550000 | Valley River at Tomolia | 35°08'20" | 83°58'50" | 1898-1996 | 86 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 1 | 51.7 | 99.7 | 142 | 210 | 271 | 343 | 426 | 557 | 0.7 | 1.17 | 8.61 | 4.33 | 0.53 | 2.24 | 2.89 | 3.08 | 2 |
| 2 | 334 | 643 | 914 | 1340 | 1720 | 2160 | 2660 | 3440 | 11.8 | 5.84 | 2.93 | 13.25 | .33 | 2.25 | 2.90 | 3.09 | 2 |
| 3 | 1950 | 2950 | 3690 | 4720 | 5550 | 6430 | 7370 | 8720 | 22.5 | 30.86 | 3.18 | 16.19 | .23 | 2.26 | 2.90 | 3.10 | 2 |
| 4 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 3.7 | 2.65 | 2.38 | 4.10 | .58 | 2.25 | 2.90 | 3.09 | 2 |
| 5 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 24.0 | 8.03 | 2.18 | 9.79 | .34 | 2.26 | 2.90 | 3.09 | 2 |
| 6 | 818 | 1380 | 1830 | 2500 | 3070 | 3700 | 4390 | 5440 | 63.3 | 18.55 | 2.34 | 8.23 | .18 | 2.26 | 2.90 | 3.10 | 2 |
| 6 ^{*r} | 963 | 1340 | 1630 | 2070 | 2440 | 2860 | 3330 | 4040 | 63.3 | 18.55 | 2.34 | 8.23 | .18 | 2.26 | 2.90 | 3.10 | 2 |
| 7 | 209 | 253 | 280 | 313 | 337 | 361 | 384 | 415 | 2.6 | 3.07 | 7.12 | 2.28 | .25 | 2.26 | 2.90 | 3.10 | 2 |
| 8 | 220 | 426 | 612 | 912 | 1190 | 1520 | 1900 | 2510 | 8.9 | 4.96 | 6.71 | 1.53 | .35 | 2.31 | 2.94 | 3.14 | 1 |
| 9 | 4600 | 7600 | 10000 | 13600 | 16700 | 20100 | 24000 | 29800 | 129 | 46.52 | 51.21 | 211.90 | .06 | 2.07 | 2.77 | 2.95 | 1 |
| 9 ^{*r} | 4210 | 7370 | 9940 | 13700 | 17000 | 20600 | 24600 | 30500 | 129 | 46.52 | 51.21 | 211.90 | .06 | 2.07 | 2.77 | 2.95 | 1 |
| 10 | 128 | 186 | 227 | 284 | 329 | 377 | 427 | 499 | .3 | 1.96 | 393.39 | 225.04 | .33 | 2.08 | 2.78 | 2.95 | 1 |
| 11 | 617 | 945 | 1190 | 1540 | 1820 | 2120 | 2450 | 2920 | 5.4 | 5.21 | 53.24 | 154.08 | .20 | 2.08 | 2.77 | 2.95 | 1 |
| 12 | 879 | 1510 | 2030 | 2810 | 3500 | 4280 | 5160 | 6510 | 14.9 | 6.25 | 18.65 | 87.83 | .37 | 2.11 | 2.80 | 2.97 | 1 |
| 13 | 7020 | 11800 | 15700 | 21600 | 26700 | 32600 | 39100 | 49200 | 242 | 36.02 | 21.01 | 145.96 | .20 | 2.10 | 2.79 | 2.97 | 1 |
| 14 | 878 | 1550 | 2130 | 3020 | 3810 | 4730 | 5770 | 7390 | 16.2 | 7.98 | 40.33 | 137.37 | .26 | 2.11 | 2.80 | 2.97 | 1 |
| 15 | 18300 | 25500 | 30400 | 36600 | 41300 | 46100 | 51000 | 57600 | 1053 | 97.48 | 23.62 | 148.17 | .11 | 2.10 | 2.80 | 2.97 | 1 |
| 16 | 960 | 1640 | 2200 | 3030 | 3730 | 4520 | 5410 | 6730 | 12.0 | 9.17 | 30.50 | 138.34 | .14 | 2.10 | 2.79 | 2.97 | 1 |
| 17 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 1150 | 116.76 | 20.23 | 154.63 | .09 | 2.10 | 2.79 | 2.97 | 1 |
| 18 | 15000 | 24300 | 31600 | 42200 | 51100 | 61000 | 71900 | 88000 | 538 | 77.81 | 10.76 | 194.65 | .09 | 2.10 | 2.79 | 2.97 | 1 |
| 18 ^{*r} | 10300 | 15300 | 19000 | 24100 | 28200 | 32500 | 37000 | 43500 | 538 | 77.81 | 10.76 | 194.65 | .09 | 2.10 | 2.79 | 2.97 | 1 |
| 19 | 821 | 1640 | 2390 | 3590 | 4700 | 6010 | 7540 | 9960 | 29.9 | 8.97 | 20.81 | 117.88 | .41 | 2.11 | 2.80 | 2.98 | 1 |
| 20 | 907 | 1380 | 1740 | 2240 | 2660 | 3120 | 3610 | 4340 | 7.1 | 4.32 | 40.20 | 103.92 | .35 | 2.12 | 2.80 | 2.98 | 1 |
| 21 | 1870 | 3710 | 5370 | 8010 | 10400 | 13200 | 16500 | 21600 | 45.9 | 14.66 | 13.59 | 118.79 | .22 | 2.12 | 2.80 | 2.98 | 1 |
| 22 | 44.2 | 77.6 | 106 | 149 | 188 | 232 | 282 | 359 | .2 | .39 | 19.18 | 66.32 | .66 | 2.12 | 2.80 | 2.98 | 1 |
| 23 | 724 | 1270 | 1720 | 2410 | 3010 | 3700 | 4480 | 5670 | 7.5 | 4.39 | 53.25 | 94.67 | .39 | 2.12 | 2.80 | 2.98 | 1 |
| 24 | 1960 | 3680 | 5190 | 7570 | 9720 | 12200 | 15100 | 19600 | 56.5 | 14.40 | 13.70 | 104.89 | .27 | 2.12 | 2.80 | 2.98 | 1 |
| 25 ^{r,nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 191 | 30.26 | 6.66 | 108.97 | .22 | 2.11 | 2.80 | 2.98 | 1 |
| 26 ^r | 4450 | 8400 | 10900 | 13700 | 15600 | 17100 | 18500 | 20100 | 202 | 32.72 | 6.28 | 108.48 | .19 | 2.14 | 2.82 | 3.01 | 1 |
| 27 | 173 | 260 | 322 | 408 | 475 | 547 | 622 | 727 | 2.0 | 2.60 | 38.00 | 100.05 | .28 | 2.16 | 2.83 | 3.01 | 1 |
| 28 ^r | 385 | 1010 | 1700 | 3030 | 4430 | 6280 | 8690 | 13000 | 53.5 | 16.06 | 13.21 | 108.45 | .21 | 2.14 | 2.82 | 3.01 | 1 |
| 29 | 77200 | 105000 | 125000 | 151000 | 172000 | 194000 | 217000 | 249000 | 8386 | 280.12 | 4.03 | 159.83 | .11 | 2.22 | 2.87 | 3.06 | 1 |
| 29 ^{*r} | 22800 | 29400 | 35100 | 43900 | 51600 | 60500 | 70800 | 87000 | 8386 | 280.12 | 4.03 | 159.83 | .11 | 2.22 | 2.87 | 3.06 | 1 |
| 30 | 51400 | 78200 | 99000 | 129000 | 154000 | 181000 | 212000 | 257000 | 8671 | 311.75 | 3.83 | 155.40 | .09 | 2.25 | 2.89 | 3.09 | 2 |
| 31 | 70.7 | 148 | 220 | 340 | 452 | 585 | 744 | 1000 | .9 | 1.17 | 18.78 | 10.29 | .38 | 2.29 | 2.92 | 3.12 | 2 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF _z | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 65 | 2770 | 4340 | 5550 | 7270 | 8680 | 10200 | 11900 | 14300 | 66.0 | 15.62 | 11.78 | 81.54 | 0.27 | 2.17 | 2.84 | 3.01 | 1 |
| 66 | 87.2 | 165 | 232 | 339 | 434 | 545 | 673 | 872 | .8 | 1.11 | 126.53 | 135.53 | .72 | 2.17 | 2.84 | 3.01 | 1 |
| 67 | 4840 | 8500 | 11400 | 15800 | 19400 | 23400 | 27800 | 34400 | 141 | 33.53 | 11.00 | 92.00 | .13 | 2.17 | 2.84 | 3.01 | 1 |
| 68 | 156 | 273 | 371 | 519 | 649 | 796 | 962 | 1220 | 1.0 | 1.34 | 39.06 | 63.54 | .52 | 2.17 | 2.84 | 3.01 | 1 |
| 69 | 3470 | 6180 | 8410 | 11700 | 14600 | 17800 | 21400 | 26700 | 78.2 | 18.92 | 15.26 | 76.96 | .22 | 2.17 | 2.84 | 3.01 | 1 |
| 70 | 6820 | 10800 | 13800 | 18000 | 21400 | 25100 | 29100 | 34800 | 149 | 24.50 | 12.08 | 79.98 | .25 | 2.17 | 2.84 | 3.01 | 1 |
| 71 | 337 | 606 | 835 | 1190 | 1510 | 1870 | 2280 | 2930 | 4.8 | 5.13 | 31.73 | 112.77 | .18 | 2.17 | 2.84 | 3.01 | 1 |
| 72 ^r | 6650 | 10200 | 12400 | 15000 | 16800 | 18400 | 19900 | 21700 | 168 | 29.13 | 11.83 | 82.17 | .20 | 2.17 | 2.84 | 3.01 | 1 |
| 73 | 2210 | 3980 | 5470 | 7750 | 9770 | 12100 | 14700 | 18700 | 43.0 | 14.25 | 17.05 | 85.63 | .21 | 2.17 | 2.84 | 3.02 | 1 |
| 74 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 21.9 | 12.15 | 14.29 | 84.86 | .15 | 2.17 | 2.84 | 3.01 | 1 |
| 75 | 8500 | 13200 | 16900 | 22100 | 26500 | 31200 | 36400 | 44000 | 535 | 47.55 | 9.18 | 83.44 | .24 | 2.18 | 2.84 | 3.02 | 1 |
| 76 | 868 | 1330 | 1670 | 2140 | 2520 | 2920 | 3350 | 3960 | 10.1 | 5.01 | 16.67 | 91.21 | .40 | 2.18 | 2.84 | 3.02 | 1 |
| 77 | 696 | 827 | 908 | 1000 | 1070 | 1140 | 1210 | 1300 | 13.8 | 7.04 | 15.49 | 100.58 | .28 | 2.18 | 2.84 | 3.02 | 1 |
| 78 | 109 | 195 | 267 | 377 | 472 | 581 | 704 | 891 | .7 | 1.06 | 98.62 | 100.04 | .60 | 2.18 | 2.85 | 3.02 | 1 |
| 79 | 6960 | 9670 | 11600 | 14300 | 16400 | 18600 | 21000 | 24400 | 771 | 64.87 | 7.08 | 87.30 | .18 | 2.19 | 2.85 | 3.03 | 1 |
| 79* ^r | 4820 | 5900 | 6620 | 7540 | 8230 | 8930 | 9640 | 10600 | 771 | 64.87 | 7.08 | 87.30 | .18 | 2.19 | 2.85 | 3.03 | 1 |
| 80 | 49.4 | 85.2 | 115 | 159 | 197 | 240 | 289 | 363 | .3 | .73 | 75.75 | 111.31 | .48 | 2.18 | 2.84 | 3.02 | 1 |
| 81 | 9710 | 13200 | 15700 | 18900 | 21400 | 23900 | 26600 | 30300 | 1150 | 94.85 | 4.90 | 87.62 | .13 | 2.25 | 2.88 | 3.05 | 1 |
| 81* ^r | 7090 | 10000 | 12300 | 15600 | 18300 | 21300 | 24600 | 29600 | 1150 | 94.85 | 4.90 | 87.62 | .13 | 2.25 | 2.88 | 3.05 | 1 |
| 82 | 8810 | 11400 | 13300 | 15600 | 17500 | 19300 | 21300 | 24000 | 1206 | 108.53 | 4.37 | 86.24 | .10 | 2.26 | 2.88 | 3.05 | 1 |
| 82* ^r | 7630 | 10300 | 11700 | 13000 | 13700 | 14300 | 14700 | 15200 | 1206 | 108.53 | 4.37 | 86.24 | .10 | 2.26 | 2.88 | 3.05 | 1 |
| 83 | 1390 | 2100 | 2630 | 3370 | 3970 | 4610 | 5300 | 6280 | 19.5 | 7.18 | 21.38 | 89.93 | .37 | 2.23 | 2.87 | 3.03 | 1 |
| 84 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 35.8 | 11.55 | 13.54 | 89.20 | .27 | 2.24 | 2.87 | 3.04 | 1 |
| 85 | 535 | 980 | 1360 | 1960 | 2490 | 3100 | 3800 | 4890 | 8.2 | 6.53 | 23.77 | 82.99 | .19 | 2.23 | 2.87 | 3.03 | 1 |
| 86 | 1410 | 2620 | 3670 | 5310 | 6790 | 8510 | 10500 | 13600 | 83.5 | 22.16 | 9.08 | 81.46 | .17 | 2.25 | 2.88 | 3.04 | 1 |
| 87 | 575 | 1120 | 1610 | 2430 | 3180 | 4090 | 5160 | 6890 | 27.9 | 9.77 | 11.67 | 46.15 | .29 | 2.26 | 2.88 | 3.05 | 2 |
| 88 | 139 | 296 | 449 | 711 | 965 | 1280 | 1660 | 2300 | 2.6 | 3.45 | 34.25 | 80.30 | .23 | 2.26 | 2.88 | 3.04 | 2 |
| 89 | 487 | 1030 | 1530 | 2370 | 3160 | 4100 | 5230 | 7040 | 7.6 | 5.36 | 21.29 | 45.76 | .27 | 2.25 | 2.89 | 3.06 | 2 |
| 90 | 1630 | 2620 | 3390 | 4500 | 5420 | 6430 | 7530 | 9150 | 191 | 39.18 | 5.87 | 56.06 | .12 | 2.25 | 2.89 | 3.06 | 2 |
| 91 | 2320 | 3500 | 4350 | 5500 | 6410 | 7360 | 8350 | 9740 | 232 | 49.28 | 5.32 | 50.49 | .09 | 2.26 | 2.89 | 3.06 | 2 |
| 92 | 12700 | 18300 | 22500 | 28200 | 32700 | 37600 | 42800 | 50200 | 2399 | 169.34 | 2.78 | 68.54 | .08 | 2.31 | 2.93 | 3.09 | 2 |
| 92* ^r | 10200 | 15700 | 19700 | 25100 | 29500 | 34000 | 38900 | 45700 | 2399 | 169.34 | 2.78 | 68.54 | .08 | 2.31 | 2.93 | 3.09 | 2 |
| 93 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 57.7 | 15.33 | 4.61 | 19.67 | .25 | 2.32 | 2.93 | 3.10 | 2 |
| 94 | 13500 | 19800 | 24400 | 30800 | 35900 | 41300 | 47200 | 55500 | 2692 | 203.19 | 2.10 | 63.32 | .07 | 2.33 | 2.94 | 3.11 | 2 |
| 94* ^r | 10800 | 15700 | 18900 | 22800 | 25500 | 28200 | 30900 | 34200 | 2692 | 203.19 | 2.10 | 63.32 | .07 | 2.33 | 2.94 | 3.11 | 2 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF₁₀₀, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 95 | 1760 | 2860 | 3740 | 5010 | 6080 | 7260 | 8570 | 10500 | 161 | 28.02 | 6.14 | 55.52 | 0.20 | 2.25 | 2.90 | 3.09 | 2 |
| 95* ^r | 2160 | 3250 | 3900 | 4620 | 5090 | 5520 | 5900 | 6350 | 161 | 28.02 | 6.14 | 55.52 | .20 | 2.25 | 2.90 | 3.09 | 2 |
| 96 | 171 | 293 | 392 | 538 | 662 | 799 | 952 | 1180 | 2.8 | 3.74 | 11.87 | 30.38 | .21 | 2.28 | 2.91 | 3.09 | 2 |
| 97 | 121 | 252 | 376 | 584 | 782 | 1020 | 1310 | 1780 | 2.1 | 2.12 | 15.71 | 20.07 | .43 | 2.29 | 2.92 | 3.10 | 2 |
| 98 | 126 | 258 | 381 | 584 | 774 | 1000 | 1270 | 1710 | 2.6 | 2.51 | 17.67 | 8.17 | .44 | 2.29 | 2.92 | 3.10 | 2 |
| 99 | 386 | 656 | 879 | 1220 | 1510 | 1840 | 2210 | 2790 | 18.6 | 10.51 | 7.48 | 38.55 | .16 | 2.30 | 2.92 | 3.09 | 2 |
| 100 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 1.9 | 3.15 | 13.58 | 10.80 | .23 | 2.30 | 2.92 | 3.10 | 2 |
| 101 | 1090 | 1740 | 2250 | 3000 | 3620 | 4310 | 5060 | 6190 | 80.4 | 22.82 | 4.03 | 28.29 | .15 | 2.33 | 2.95 | 3.13 | 2 |
| 102 | 70 | 125 | 191 | 301 | 407 | 535 | 688 | 937 | 1.5 | 2.11 | 43.56 | 39.01 | .34 | 2.32 | 2.93 | 3.10 | 2 |
| 103 | 4000 | 6410 | 8220 | 10800 | 12800 | 15000 | 17400 | 20800 | 733 | 71.80 | 2.84 | 35.09 | .14 | 2.32 | 2.93 | 3.11 | 2 |
| 104 | 1420 | 2150 | 2690 | 3450 | 4060 | 4730 | 5440 | 6480 | 93.3 | 18.49 | 3.08 | 17.46 | .28 | 2.32 | 2.93 | 3.11 | 2 |
| 105 | 340 | 711 | 1060 | 1650 | 2200 | 2870 | 3670 | 4970 | 4.9 | 3.71 | 7.90 | 21.89 | .35 | 2.33 | 2.94 | 3.11 | 2 |
| 106 | 501 | 1000 | 1460 | 2210 | 2900 | 3730 | 4710 | 6290 | 27.0 | 8.46 | 5.17 | 11.26 | .41 | 2.33 | 2.94 | 3.12 | 2 |
| 107 | 1930 | 3090 | 3990 | 5250 | 6290 | 7420 | 8640 | 10400 | 182 | 27.24 | 2.11 | 9.57 | .25 | 2.33 | 2.94 | 3.12 | 2 |
| 108 | 517 | 1140 | 1760 | 2830 | 3870 | 5170 | 6390 | 8310 | 24.0 | 6.29 | 3.48 | 16.11 | .57 | 2.33 | 2.94 | 3.12 | 2 |
| 109 | 869 | 1590 | 2220 | 3220 | 4120 | 5170 | 6390 | 8310 | 33.6 | 8.56 | 2.56 | 6.86 | .51 | 2.34 | 2.95 | 3.12 | 2 |
| 110 | 217 | 390 | 539 | 772 | 982 | 1220 | 1500 | 1940 | 2.5 | 3.23 | 5.47 | 11.12 | .44 | 2.34 | 2.94 | 3.11 | 2 |
| 111 | 1760 | 2910 | 3830 | 5180 | 6340 | 7640 | 9080 | 11300 | 168 | 32.46 | 2.04 | 17.33 | .16 | 2.34 | 2.94 | 3.11 | 2 |
| 112 | 230 | 435 | 613 | 892 | 1140 | 1430 | 1770 | 2290 | 6.3 | 3.77 | 11.66 | 7.75 | .46 | 2.33 | 2.94 | 3.11 | 2 |
| 113 | 141 | 367 | 620 | 1110 | 1630 | 2330 | 3240 | 4890 | 3.3 | 3.60 | 5.93 | 2.05 | .28 | 2.39 | 2.99 | 3.17 | 2 |
| 114 | 606 | 1300 | 1990 | 3190 | 4360 | 5810 | 7610 | 10600 | 53.3 | 15.10 | 2.22 | 5.60 | .26 | 2.36 | 2.96 | 3.13 | 2 |
| 115 | 122 | 263 | 403 | 645 | 883 | 1180 | 1540 | 2150 | 4.9 | 2.55 | 10.28 | 15.94 | .71 | 2.40 | 2.99 | 3.15 | 2 |
| 116 | 1570 | 2760 | 3750 | 5260 | 6590 | 8090 | 9800 | 12400 | 94 | 15.74 | 4.07 | 24.27 | .33 | 2.35 | 2.95 | 3.11 | 2 |
| 117 | 109 | 214 | 308 | 455 | 588 | 743 | 921 | 1200 | 1.0 | 1.21 | 31.68 | 22.23 | .38 | 2.35 | 2.95 | 3.11 | 2 |
| 118 | 769 | 1570 | 2320 | 3580 | 4760 | 6190 | 7910 | 10700 | 26.9 | 10.28 | 6.16 | 22.31 | .25 | 2.40 | 2.97 | 3.11 | 2 |
| 119 | 469 | 758 | 982 | 1300 | 1560 | 1850 | 2160 | 2620 | 26.3 | 12.57 | 10.60 | 85.79 | .17 | 2.11 | 2.80 | 2.97 | 1 |
| 120 | 1670 | 3020 | 4180 | 6020 | 7670 | 9590 | 11800 | 15300 | 168 | 32.93 | 6.66 | 89.48 | .16 | 2.12 | 2.80 | 2.98 | 1 |
| 121 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 188 | 42.64 | 5.17 | 90.27 | .10 | 2.12 | 2.81 | 2.98 | 1 |
| 122 | 899 | 1630 | 2240 | 3150 | 3940 | 4820 | 5800 | 7280 | 20.6 | 9.17 | 19.56 | 88.69 | .25 | 2.11 | 2.80 | 2.97 | 1 |
| 123 | 662 | 1130 | 1520 | 2120 | 2640 | 3240 | 3930 | 4980 | 15.9 | 7.48 | 21.30 | 81.00 | .29 | 2.12 | 2.80 | 2.98 | 1 |
| 124 | 1660 | 2900 | 3950 | 5580 | 7030 | 8700 | 10600 | 13600 | 33.6 | 13.47 | 12.21 | 74.59 | .19 | 2.12 | 2.80 | 2.98 | 1 |
| 125 | 2110 | 3600 | 4830 | 6690 | 8320 | 10200 | 12200 | 15400 | 37.1 | 12.83 | 12.47 | 73.20 | .23 | 2.12 | 2.80 | 2.98 | 1 |
| 126 | 11500 | 18200 | 23300 | 30600 | 36500 | 42900 | 49800 | 59800 | 606 | 52.96 | 6.84 | 85.86 | .22 | 2.14 | 2.81 | 2.98 | 1 |
| 127 | 1260 | 2330 | 3250 | 4680 | 5950 | 7410 | 9090 | 11700 | 14.6 | 6.27 | 21.48 | 86.92 | .37 | 2.17 | 2.84 | 3.02 | 1 |
| 128 | 3740 | 5340 | 6460 | 7920 | 9050 | 10200 | 11400 | 13100 | 116 | 20.29 | 12.27 | 88.54 | .28 | 2.13 | 2.81 | 2.98 | 1 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; SHAPE, basin shape; BSLOPE, basin slope; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 129 | 221 | 566 | 945 | 1660 | 2410 | 3390 | 4650 | 6880 | 5.0 | 4.16 | 22.72 | 65.39 | 0.22 | 2.13 | 2.81 | 2.98 | 1 |
| 130 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 7.5 | 4.66 | 25.70 | 94.32 | .35 | 2.18 | 2.83 | 2.99 | 1 |
| 131 | 1820 | 2860 | 3650 | 4760 | 5670 | 6650 | 7710 | 9240 | 33.7 | 9.75 | 18.51 | 93.90 | .35 | 2.18 | 2.83 | 2.99 | 1 |
| 132 | 25000 | 36600 | 45000 | 56300 | 65300 | 74800 | 84800 | 99000 | 1275 | 82.36 | 6.20 | 85.28 | .19 | 2.21 | 2.85 | 3.01 | 1 |
| 133 | 175 | 313 | 428 | 602 | 755 | 927 | 1120 | 1420 | 1.1 | 1.93 | 40.95 | 95.44 | .41 | 2.19 | 2.83 | 3.00 | 1 |
| 134 | 2370 | 4060 | 5380 | 7250 | 8790 | 10400 | 12200 | 14800 | 75.9 | 21.38 | 18.18 | 93.48 | .17 | 2.21 | 2.85 | 3.01 | 1 |
| 135 | 1300 | 2260 | 3060 | 4270 | 5330 | 6540 | 7900 | 9990 | 21.1 | 8.79 | 11.61 | 78.16 | .27 | 2.21 | 2.85 | 3.02 | 1 |
| 136 | 828 | 1250 | 1550 | 1980 | 2330 | 2690 | 3090 | 3650 | 23.6 | 11.69 | 16.49 | 90.08 | .19 | 2.22 | 2.86 | 3.02 | 1 |
| 137 | 3880 | 5610 | 6850 | 8500 | 9800 | 11200 | 12600 | 14600 | 285 | 34.81 | 11.44 | 91.08 | .23 | 2.22 | 2.86 | 3.02 | 1 |
| 138 ^r | 14800 | 17000 | 17600 | 18000 | 18200 | 18200 | 18300 | 18300 | 1689 | 91.01 | 6.68 | 87.29 | .20 | 2.22 | 2.86 | 3.02 | 1 |
| 139 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 1689 | 91.01 | 6.68 | 87.29 | .20 | .00 | .22 | .86 | 1 |
| 140 | 1590 | 2590 | 3390 | 4570 | 5580 | 6690 | 7930 | 9790 | 32.1 | 9.71 | 15.85 | 66.01 | .34 | 2.16 | 2.82 | 2.99 | 1 |
| 141 | 1660 | 2770 | 3630 | 4860 | 5890 | 7000 | 8210 | 9960 | 14.8 | 6.54 | 18.72 | 79.92 | .34 | 2.12 | 2.80 | 2.98 | 1 |
| 142 | 4760 | 7290 | 9170 | 11800 | 13900 | 16200 | 18600 | 22100 | 125 | 23.34 | 10.90 | 83.89 | .23 | 2.17 | 2.82 | 2.99 | 1 |
| 143 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 16.7 | 9.61 | 19.55 | 79.42 | .18 | 2.17 | 2.82 | 2.99 | 1 |
| 144 | 12100 | 17400 | 21200 | 26400 | 30600 | 35100 | 39700 | 46400 | 349 | 45.45 | 17.28 | 94.27 | .17 | 2.18 | 2.83 | 3.00 | 1 |
| 145 | 6400 | 11700 | 16400 | 23900 | 30700 | 38700 | 48000 | 62700 | 137 | 18.60 | 8.79 | 90.65 | .40 | 2.20 | 2.84 | 3.01 | 1 |
| 146 | 521 | 860 | 1130 | 1520 | 1850 | 2220 | 2620 | 3230 | 3.0 | 2.38 | 36.12 | 70.12 | .48 | 2.19 | 2.84 | 3.00 | 1 |
| 147 | 143 | 266 | 371 | 533 | 675 | 838 | 1020 | 1310 | .9 | 1.60 | 68.37 | 91.52 | .32 | 2.24 | 2.87 | 3.03 | 1 |
| 148 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 7.4 | 6.09 | 22.99 | 69.92 | .21 | 2.18 | 2.83 | 3.00 | 1 |
| 149 | 1090 | 2050 | 2870 | 4160 | 5300 | 6620 | 8140 | 10500 | 15.5 | 8.06 | 24.42 | 85.61 | .24 | 2.19 | 2.83 | 3.00 | 1 |
| 150 | 2920 | 4480 | 5650 | 7310 | 8660 | 10100 | 11700 | 14000 | 43.2 | 16.66 | 9.64 | 61.78 | .15 | 2.19 | 2.83 | 3.00 | 1 |
| 151 | 21800 | 29600 | 35200 | 42500 | 48300 | 54300 | 60600 | 69500 | 1434 | 115.73 | 5.50 | 91.10 | .11 | 2.23 | 2.86 | 3.02 | 1 |
| 152 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 76.3 | 15.61 | 9.64 | 103.60 | .31 | 2.23 | 2.87 | 3.03 | 1 |
| 152 ^{*r} | 746 | 1470 | 2170 | 3380 | 4570 | 6070 | 7930 | 11100 | 76.3 | 15.61 | 9.64 | 103.60 | .31 | 2.23 | 2.87 | 3.03 | 1 |
| 153 | 42100 | 57300 | 68000 | 82300 | 93500 | 105000 | 118000 | 135000 | 3464 | 119.72 | 6.22 | 93.60 | .24 | 2.25 | 2.87 | 3.04 | 1 |
| 153 ^{*r} | 28700 | 36300 | 41100 | 46700 | 50800 | 54700 | 58600 | 63600 | 3464 | 119.72 | 6.22 | 93.60 | .24 | 2.25 | 2.87 | 3.04 | 1 |
| 154 | 146 | 229 | 293 | 385 | 462 | 546 | 638 | 772 | 7.6 | 5.87 | 42.55 | 86.78 | .22 | 2.25 | 2.87 | 3.03 | 3 |
| 155 | 90.9 | 168 | 236 | 347 | 449 | 571 | 715 | 945 | 2.2 | 2.10 | 63.92 | 88.21 | .48 | 2.21 | 2.84 | 3.01 | 3 |
| 156 | 863 | 1490 | 2000 | 2770 | 3420 | 4160 | 4980 | 6220 | 32.4 | 11.10 | 17.11 | 86.34 | .27 | 2.24 | 2.87 | 3.03 | 3 |
| 157 | 2760 | 3700 | 4340 | 5190 | 5850 | 6530 | 7250 | 8230 | 348 | 40.74 | 7.27 | 84.77 | .21 | 2.25 | 2.87 | 3.03 | 3 |
| 158 | 120 | 199 | 262 | 356 | 436 | 527 | 628 | 781 | 7.6 | 4.37 | 17.00 | 77.76 | .39 | 2.25 | 2.87 | 3.04 | 3 |
| 159 | 3570 | 5540 | 7100 | 9370 | 11300 | 13400 | 15800 | 19300 | 459 | 57.53 | 5.33 | 80.68 | .14 | 2.26 | 2.88 | 3.04 | 3 |
| 160 | 46000 | 63400 | 75700 | 92000 | 105000 | 118000 | 132000 | 151000 | 4395 | 156.35 | 5.15 | 89.44 | .18 | 2.26 | 2.88 | 3.04 | 2 |
| 161 | 175 | 319 | 442 | 634 | 806 | 1000 | 1230 | 1590 | 7.9 | 4.81 | 7.27 | 23.11 | .43 | 2.26 | 2.88 | 3.04 | 2 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

(Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available)

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₅ | CF ₁₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|-----------------|------------------|-----|
| 162 | 2090 | 3600 | 4870 | 6790 | 8480 | 10400 | 12600 | 15900 | 292 | 39.33 | 5.14 | 66.05 | 0.18 | 2.29 | 2.89 | 3.05 | 3 |
| 163 | 36500 | 45500 | 51200 | 58300 | 63500 | 68600 | 73800 | 80600 | 4852 | 176.67 | 4.67 | 86.19 | .16 | 2.30 | 2.90 | 3.05 | 2 |
| 163*r | 28500 | 33500 | 36200 | 39100 | 41000 | 42700 | 44200 | 46100 | 4852 | 176.67 | 4.67 | 86.19 | .16 | 2.30 | 2.90 | 3.05 | 2 |
| 164 | 147 | 385 | 654 | 1170 | 1730 | 2480 | 3460 | 5230 | 14.1 | 7.56 | 12.15 | 24.86 | .30 | 2.31 | 2.90 | 3.05 | 2 |
| 165 | 490 | 1000 | 1490 | 2310 | 3100 | 4060 | 5210 | 7120 | 60.1 | 19.22 | 3.19 | 11.61 | .16 | 2.32 | 2.90 | 3.05 | 2 |
| 166 | 32500 | 47400 | 58200 | 72900 | 84600 | 96900 | 110000 | 128000 | 5255 | 229.76 | 3.55 | 81.22 | .10 | 2.38 | 2.95 | 3.09 | 2 |
| 166*r | 25100 | 33900 | 39800 | 47400 | 53100 | 58800 | 64700 | 72600 | 5255 | 229.76 | 3.55 | 81.22 | .10 | 2.38 | 2.95 | 3.09 | 2 |
| 167 | 657 | 1200 | 1660 | 2360 | 2970 | 3660 | 4440 | 5630 | 21.6 | 7.51 | 8.09 | 12.90 | .38 | 2.39 | 2.95 | 3.09 | 2 |
| 168 | 861 | 1480 | 1990 | 2760 | 3420 | 4170 | 5010 | 6290 | 92.8 | 24.69 | 4.25 | 22.86 | .16 | 2.29 | 2.89 | 3.04 | 2 |
| 169 | 395 | 764 | 1090 | 1600 | 2050 | 2580 | 3190 | 4130 | 15.7 | 5.78 | 6.99 | 19.12 | .45 | 2.33 | 2.92 | 3.07 | 2 |
| 170 | 56.9 | 96.8 | 129 | 178 | 219 | 265 | 317 | 395 | .5 | .86 | 8.83 | 41.15 | .58 | 2.33 | 2.92 | 3.07 | 2 |
| 171 | 4140 | 6860 | 9050 | 12300 | 15000 | 18100 | 21500 | 26700 | 676 | 52.96 | 2.15 | 31.48 | .24 | 2.33 | 2.91 | 3.05 | 2 |
| 172 | 555 | 1110 | 1640 | 2310 | 3330 | 4330 | 5540 | 7510 | 32.3 | 11.64 | 7.19 | 23.35 | .25 | 2.28 | 2.89 | 3.04 | 2 |
| 173 | 1970 | 2990 | 3740 | 4790 | 5630 | 6530 | 7500 | 8880 | 379 | 65.20 | 2.72 | 25.51 | .09 | 2.32 | 2.90 | 3.05 | 2 |
| 174 | 488 | 732 | 912 | 1160 | 1360 | 1580 | 1810 | 2140 | 103 | 29.39 | 1.79 | 6.03 | .12 | 2.38 | 2.90 | 3.05 | 2 |
| 175 | 31.2 | 68.7 | 105 | 166 | 224 | 295 | 379 | 517 | .6 | 1.41 | 31.94 | 10.32 | .33 | 2.32 | 2.93 | 3.09 | 2 |
| 176 | 940 | 1590 | 2110 | 2880 | 3530 | 4260 | 5060 | 6270 | 47.5 | 10.83 | 5.65 | 18.88 | .41 | 2.32 | 2.93 | 3.09 | 2 |
| 177 | 139 | 310 | 482 | 788 | 1090 | 1470 | 1950 | 2760 | 8.6 | 4.84 | 19.02 | 36.42 | .36 | 2.33 | 2.93 | 3.10 | 2 |
| 178 | 1070 | 2100 | 3040 | 4570 | 5980 | 7660 | 9640 | 12800 | 49.7 | 15.46 | 4.84 | 24.90 | .22 | 2.38 | 2.95 | 3.09 | 2 |
| 179 | 4810 | 7600 | 9780 | 12900 | 15600 | 18400 | 21600 | 26300 | 599 | 47.76 | 2.47 | 26.63 | .27 | 2.34 | 2.93 | 3.09 | 2 |
| 180 | 1510 | 2600 | 3490 | 4820 | 5980 | 7270 | 8720 | 10900 | 69.3 | 13.50 | 5.64 | 26.50 | .37 | 2.37 | 2.94 | 3.08 | 2 |
| 181 | 280 | 345 | 386 | 436 | 472 | 508 | 543 | 589 | 7.8 | 5.35 | 4.79 | 12.77 | .29 | 2.38 | 2.94 | 3.08 | 2 |
| 182 | 129 | 331 | 550 | 953 | 1370 | 1900 | 2570 | 3720 | 1.1 | 1.27 | 3.71 | .81 | .70 | 2.39 | 2.95 | 3.10 | 2 |
| 183 | 326 | 731 | 1140 | 1870 | 2600 | 3520 | 4670 | 6630 | 10.2 | 4.40 | 6.96 | 7.38 | .49 | 2.40 | 2.96 | 3.10 | 2 |
| 184 | 411 | 700 | 936 | 1290 | 1590 | 1920 | 2300 | 2870 | 15.3 | 4.35 | 5.03 | 6.70 | .75 | 2.32 | 2.91 | 3.06 | 2 |
| 185 | 3870 | 6090 | 7780 | 10100 | 12100 | 14200 | 16400 | 19600 | 680 | 38.60 | .87 | 7.67 | .47 | 2.33 | 2.92 | 3.07 | 2 |
| 186 | 416 | 796 | 1130 | 1660 | 2140 | 2700 | 3350 | 4370 | 16.0 | 5.02 | 4.36 | .72 | .66 | 2.35 | 2.93 | 3.08 | 2 |
| 187 | 150 | 323 | 489 | 772 | 1040 | 1370 | 1770 | 2420 | 3.8 | 3.57 | 9.32 | 17.28 | .30 | 2.32 | 2.91 | 3.06 | 1 |
| 188 | 1380 | 2730 | 4000 | 6120 | 8150 | 10600 | 13600 | 18500 | 28.8 | 15.93 | 89.91 | 323.81 | .12 | 2.15 | 2.78 | 2.94 | 1 |
| 189 | 4070 | 8150 | 11900 | 18100 | 23900 | 30800 | 39000 | 52300 | 48.1 | 20.64 | 48.76 | 314.89 | .12 | 2.14 | 2.78 | 2.95 | 1 |
| 190 | 456 | 768 | 1020 | 1400 | 1730 | 2100 | 2520 | 3150 | 11.0 | 6.66 | 386.26 | 325.50 | .26 | 2.11 | 2.77 | 2.95 | 1 |
| 191 | 3640 | 6000 | 7830 | 10500 | 12700 | 15000 | 17600 | 21400 | 89.2 | 20.61 | 32.65 | 265.44 | .20 | 2.13 | 2.79 | 2.96 | 1 |
| 192 | 12700 | 20900 | 27600 | 37800 | 46700 | 56800 | 68300 | 85800 | 504 | 48.21 | 21.29 | 243.78 | .22 | 2.13 | 2.79 | 2.96 | 1 |
| 192*r | 7340 | 9530 | 11000 | 12700 | 14100 | 15400 | 16700 | 18500 | 504 | 48.21 | 21.29 | 243.78 | .22 | 2.13 | 2.79 | 2.96 | 1 |
| 193 | 6280 | 12000 | 17000 | 24700 | 31500 | 39300 | 48200 | 61800 | 128 | 20.23 | 33.91 | 254.90 | .31 | 2.09 | 2.77 | 2.95 | 1 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 194 | 3250 | 4640 | 5630 | 6960 | 8010 | 9110 | 10300 | 11900 | 35.5 | 14.74 | 32.24 | 168.32 | 0.16 | 2.08 | 2.77 | 2.95 | 1 |
| 195 ^f | 16200 | 21900 | 25000 | 28300 | 30400 | 32200 | 33800 | 35700 | 869 | 70.50 | 12.10 | 218.10 | .17 | 2.08 | 2.77 | 2.95 | 1 |
| 196 | 3270 | 5300 | 6850 | 9020 | 10800 | 12700 | 14700 | 17600 | 78.8 | 22.18 | 31.52 | 281.93 | .16 | 2.08 | 2.77 | 2.95 | 1 |
| 197 | 1800 | 2650 | 3260 | 4090 | 4750 | 5440 | 6180 | 7220 | 44.7 | 15.33 | 27.18 | 257.85 | .21 | 2.08 | 2.77 | 2.95 | 1 |
| 198 | 4710 | 6530 | 7810 | 9490 | 10800 | 12100 | 13500 | 15500 | 109 | 27.61 | 14.56 | 202.20 | .15 | 2.08 | 2.77 | 2.95 | 1 |
| 199 | 5450 | 9070 | 12000 | 16500 | 20300 | 24700 | 29600 | 37000 | 128 | 30.68 | 13.23 | 198.38 | .13 | 2.08 | 2.77 | 2.95 | 1 |
| 200 ^f | 28000 | 35300 | 39200 | 43300 | 45800 | 48100 | 50100 | 52500 | 1226 | 93.13 | 6.98 | 208.67 | .14 | 2.20 | 2.82 | 2.99 | 1 |
| 201 | 6730 | 11200 | 14800 | 20000 | 24300 | 29100 | 34300 | 42000 | 231 | 28.32 | 19.16 | 173.69 | .29 | 2.08 | 2.77 | 2.95 | 1 |
| 202 | 7760 | 13200 | 17500 | 23700 | 28800 | 34300 | 40400 | 49200 | 287 | 31.47 | 17.57 | 165.49 | .29 | 2.08 | 2.77 | 2.95 | 1 |
| 203 | 3240 | 5400 | 7100 | 9550 | 11600 | 13800 | 16300 | 19900 | 42.8 | 13.55 | 22.17 | 145.31 | .25 | 2.09 | 2.78 | 2.95 | 1 |
| 204 ^f | 39200 | 53100 | 59000 | 63800 | 66100 | 67700 | 68800 | 69800 | 1694 | 110.42 | 5.25 | 193.78 | .14 | 2.10 | 2.78 | 2.96 | 1 |
| 205 | 1150 | 1700 | 2100 | 2650 | 3090 | 3560 | 4050 | 4760 | 22.1 | 11.48 | 21.49 | 105.01 | .17 | 2.09 | 2.78 | 2.96 | 1 |
| 206 | 217 | 357 | 467 | 625 | 756 | 898 | 1050 | 1280 | .9 | 1.13 | 85.26 | 88.49 | .64 | 2.09 | 2.78 | 2.95 | 1 |
| 207 | 1570 | 2900 | 4040 | 5830 | 7430 | 9270 | 11400 | 14700 | 19.5 | 8.29 | 38.11 | 134.61 | .26 | 2.14 | 2.80 | 2.97 | 1 |
| 208 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 10.2 | 6.32 | 28.92 | 66.74 | .28 | 2.10 | 2.79 | 2.97 | 1 |
| 209 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 27.8 | 10.14 | 19.34 | 69.36 | .27 | 2.10 | 2.79 | 2.97 | 1 |
| 210 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 6.8 | 6.67 | 31.49 | 60.00 | .16 | 2.12 | 2.80 | 2.98 | 1 |
| 211 | 208 | 398 | 570 | 850 | 1110 | 1420 | 1780 | 2360 | 2.2 | 1.69 | 47.86 | 66.44 | .73 | 2.12 | 2.80 | 2.98 | 1 |
| 212 | 2660 | 3280 | 3680 | 4160 | 4510 | 4860 | 5200 | 5650 | 65.6 | 16.39 | 13.47 | 86.79 | .24 | 2.12 | 2.80 | 2.98 | 1 |
| 213 | 4210 | 7040 | 9300 | 12600 | 15400 | 18500 | 21900 | 27000 | 186 | 25.82 | 10.45 | 90.93 | .27 | 2.13 | 2.80 | 2.98 | 1 |
| 214 | 1250 | 1950 | 2470 | 3210 | 3820 | 4460 | 5160 | 6170 | 42.9 | 14.12 | 15.63 | 92.00 | .21 | 2.12 | 2.80 | 2.98 | 1 |
| 215 | 30200 | 43600 | 53500 | 67200 | 78300 | 90100 | 103000 | 121000 | 2280 | 149.50 | 4.38 | 169.42 | .10 | 2.15 | 2.80 | 2.98 | 1 |
| 215 ^{*f} | 32700 | 46400 | 54600 | 64100 | 70700 | 76700 | 82400 | 89400 | 2280 | 149.50 | 4.38 | 169.42 | .10 | 2.15 | 2.80 | 2.98 | 1 |
| 216 | 93.2 | 180 | 258 | 382 | 494 | 625 | 778 | 1020 | 1.0 | 1.60 | 56.18 | 100.24 | .40 | 2.15 | 2.80 | 2.98 | 1 |
| 217 | 227 | 316 | 378 | 458 | 520 | 583 | 648 | 737 | 1.6 | 2.80 | 78.01 | 132.30 | .19 | 2.15 | 2.80 | 2.97 | 1 |
| 218 | 2660 | 4240 | 5450 | 7140 | 8520 | 10000 | 11600 | 13900 | 101 | 34.64 | 18.90 | 138.79 | .08 | 2.15 | 2.80 | 2.97 | 1 |
| 219 | 4060 | 6610 | 8570 | 11300 | 13600 | 16100 | 18700 | 22500 | 306 | 48.80 | 11.36 | 120.89 | .13 | 2.15 | 2.80 | 2.98 | 1 |
| 220 | 5080 | 7620 | 9450 | 11900 | 13900 | 16000 | 18100 | 21200 | 155 | 30.06 | 13.21 | 148.05 | .17 | 2.15 | 2.80 | 2.97 | 1 |
| 221 | 6940 | 10200 | 12500 | 15900 | 18500 | 21400 | 24500 | 29000 | 569 | 56.83 | 10.23 | 125.33 | .17 | 2.16 | 2.80 | 2.98 | 1 |
| 222 ^f | 63.2 | 68.3 | 70.9 | 73.6 | 75.3 | 76.9 | 78.2 | 79.9 | 4.8 | 4.56 | 29.75 | 52.42 | .23 | 2.15 | 2.80 | 2.97 | 1 |
| 223 | 1430 | 2080 | 2550 | 3200 | 3710 | 4260 | 4830 | 5650 | 87.4 | 33.20 | 11.75 | 91.45 | .08 | 2.16 | 2.80 | 2.98 | 1 |
| 223 ^{*f} | 1490 | 1830 | 2050 | 2310 | 2490 | 2680 | 2860 | 3100 | 87.4 | 33.20 | 11.75 | 91.45 | .08 | 2.16 | 2.80 | 2.98 | 1 |
| 224 | 2750 | 4040 | 4980 | 6300 | 7360 | 8490 | 9710 | 11500 | 118 | 16.59 | 12.07 | 96.08 | .43 | 2.16 | 2.81 | 2.98 | 1 |
| 225 | 560 | 1040 | 1440 | 2070 | 2620 | 3260 | 3980 | 5090 | 3.9 | 3.17 | 28.98 | 99.43 | .36 | 2.16 | 2.81 | 2.98 | 1 |
| 226 | 53300 | 79500 | 98500 | 124000 | 145000 | 166000 | 189000 | 221000 | 3450 | 170.84 | 3.90 | 170.74 | .12 | 2.16 | 2.81 | 2.98 | 1 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF₁₀₀, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₇₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 227 | 566 | 934 | 1230 | 1650 | 2010 | 2400 | 2840 | 3480 | 9.6 | 5.98 | 17.12 | 96.67 | 0.27 | 2.15 | 2.81 | 2.98 | 1 |
| 228 | 4640 | 6540 | 7870 | 9640 | 11000 | 12400 | 13900 | 16000 | 174 | 29.85 | 9.77 | 97.43 | .20 | 2.17 | 2.82 | 2.99 | 1 |
| 229 | 449 | 685 | 862 | 1110 | 1310 | 1530 | 1760 | 2100 | 6.6 | 6.14 | 16.73 | 89.50 | .17 | 2.17 | 2.82 | 3.00 | 1 |
| 230 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 4000 | 186.48 | 3.43 | 160.97 | .11 | 2.18 | 2.83 | 3.00 | 1 |
| 230 ^{*r} | 41300 | 51800 | 58000 | 65200 | 70200 | 74900 | 79400 | 85000 | 4000 | 186.48 | 3.43 | 160.97 | .11 | 2.18 | 2.83 | 3.00 | 1 |
| 231 | 852 | 955 | 1020 | 1090 | 1130 | 1180 | 1220 | 1280 | 13.7 | 6.59 | 21.96 | 86.01 | .31 | 2.19 | 2.83 | 3.00 | 1 |
| 232 | 397 | 715 | 990 | 1420 | 1800 | 2250 | 2760 | 3570 | 2.9 | 2.80 | 45.36 | 113.22 | .37 | 2.19 | 2.83 | 3.00 | 1 |
| 233 | 7730 | 10500 | 12500 | 15100 | 17000 | 19100 | 21200 | 24200 | 342 | 51.53 | 6.63 | 131.78 | .13 | 2.19 | 2.83 | 3.00 | 1 |
| 234 | 425 | 719 | 959 | 1320 | 1630 | 1970 | 2360 | 2940 | 3.4 | 4.41 | 72.33 | 173.68 | .18 | 2.20 | 2.83 | 3.00 | 1 |
| 235 | 571 | 1080 | 1520 | 2230 | 2880 | 3630 | 4510 | 5890 | 3.6 | 3.55 | 35.95 | 95.22 | .28 | 2.18 | 2.81 | 2.98 | 1 |
| 236 | 1670 | 2420 | 2960 | 3700 | 4290 | 4920 | 5580 | 6520 | 20.7 | 7.02 | 29.69 | 93.64 | .42 | 2.18 | 2.81 | 2.99 | 1 |
| 237 | 4630 | 7020 | 8770 | 11100 | 13000 | 15000 | 17100 | 20000 | 55.6 | 14.09 | 21.06 | 90.60 | .28 | 2.20 | 2.83 | 3.00 | 1 |
| 238 | 1400 | 2320 | 3040 | 4090 | 4970 | 5930 | 6990 | 8540 | 8.5 | 5.26 | 27.59 | 55.44 | .28 | 2.22 | 2.83 | 3.00 | 1 |
| 239 | 33200 | 47300 | 56800 | 69100 | 78400 | 87900 | 97500 | 111000 | 1372 | 81.80 | 5.70 | 84.63 | .21 | 2.23 | 2.85 | 3.01 | 1 |
| 240 | 2190 | 4120 | 5850 | 8630 | 11200 | 14200 | 17800 | 23600 | 110 | 26.68 | 7.72 | 83.54 | .16 | 2.24 | 2.85 | 3.01 | 1 |
| 241 | 176 | 284 | 367 | 486 | 584 | 690 | 806 | 975 | .9 | 1.06 | 89.92 | 65.70 | .73 | 2.24 | 2.85 | 3.01 | 1 |
| 242 | 4490 | 6350 | 7650 | 9360 | 10700 | 12000 | 13500 | 15400 | 106 | 29.55 | 12.14 | 108.15 | .12 | 2.20 | 2.84 | 3.00 | 1 |
| 243 | 1030 | 1750 | 2350 | 3270 | 4070 | 4970 | 6000 | 7570 | 15.4 | 9.24 | 47.53 | 142.49 | .18 | 2.20 | 2.84 | 3.01 | 1 |
| 244 ^r | 73500 | 106000 | 132000 | 170000 | 202000 | 237000 | 276000 | 335000 | 6863 | 255.33 | 4.59 | 134.56 | .11 | 2.25 | 2.86 | 3.02 | 1 |
| 245 | 845 | 1220 | 1480 | 1850 | 2140 | 2440 | 2760 | 3210 | 16.7 | 5.91 | 33.41 | 75.65 | .47 | 2.24 | 2.86 | 3.02 | 1 |
| 246 | 16.8 | 28.7 | 38.6 | 53.4 | 66.2 | 80.7 | 97.1 | 122 | .1 | 1.03 | 114.65 | 86.40 | .14 | 2.25 | 2.86 | 3.02 | 1 |
| 247 | 107 | 195 | 272 | 393 | 502 | 630 | 778 | 1010 | 6.2 | 5.46 | 11.97 | 23.56 | .19 | 2.26 | 2.87 | 3.03 | 3 |
| 248 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | .1 | .37 | 119.76 | 58.22 | 1.45 | 2.25 | 2.86 | 3.03 | 3 |
| 249 | 363 | 528 | 646 | 806 | 932 | 1060 | 1200 | 1400 | 83.3 | 20.22 | 7.30 | 40.58 | .20 | 2.29 | 2.89 | 3.04 | 3 |
| 250 | 1350 | 2430 | 3400 | 4990 | 6460 | 8230 | 10300 | 13800 | 183 | 26.23 | 10.26 | 76.68 | .27 | 2.23 | 2.85 | 3.02 | 3 |
| 251 | 77 | 116 | 144 | 184 | 215 | 248 | 284 | 334 | 4.7 | 4.32 | 33.83 | 66.99 | .24 | 2.25 | 2.86 | 3.03 | 3 |
| 252 | 1450 | 2200 | 2760 | 3530 | 4160 | 4830 | 5560 | 6600 | 365 | 64.79 | 4.11 | 63.07 | .09 | 2.29 | 2.89 | 3.04 | 3 |
| 253 | 467 | 648 | 774 | 942 | 1070 | 1210 | 1350 | 1550 | 39.8 | 14.30 | 7.65 | 24.83 | .21 | 2.28 | 2.88 | 3.04 | 3 |
| 254 | 232 | 345 | 428 | 541 | 633 | 729 | 832 | 979 | 16.1 | 6.85 | 3.83 | 7.32 | .36 | 2.30 | 2.89 | 3.05 | 3 |
| 255 | 4890 | 7610 | 9660 | 12500 | 14900 | 17400 | 20100 | 24000 | 1228 | 130.44 | 2.09 | 27.34 | .07 | 2.31 | 2.90 | 3.05 | 3 |
| 256 | 1120 | 1810 | 2370 | 3200 | 3920 | 4710 | 5610 | 6950 | 20.7 | 8.95 | 268.53 | 407.99 | .26 | 2.19 | 2.78 | 2.94 | 1 |
| 257 | 6270 | 9440 | 11800 | 14900 | 17500 | 20200 | 23000 | 27100 | 127 | 20.20 | 67.00 | 299.40 | .31 | 2.18 | 2.78 | 2.94 | 1 |
| 258 | 7050 | 12500 | 17200 | 24600 | 31300 | 39200 | 48300 | 62700 | 172 | 23.12 | 52.06 | 299.74 | .32 | 2.18 | 2.78 | 2.94 | 1 |
| 259 | 4580 | 8750 | 12500 | 18600 | 24200 | 30900 | 38700 | 51300 | 66.7 | 34.93 | 86.54 | 285.37 | .05 | 2.17 | 2.78 | 2.94 | 1 |
| 260 | 57.3 | 93.4 | 122 | 163 | 197 | 234 | 275 | 336 | 0.5 | 1.07 | 526.60 | 243.48 | .48 | 2.18 | 2.78 | 2.95 | 1 |

46 Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

(Q_r, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHAPE, basin shape; CF_r, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available)

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₇₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 296 | 1510 | 2430 | 3140 | 4170 | 5020 | 5960 | 6980 | 8490 | 26.8 | 11.33 | 37.09 | 239.70 | 0.21 | 2.24 | 2.80 | 2.96 | 1 |
| 297 | 1680 | 2540 | 3160 | 4000 | 4670 | 5370 | 6100 | 7130 | 41.4 | 13.96 | 44.43 | 242.70 | .22 | 2.24 | 2.80 | 2.96 | 1 |
| 298 | 556 | 935 | 1250 | 1710 | 2120 | 2580 | 3100 | 3890 | 10.9 | 4.91 | 338.78 | 285.36 | .44 | 2.24 | 2.80 | 2.96 | 1 |
| 299 | 6970 | 10900 | 14000 | 18500 | 22300 | 26600 | 31300 | 38300 | 296 | 36.20 | 3.88 | 343.47 | .23 | 2.24 | 2.80 | 2.95 | 1 |
| 300 | 479 | 715 | 893 | 1140 | 1350 | 1570 | 1820 | 2170 | 14.8 | 11.44 | 50.40 | 263.91 | .11 | 2.23 | 2.79 | 2.95 | 1 |
| 301 | 658 | 1120 | 1500 | 2080 | 2590 | 3170 | 3820 | 4820 | 10.0 | 4.78 | 179.84 | 387.36 | .45 | 2.25 | 2.79 | 2.95 | 1 |
| 302 | 2490 | 3840 | 4880 | 6360 | 7600 | 8940 | 10400 | 12600 | 66.7 | 27.47 | 50.49 | 440.37 | .09 | 2.23 | 2.78 | 2.94 | 1 |
| 303 | 80.1 | 109 | 129 | 154 | 174 | 194 | 215 | 243 | .6 | .88 | 436.52 | 199.55 | .72 | 2.24 | 2.80 | 2.96 | 1 |
| 304 | 1450 | 2420 | 3200 | 4360 | 5360 | 6480 | 7730 | 9630 | 42.2 | 13.01 | 24.24 | 226.31 | .25 | 2.24 | 2.80 | 2.96 | 1 |
| 305 | 3220 | 6340 | 9240 | 14100 | 18600 | 24200 | 30900 | 41800 | 109 | 15.41 | 10.25 | 187.68 | .46 | 2.23 | 2.79 | 2.95 | 1 |
| 306 | 1790 | 2920 | 3840 | 5230 | 6440 | 7800 | 9360 | 11700 | 63.1 | 15.97 | 28.17 | 307.71 | .25 | 2.23 | 2.79 | 2.95 | 1 |
| 307 | 10700 | 15300 | 18700 | 23300 | 26900 | 30700 | 34700 | 40400 | 676 | 61.46 | 2.71 | 300.03 | .18 | 2.23 | 2.78 | 2.94 | 1 |
| 308 | 2030 | 3610 | 4990 | 7170 | 9160 | 11500 | 14200 | 18500 | 79.8 | 13.83 | 57.53 | 415.17 | .42 | 2.22 | 2.78 | 2.93 | 1 |
| 309 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 14.5 | 4.76 | 503.19 | 641.91 | .66 | 2.19 | 2.78 | 2.94 | 1 |
| 310 | 1780 | 3100 | 4230 | 5990 | 7550 | 9360 | 11400 | 14700 | 23.8 | 7.84 | 282.05 | 600.92 | .39 | 2.19 | 2.78 | 2.94 | 1 |
| 310 ^{r,nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 23.8 | 7.84 | 282.05 | 600.92 | .39 | 2.19 | 2.78 | 2.94 | 1 |
| 311 | 247 | 427 | 575 | 794 | 983 | 1190 | 1430 | 1790 | 5.5 | 3.89 | 574.31 | 591.79 | .36 | 2.19 | 2.78 | 2.94 | 1 |
| 312 | 3020 | 5220 | 7130 | 10100 | 12800 | 16000 | 19700 | 25600 | 130 | 23.03 | 21.11 | 426.04 | .24 | 2.21 | 2.78 | 2.94 | 1 |
| 312 ^{r*} | 2900 | 4940 | 6670 | 9370 | 11800 | 14600 | 17800 | 22900 | 130 | 23.03 | 21.11 | 426.04 | .24 | 2.21 | 2.78 | 2.94 | 1 |
| 313 | 14900 | 22000 | 27300 | 34600 | 40700 | 47100 | 54100 | 64200 | 945 | 72.49 | 2.59 | 320.73 | .18 | 2.20 | 2.78 | 2.94 | 1 |
| 314 | 2050 | 3080 | 3850 | 4930 | 5810 | 6750 | 7770 | 9250 | 79.5 | 19.44 | 34.12 | 403.22 | .21 | 2.21 | 2.77 | 2.92 | 1 |
| 315 | 4080 | 6670 | 8740 | 11800 | 14300 | 17200 | 20300 | 25000 | 158 | 24.08 | 47.85 | 440.28 | .27 | 2.21 | 2.77 | 2.92 | 1 |
| 316 | 19800 | 30400 | 37900 | 48000 | 55900 | 64100 | 72600 | 84500 | 1332 | 90.72 | 4.09 | 337.83 | .16 | 2.21 | 2.77 | 2.92 | 1 |
| 317 | 626 | 942 | 1170 | 1490 | 1740 | 2010 | 2300 | 2700 | 8.0 | 5.34 | 142.20 | 400.62 | .27 | 2.20 | 2.77 | 2.92 | 1 |
| 318 | 3350 | 5410 | 7020 | 9340 | 11300 | 13400 | 15700 | 19100 | 126 | 28.76 | 72.67 | 508.25 | .15 | 2.20 | 2.76 | 2.92 | 1 |
| 319 | 23300 | 37000 | 48000 | 64000 | 77700 | 92900 | 110000 | 135000 | 1567 | 106.96 | 6.30 | 358.29 | .14 | 2.20 | 2.77 | 2.92 | 1 |
| 320 | 4100 | 5830 | 7050 | 8690 | 9970 | 11300 | 12700 | 14600 | 27.6 | 10.24 | 259.95 | 565.57 | .26 | 2.26 | 2.80 | 2.95 | 1 |
| 321 ^{r,nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 33.5 | 12.63 | 213.40 | 568.89 | .21 | 2.26 | 2.79 | 2.95 | 1 |
| 322 ^r | 4400 | 6590 | 8210 | 10500 | 12300 | 14200 | 16300 | 19300 | 58.4 | 17.24 | 172.62 | 565.25 | .19 | 2.25 | 2.79 | 2.95 | 1 |
| 323 | 4320 | 6990 | 9070 | 12100 | 14600 | 17300 | 20200 | 24600 | 51.5 | 19.40 | 155.96 | 569.36 | .14 | 2.25 | 2.79 | 2.95 | 1 |
| 324 | 7690 | 11800 | 15000 | 19500 | 23300 | 27400 | 31800 | 38400 | 130 | 24.00 | 125.34 | 533.76 | .22 | 2.22 | 2.77 | 2.93 | 1 |
| 325 | 761 | 1110 | 1370 | 1720 | 2010 | 2310 | 2630 | 3090 | 14.4 | 5.16 | 556.54 | 589.19 | .54 | 2.26 | 2.80 | 2.95 | 1 |
| 326 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 243 | 35.84 | 79.37 | 478.74 | .19 | 2.21 | 2.77 | 2.92 | 1 |
| 327 | 1930 | 2710 | 3250 | 3960 | 4510 | 5070 | 5660 | 6470 | 65.3 | 17.58 | 74.41 | 510.37 | .21 | 2.21 | 2.77 | 2.92 | 1 |
| 328 | 11200 | 16900 | 21200 | 27000 | 31700 | 36800 | 42200 | 49800 | 350 | 42.50 | 51.32 | 482.01 | .19 | 2.21 | 2.77 | 2.92 | 1 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; SHAPE, basin shape; BSLOPE, basin slope; SHAPE, basin shape; CF, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 329 | 1910 | 2980 | 3770 | 4850 | 5720 | 6640 | 7620 | 9000 | 49.2 | 10.68 | 183.96 | 530.96 | 0.43 | 2.21 | 2.77 | 2.92 | 1 |
| 330 | 368 | 430 | 468 | 513 | 546 | 578 | 609 | 650 | 9.2 | 4.90 | 127.36 | 313.06 | .39 | 2.16 | 2.77 | 2.94 | 1 |
| 331 | 2840 | 4540 | 5880 | 7860 | 9540 | 11400 | 13500 | 16600 | 104 | 37.92 | 34.80 | 410.63 | .07 | 2.17 | 2.78 | 2.94 | 1 |
| 332 | 5400 | 9260 | 12500 | 17300 | 21600 | 26400 | 31900 | 40300 | 43.3 | 14.34 | 158.20 | 520.68 | .21 | 2.18 | 2.78 | 2.94 | 1 |
| 333 | 5550 | 9390 | 12600 | 17400 | 21700 | 26500 | 32000 | 40400 | 60.8 | 27.05 | 50.38 | 484.24 | .08 | 2.17 | 2.77 | 2.94 | 1 |
| 334 | 145 | 224 | 283 | 367 | 436 | 510 | 590 | 707 | 1.6 | 3.08 | 519.11 | 405.77 | .17 | 2.17 | 2.77 | 2.93 | 1 |
| 335 | 4950 | 9080 | 12800 | 18800 | 24300 | 30900 | 38600 | 51100 | 157 | 39.09 | 34.98 | 531.07 | .10 | 2.17 | 2.77 | 2.93 | 1 |
| 336 | 16000 | 26300 | 34600 | 47000 | 57600 | 69600 | 83100 | 104000 | 608 | 73.77 | 23.71 | 452.57 | .11 | 2.17 | 2.77 | 2.93 | 1 |
| 337 | 1050 | 2040 | 2940 | 4390 | 5730 | 7330 | 9200 | 12200 | 23.1 | 9.70 | 118.81 | 398.27 | .25 | 2.15 | 2.77 | 2.94 | 1 |
| 338 | 5940 | 10500 | 14300 | 20200 | 25400 | 31400 | 38300 | 48900 | 92.1 | 19.38 | 84.54 | 376.69 | .24 | 2.15 | 2.77 | 2.94 | 1 |
| 339 | 15.7 | 23.5 | 29.2 | 37 | 43.3 | 50 | 57.1 | 67.3 | .5 | 1.72 | 997.21 | 415.55 | .18 | 2.16 | 2.77 | 2.94 | 1 |
| 340 | 2260 | 3750 | 4970 | 6830 | 8450 | 10300 | 12400 | 15600 | 42.0 | 11.66 | 104.61 | 406.56 | .31 | 2.16 | 2.77 | 2.93 | 1 |
| 341 | 3340 | 5170 | 6580 | 8580 | 10200 | 12000 | 14000 | 16900 | 140 | 25.26 | 6.86 | 375.26 | .23 | 2.28 | 2.80 | 2.95 | 1 |
| 342 | 1960 | 2870 | 3530 | 4420 | 5140 | 5890 | 6690 | 7830 | 57.1 | 16.11 | 31.33 | 436.73 | .22 | 2.28 | 2.80 | 2.95 | 1 |
| 343 ^r | 975 | 1600 | 2160 | 3070 | 3920 | 4950 | 6200 | 8250 | 14.9 | 7.41 | 98.65 | 246.33 | .26 | 2.28 | 2.81 | 2.95 | 1 |
| 344 | 2900 | 4580 | 5930 | 7900 | 9590 | 11500 | 13600 | 16700 | 86.5 | 20.22 | 123.81 | 435.46 | .21 | 2.28 | 2.80 | 2.95 | 1 |
| 345 | 124 | 256 | 375 | 568 | 746 | 934 | 1200 | 1580 | 1.6 | 2.64 | 491.80 | 467.80 | .25 | 2.27 | 2.80 | 2.95 | 1 |
| 346 | 6160 | 8870 | 10800 | 13500 | 15700 | 18000 | 20400 | 23900 | 323 | 34.17 | 5.76 | 394.79 | .28 | 2.24 | 2.80 | 2.96 | 1 |
| 347 | 9490 | 13500 | 16300 | 20000 | 22800 | 25700 | 28600 | 32700 | 436 | 52.12 | 6.48 | 408.05 | .16 | 2.27 | 2.80 | 2.94 | 1 |
| 348 | 2500 | 3450 | 4090 | 4940 | 5590 | 6250 | 6940 | 7880 | 51.9 | 16.68 | 63.83 | 456.46 | .19 | 2.28 | 2.80 | 2.94 | 1 |
| 349 ^t | 2800 | 4370 | 5530 | 7120 | 8390 | 9740 | 11200 | 13200 | 144 | 38.21 | 40.37 | 464.09 | .10 | 2.27 | 2.80 | 2.95 | 1 |
| 350 | 5120 | 7330 | 8910 | 11000 | 12700 | 14500 | 16400 | 19000 | 174 | 49.80 | 42.39 | 475.41 | .07 | 2.27 | 2.79 | 2.94 | 1 |
| 351 | 13600 | 21400 | 27400 | 36000 | 43100 | 50800 | 59200 | 71500 | 664 | 63.31 | 8.43 | 430.10 | .17 | 2.27 | 2.79 | 2.94 | 1 |
| 352 ^{nc} | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 143 | 21.61 | 112.60 | 411.88 | .31 | 2.27 | 2.80 | 2.95 | 1 |
| 352 ^{*f} | 3990 | 6940 | 9190 | 12300 | 14800 | 17500 | 20300 | 24300 | 143 | 21.61 | 112.60 | 411.88 | .31 | 2.27 | 2.80 | 2.95 | 1 |
| 353 | 1470 | 2070 | 2490 | 3050 | 3480 | 3930 | 4400 | 5040 | 51.0 | 15.75 | 167.42 | 520.46 | .21 | 2.27 | 2.80 | 2.95 | 1 |
| 354 | 6780 | 9790 | 12100 | 15200 | 17800 | 20700 | 23700 | 28200 | 347 | 37.92 | 56.29 | 464.22 | .24 | 2.27 | 2.80 | 2.95 | 1 |
| 354 ^{*f} | 7470 | 11800 | 15000 | 19300 | 22700 | 26200 | 29900 | 35000 | 347 | 37.92 | 56.29 | 464.22 | .24 | 2.27 | 2.80 | 2.95 | 1 |
| 355 | 5370 | 7370 | 8720 | 10500 | 11800 | 13200 | 14600 | 16500 | 131 | 22.52 | 106.56 | 613.81 | .26 | 2.27 | 2.80 | 2.94 | 1 |
| 356 | 8720 | 11500 | 13300 | 15600 | 17400 | 19100 | 20900 | 23300 | 184 | 26.94 | 85.10 | 589.97 | .25 | 2.27 | 2.80 | 2.94 | 1 |
| 357 | 16900 | 26600 | 33800 | 43800 | 51700 | 60200 | 69200 | 81900 | 655 | 57.17 | 37.57 | 502.95 | .20 | 2.27 | 2.79 | 2.94 | 1 |
| 357 ^{*f} | 16600 | 23100 | 27200 | 32200 | 35800 | 39300 | 42700 | 47200 | 655 | 57.17 | 37.57 | 502.95 | .20 | 2.27 | 2.79 | 2.94 | 1 |
| 358 | 19.7 | 36.8 | 51.8 | 75.5 | 97 | 122 | 151 | 198 | .5 | 1.78 | 595.52 | 474.30 | .20 | 2.27 | 2.80 | 2.94 | 1 |
| 359 | 944 | 1290 | 1530 | 1840 | 2090 | 2340 | 2590 | 2950 | 13.8 | 8.53 | 346.36 | 601.47 | .19 | 2.27 | 2.79 | 2.94 | 1 |
| 360 | 2310 | 3640 | 4660 | 6120 | 7330 | 8640 | 10100 | 12200 | 44.4 | 12.93 | 173.28 | 606.86 | .26 | 2.26 | 2.79 | 2.93 | 1 |

Table 2. Recurrence interval discharges and basin characteristics for gaged rural sites in North Carolina—Continued

[Q, recurrence interval flood discharge for years indicated; DA, drainage area; L, channel length; CSLOPE, channel slope; BSLOPE, basin slope; SHLAP, basin shape; CF, climate factor for recurrence interval years indicated; REG, region: 1, if site is in Blue Ridge-Piedmont; 2, if site is in Coastal Plain; 3, if site is in Sand Hills; nc, flood-frequency estimates were not computed because the site has less than 10 years of peak-flow record; *, duplicate map identification number for sites having separate periods of regulated or channelized flows; r, site excluded from regional analysis because flows were affected by regulation or channelization; n.a., data not available]

| Map identification number (fig. 1) | Q ₂ | Q ₅ | Q ₁₀ | Q ₂₅ | Q ₅₀ | Q ₁₀₀ | Q ₂₀₀ | Q ₅₀₀ | DA (mi ²) | L (mi) | CSLOPE (ft/mi) | BSLOPE (ft/mi) | SHAPE (DA/L ²) | CF ₂ | CF ₂₅ | CF ₁₀₀ | REG |
|------------------------------------|----------------|----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------------|--------|----------------|----------------|----------------------------|-----------------|------------------|-------------------|-----|
| 36] nc | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 1571 | 85.95 | 21.06 | 472.39 | 0.21 | 2.28 | 2.79 | 2.94 | 1 |
| 36.1* r | 10800 | 17500 | 22400 | 29100 | 34500 | 40100 | 46100 | 54400 | 1571 | 85.95 | 21.06 | 472.39 | .21 | 2.28 | 2.79 | 2.94 | 1 |
| 362 | 2920 | 4140 | 5020 | 6200 | 7140 | 8130 | 9180 | 10700 | 42.0 | 19.16 | 86.51 | 480.21 | .11 | 2.29 | 2.80 | 2.95 | 1 |
| 363 | 1440 | 2410 | 3200 | 4380 | 5400 | 6550 | 7830 | 9780 | 37.6 | 7.91 | 150.30 | 474.21 | .61 | 2.29 | 2.81 | 2.96 | 1 |
| 364 ^r | 1640 | 2090 | 2470 | 3070 | 3600 | 4220 | 4940 | 6070 | 190 | 26.23 | 50.04 | 384.09 | .28 | 2.29 | 2.81 | 2.96 | 1 |
| 365 | 11300 | 15800 | 18800 | 22800 | 25800 | 28900 | 32100 | 36500 | 406 | 47.41 | 15.70 | 368.28 | .18 | 2.31 | 2.81 | 2.96 | 1 |
| 365* r | 8960 | 12600 | 14800 | 17400 | 19200 | 20800 | 22400 | 24300 | 406 | 47.41 | 15.70 | 368.28 | .18 | 2.31 | 2.81 | 2.96 | 1 |
| 366 | 4190 | 6510 | 8320 | 10900 | 13000 | 15400 | 18000 | 21800 | 104 | 22.63 | 50.23 | 435.97 | .20 | 2.31 | 2.81 | 2.95 | 1 |

APPENDIX

The value of the mean square error (MSE_s) at a specific site can be estimated as follows: Denote the column vector of n logarithms of observed peak-discharge characteristics at n sites in a region by Y . For example,

$$Y = \begin{bmatrix} \log Q_{50,1} \\ \log Q_{50,2} \\ \text{""} \\ \log Q_{50,n} \end{bmatrix},$$

in which, $Q_{50,i}$ represents the observed 50-year peak at the i th gaging station in the region. Further, let X represent a (n by p) matrix of $p-1$ basin characteristics augmented by a column of ones at n gaging stations and B represent a column vector of p regression coefficients.

For example,

$$X = \begin{bmatrix} 1 & \log(DA_1) & \log(LA_1) & \log(RQ50_1) \\ 1 & \log(DA_2) & \log(LA_2) & \log(RQ50_2) \\ \text{""} & \text{""} & \text{""} & \text{""} \\ 1 & \log(DA_n) & \log(LA_n) & \log(RQ50_n) \end{bmatrix} \text{ and } B = \begin{bmatrix} a \\ b_1 \\ b_2 \\ b_4 \end{bmatrix}.$$

The linear model can be written as

$$Y = XB.$$

The mean square sampling error, $MSE_{s,0}$, for an ungaged site with basin characteristics given by the row vector $x_0 = [1 \log(DA_0) \log(LA_0) \log(RQ50_0)]$, for example, is calculated as

$$MSE_{s,0} = x_0 \{X^T \Lambda^{-1} X\}^{-1} x_0^T,$$

in which Λ is the (n by n) covariance matrix associated with Y . The diagonal elements of Λ are model error variance, γ^2 , plus the time-sampling error for each site i ($i=1,2,3,\dots,n$), which is estimated as a function of a regional estimate of the standard deviation of annual peaks at site i , the recurrence interval of the dependent variable and the number of years of record at site i . The off-diagonal elements of Λ are the sample covariance of the estimated t -year peaks at sites i and j . These off-diagonal elements are estimated as a function of a regional estimate of the standard deviation of annual peaks at sites i and j , the recurrence interval of the dependent variable and the number of concurrent years of record at sites i and j (Tasker and Stedinger, 1989). The (p by p) matrix $\{X^T \Lambda^{-1} X\}^{-1}$ for each equation is given in Appendix table 1. The mean square error of a prediction, in log (base 10) units, at specific ungaged sites can be estimated as

$$MSE_{p,0} = (\gamma^2 + MSE_{s,0}).$$

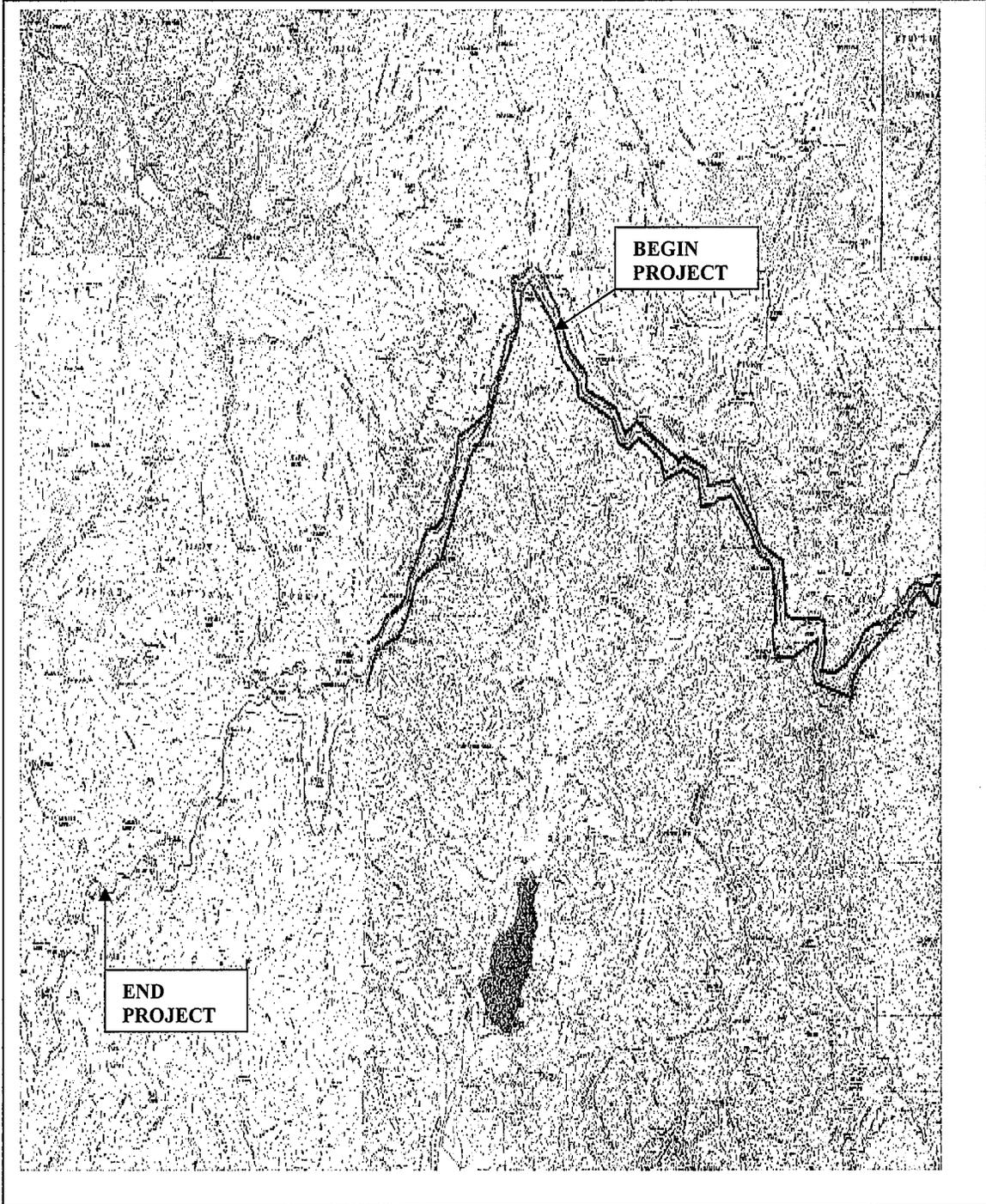
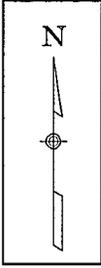
The standard error of a prediction, $SE_{\text{prediction}}$, in percent, can be calculated as

$$SE_{\text{prediction}} = 100 \{e^{5.302 \times (MSE_{p,0})} - 1\}^{0.5}.$$

Appendix Table 1. Matrix $\{X^T \Lambda^{-1} X\}^{-1}$ for the equations in table 5 (p. 11)

[These matrices can be used to compute the standard error of prediction and prediction intervals as explained in the text. Numbers are given in scientific notation, for example, 0.43958E-01 = 0.43958 x 10⁻¹ = 0.043958]

| Blue Ridge-Piedmont | | Hydrologic area | | | |
|------------------------------|--------------|-----------------|--------------|--------------|--------------|
| | | Coastal Plain | | Sand Hills | |
| 2-year recurrence interval | | | | | |
| 0.14072E-02 | -0.49612E-03 | 0.31893E-02 | -0.98276E-03 | 0.10200E-01 | -0.44648E-02 |
| -0.49612E-03 | 0.24350E-03 | -0.98276E-03 | 0.43777E-03 | -0.44648E-02 | 0.25105E-02 |
| 5-year recurrence interval | | | | | |
| 0.16431E-02 | -0.55517E-03 | 0.37147E-02 | -0.10840E-02 | 0.12971E-01 | -0.56042E-02 |
| -0.55517E-03 | 0.26322E-03 | -0.10840E-02 | 0.45031E-03 | -0.56042E-02 | 0.31270E-02 |
| 10-year recurrence interval | | | | | |
| 0.18985E-02 | -0.62424E-03 | 0.43917E-02 | -0.12495E-02 | 0.15456E-01 | -0.65943E-02 |
| -0.62424E-03 | 0.28912E-03 | -0.12495E-02 | 0.50084E-03 | -0.65943E-02 | 0.36522E-02 |
| 25-year recurrence interval | | | | | |
| 0.22833E-02 | -0.73140E-03 | 0.54496E-02 | -0.15204E-02 | 0.19118E-01 | -0.80470E-02 |
| -0.73140E-03 | 0.33094E-03 | -0.15204E-02 | 0.59196E-03 | -0.80470E-02 | 0.44209E-02 |
| 50-year recurrence interval | | | | | |
| 0.25999E-02 | -0.82124E-03 | 0.63333E-02 | -0.17517E-02 | 0.22136E-01 | -0.92451E-02 |
| -0.82124E-03 | 0.36687E-03 | -0.17517E-02 | 0.67303E-03 | -0.92451E-02 | 0.50554E-02 |
| 100-year recurrence interval | | | | | |
| 0.29342E-02 | -0.91725E-03 | 0.72726E-02 | -0.20005E-02 | 0.25348E-01 | -0.10523E-01 |
| -0.91725E-03 | 0.40581E-03 | -0.20005E-02 | 0.76200E-03 | -0.10523E-01 | 0.57330E-02 |
| 200-year recurrence interval | | | | | |
| 0.32839E-02 | -0.10186E-02 | 0.82596E-02 | -0.22640E-02 | 0.28740E-01 | -0.11875E-01 |
| -0.10186E-02 | 0.44737E-03 | -0.22640E-02 | 0.85763E-03 | -0.11875E-01 | 0.64516E-02 |
| 500-year recurrence interval | | | | | |
| 0.37671E-02 | -0.11600E-02 | 0.96272E-02 | -0.26319E-02 | 0.33482E-01 | -0.13772E-01 |
| -0.11600E-02 | 0.50586E-03 | -0.26319E-02 | 0.99272E-03 | -0.13772E-01 | 0.74616E-02 |



Map Source: www.topozone.com

Compilation of Knoxville, Craggy Pinnacle, Montreat, Mt. Mitchell – TN quadrangles

Not To Scale



ARCADIS

1210 Premier Drive, Suite 200
Chattanooga, TN 37421
Tel: 423/756-7193 Fax: 423/756-7197

TOPOGRAPHIC SITE MAP
REHABILITATION OF BLUE RIDGE
PARKWAY BETWEEN MILEPOST 359.8
AND MILEPOST 375.3

PROJECT NO.
PRA BLRI 2P14

APPENDIX
A

DATE
3/29/04

ARCADIS

Appendix C

NCDOT, Guidelines for Drainage
Studies and Hydraulic Design



Hydraulics Unit

Guideline for Drainage Studies and Hydraulic Design VI. Hydrology

The hydrological analysis phase involves the determination of discharge rates and/or volumes of runoff that the drainage facilities will be required to convey or control. Many hydrological methods are available and most can be appropriately used under proper control and application. Particular methods recommended for highway drainage study circumstances for their use are listed below. When the site involves a **FEMA flood study area**, discharge methods provided in the report will take precedent over these methods for determining compliance with the regulation. The any hydrologic procedure should be compared to historical site information and adjustments made in the values as procedure used when deemed appropriate. The designer must also consider potential future land use changes within watershed over the life of a roadway structure and include this effect when estimating design discharges.

METHODS

Rural Watersheds - Peak Discharge

- > 1 mi² The procedures and values presented in U. S. Geological Survey, Water Resources Investigation R 99-4114 (4), shall apply.
- < 1mi² The hydrological procedure and charts presented in Appendix C, N. C. Division of Highways Hydrologic Charts-1973, (C200.1  and C200.2)  shall be used.

Urban Watersheds - Peak Discharge

- < 10 acres If watershed is primarily composed of pavement, grassed shoulders and slopes, and/or other minor surface type runoff, use rational formula for discharge determination. If predominately residential type development with natural drainage channels, use Highway Charts C200.1  and C200.3 .
- > 10 acres < 100 Use Highway drainage charts (C200.1  and C200.3 ). If areas have greater than 50% impervious cover and/or extensive storm drainage systems, a special procedure such as routing is recommended. The HEC-1 and NRCS, TR-20 are widely used routing procedures. Determination of specific sites for special and selection of a design procedure must be approved by the Reviewing Engineer. This item should be added in the pre-design meeting.
- > 100 acres Use the procedure presented in U.S. Geological Survey - Water Resource Investigation Report 4084(5).

Volume of Flow

The procedures presented in U.S. Geological Survey Report 96-4085(6) for developing a runoff hydrograph can be utilized to determine flow volume. For estimating purposes or minor impoundment (<1 acre-foot) a simple triangular hydrograph as described later in this chapter can be used.

APPLICATION GUIDANCE

"U.S.G.S. Water Resources Investigations Report 99-4114"

Two regional analysis methods are presented in this report (4). The first employs the traditional **regional regression** that are presented in Table 5, page 11. The second is the **region-of-influence** method that must be developed through a computer software program due to the complexity of the computations. This program provides both the regional and region-of-influence solutions, allowing the engineer to compare and select a design value. This computer software is available at the NC USGS home page on the internet. For gaged sites, the discharge estimate is to be determined by weighting the regional and station estimates (See Equation 7, Page 15). For sites on gaged stream and having a distance within 50% (0.5 to 1.5) of the gage site, the discharge estimate is to be transferred from the gage in accordance to and 9, Page 16.

"Highway Charts"(Appendix C)

The rural areas charts C200.1 and C200.2 are to be used within the limits previously noted. The procedure follows:

(1) From Chart C200.1 determine the hydrologic contour by location of the structure site. Interpolate to 0 interval.

(2) Determine:

Drainage area (acres or mi²) Watershed shape factor (A/L^2)

- o $A = \text{area}$
- o $L = \text{length}$

Percent forested cover

(3) Enter chart C200.2 with drainage area and hydrological contour and read discharge.

(4) For discharges other than Q50, apply frequency adjustment factors shown on chart.

(5) Enter charts C200.4 and C200.5 to determine adjustment factors to be applied to above values for percent forested cover and watershed shape.

*NOTE: The forested cover value can be used to reduce discharge only when the watershed is mountainous, well ar or a designated preserve area where clearing is very unlikely. The multiple of the two adjustment factors cannot exceed the limits of 0.7 and 1.5.

The urban chart, C200.3 is to be used within the limitations previously noted. Procedure for use is as follows:

(1) From chart C200.1 determine the hydraulic contour to the nearest 0.5 interval.

(2) Determine the type and relative density of development. This should be a projection of conditions based on future development over the life of the structure. The development types as noted on the chart are:

- o **Residential-High Type**; This is suburban type development with lots sizes > 0.5 acres
- o **Average Development**; Small lots < 0.5 acres or mixture of residential and some small business
- o **Large Area Full Business**; Area > 75 acres, no more than 50% impervious cover or extensive storm

(5) For discharges other than Q10, apply frequency adjustment factors shown on chart.

"Rational Formula"

The rational formula estimates the peak rate of runoff (Q) in ft³/s as a function of drainage area (A), in acres, runoff (C), and mean rainfall intensity (I) in in/h for a duration equal to the time of concentration (t_c), the time required for runoff from the most hydraulically remote point of the basin to the location of analysis.

$$Q = CIA$$

Use limitations are noted previously in the guidelines. For expanded discussion of the rational formula see "FHWA Engineering Circular No. 22"(7)

Some specific criteria are:

A = 10 +/- acres maximum (When the watershed for a continuous storm drain system is greater than suggested maximum, it is acceptable to exceed this value).

I = Use highway charts C200.7, C200.8, and C200.9 (Appendix C). Interpolate between cities and other points. The Hydrain program will provide values based on latitude and longitude location.

C = Use a weighted value = $C_i A_i / A$

Table 4-2 provides some often used values:

| TABLE 4-2 | |
|-----------------------|-----------|
| TYPE OF SURFACE | C |
| Pavement | 0.7 - 0.9 |
| Gravel surfaces | 0.4 - 0.6 |
| Grassed, steep slopes | 0.3 - 0.4 |
| Grassed, flat slopes | 0.2 - 0.3 |
| Woods | 0.1 - 0.2 |

Time of concentration (t_c) - Use Kinematic Wave Equation for overland flow time. See page 3-8, Hydraulic Engineering Circular No. 22, (6). Minimum t_c - 10 min.

USGS WRI-REPORT 96-4185, ESTIMATING FLOOD HYDROGRAPHS FOR URBAN BASINS IN NC
USGS Report 96-4084 "Estimation of Flood-Frequency Characteristics of Small Urban Streams in North Carolina".

Urban regression equations are provided on page 14 of this reference. Details are provided on page 17 for the equations.

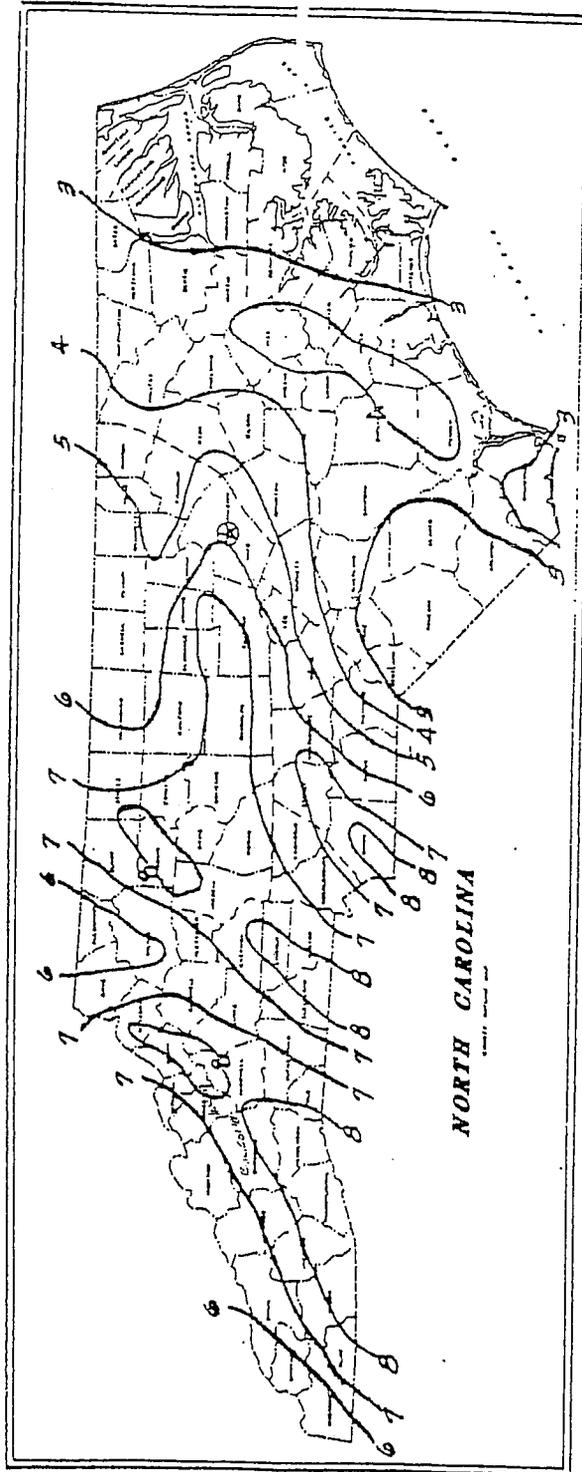
<http://www.doh.dot.state.nc.us/preconstruct/highway/hydro/gl0399web/vi.hydrology.html> 10/14/2003

systems

- o **Small Area Full Business**; Area < 75 acres no more than 50% impervious cover or extensive storm systems

(3) Enter chart C200.3  with drainage area and hydraulic contour and read discharge.

(4) Apply appropriate adjustment factor for development type.



NORTH CAROLINA STATE HIGHWAY COMMISSION
HYDROGRAPHIC DEPT.
MAP OF HYDROLOGIC CONTOURS FOR USE IN DETERMINING
PROJECT DESIGN DISCHARGES

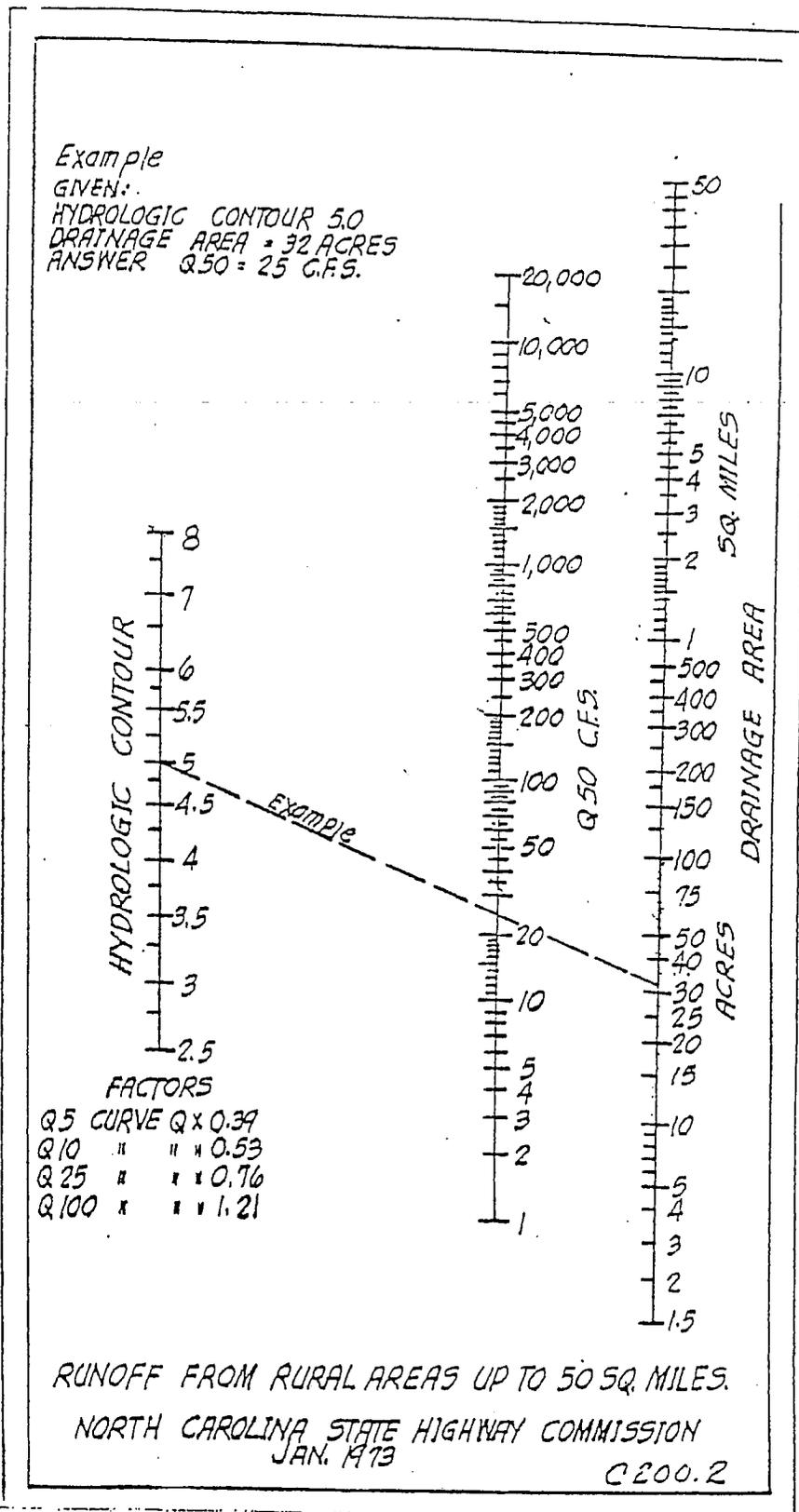
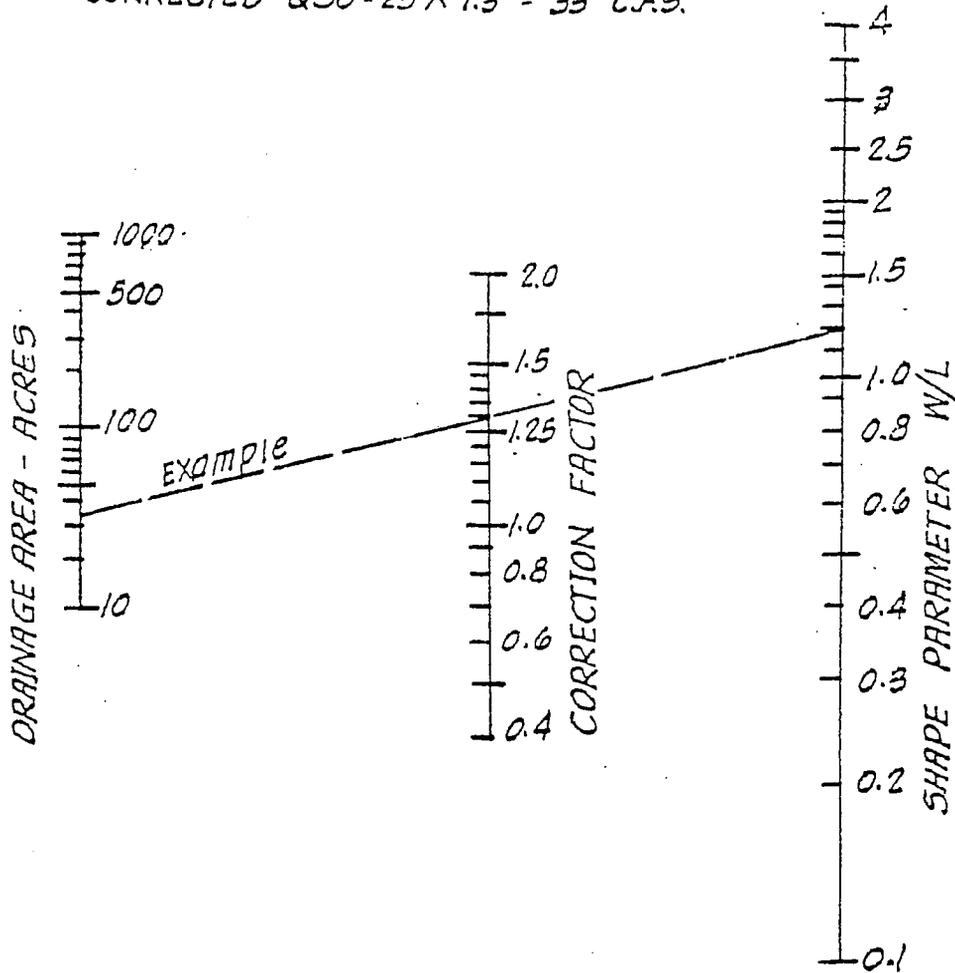


CHART C 200.2

EXAMPLE
GIVEN :

DRAINAGE AREA 32 ACRES RURAL
W/L = 1.2

ANSWER FROM CHART 100.2 Q₅₀ = 25 C.F.S.
CORRECTED Q₅₀ = 25 X 1.3 = 33 C.F.S.

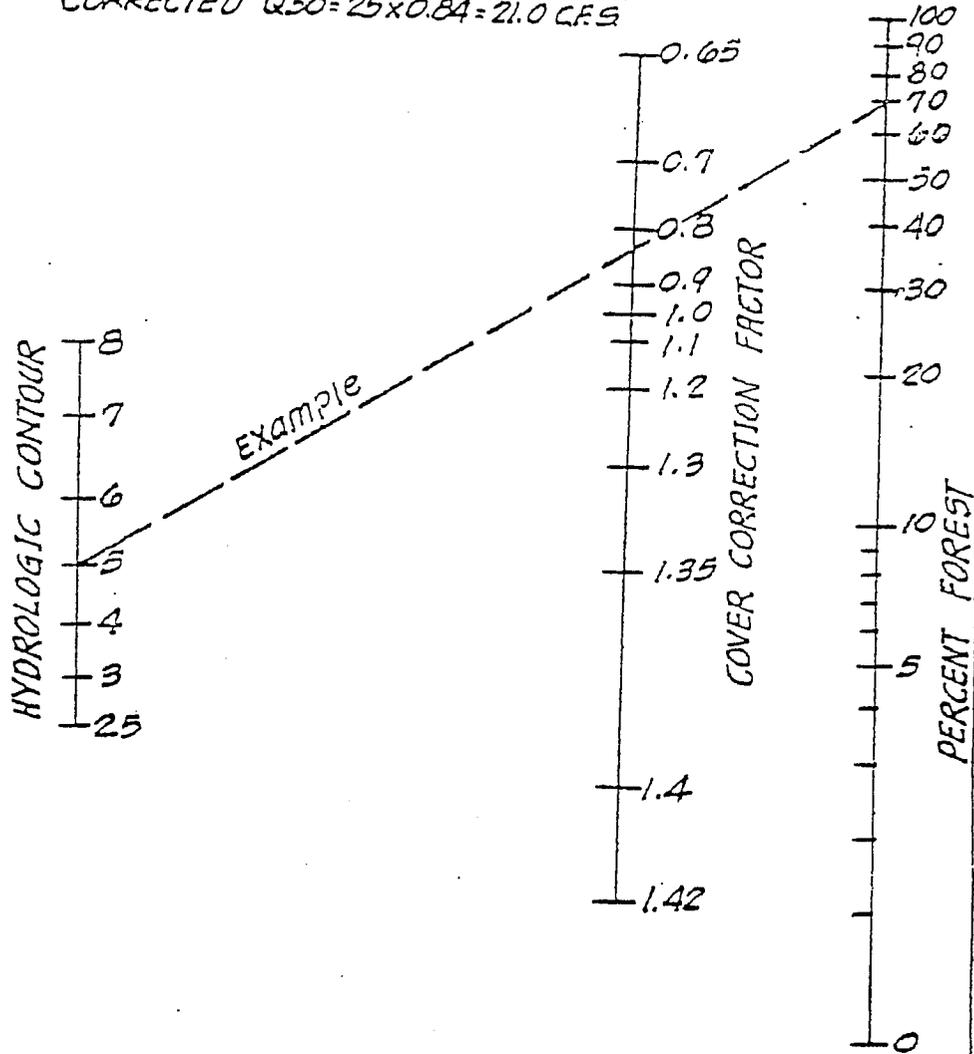


DRAINAGE AREA SHAPE PARAMETER
CORRECTION FACTORS

NORTH CAROLINA STATE HIGHWAY COMMISSION
JAN, 1973

CHART C 200.4

EXAMPLE
GIVEN:
HYDROLOGIC CONTOUR 5.0
DRAINAGE AREA 35 AC
% FOREST 70%
ANSWER FROM CHART Q50 = 25 CFS
CORRECTED Q50 = 25 x 0.84 = 21.0 CFS

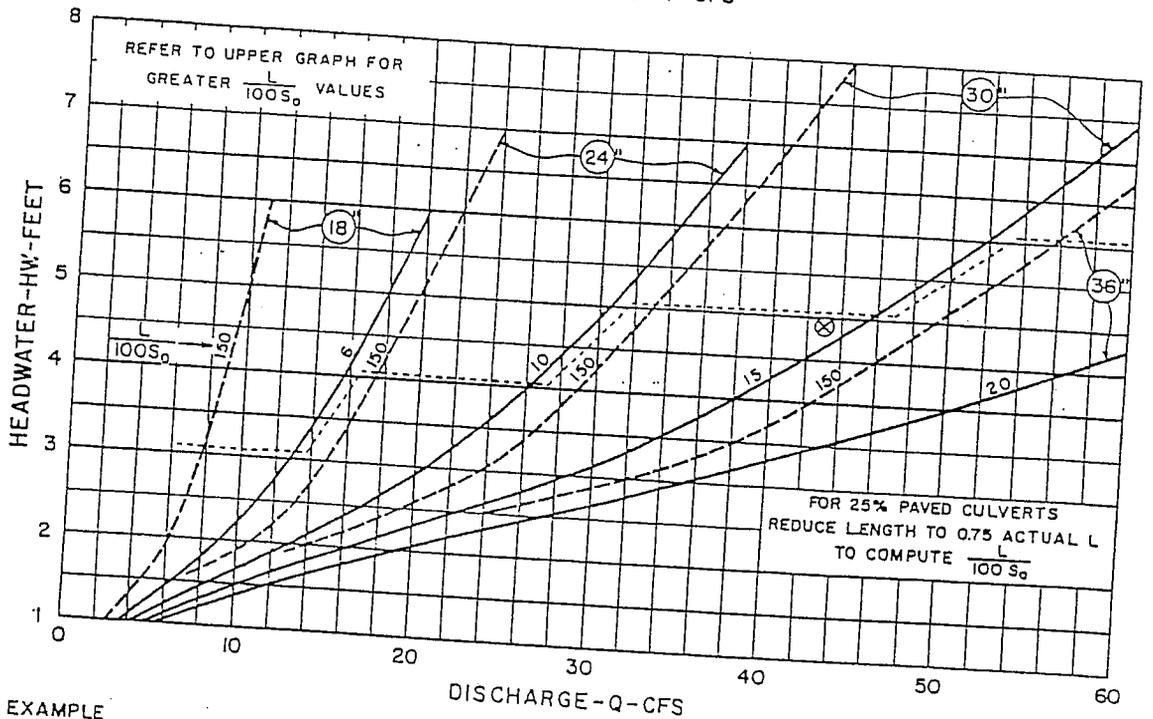
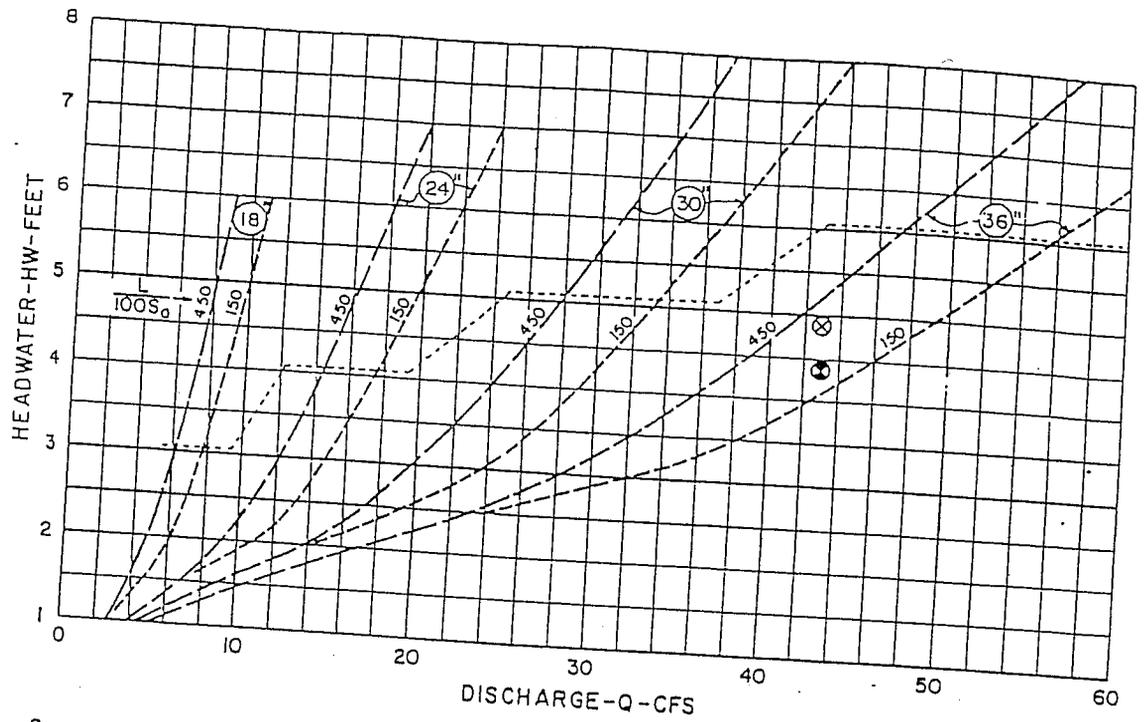


DRAINAGE AREA COVER PARAMETER
CORRECTION FACTORS

NORTH CAROLINA STATE HIGHWAY COMMISSION
JAN, 1973

C 200.5

CHART C200.5



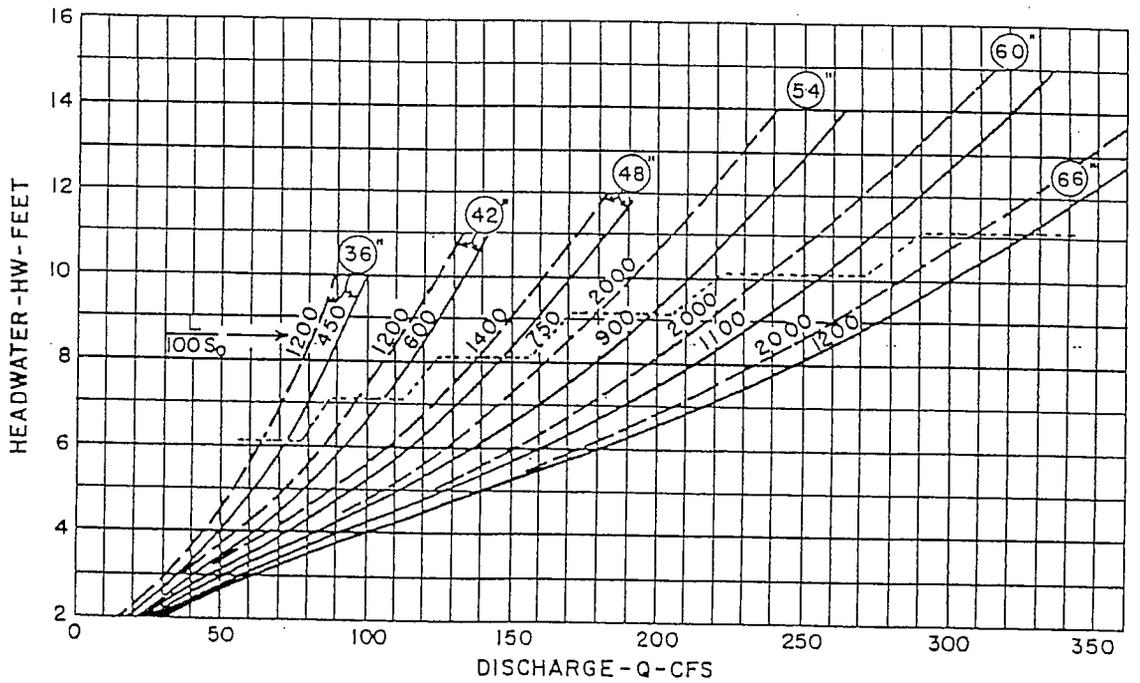
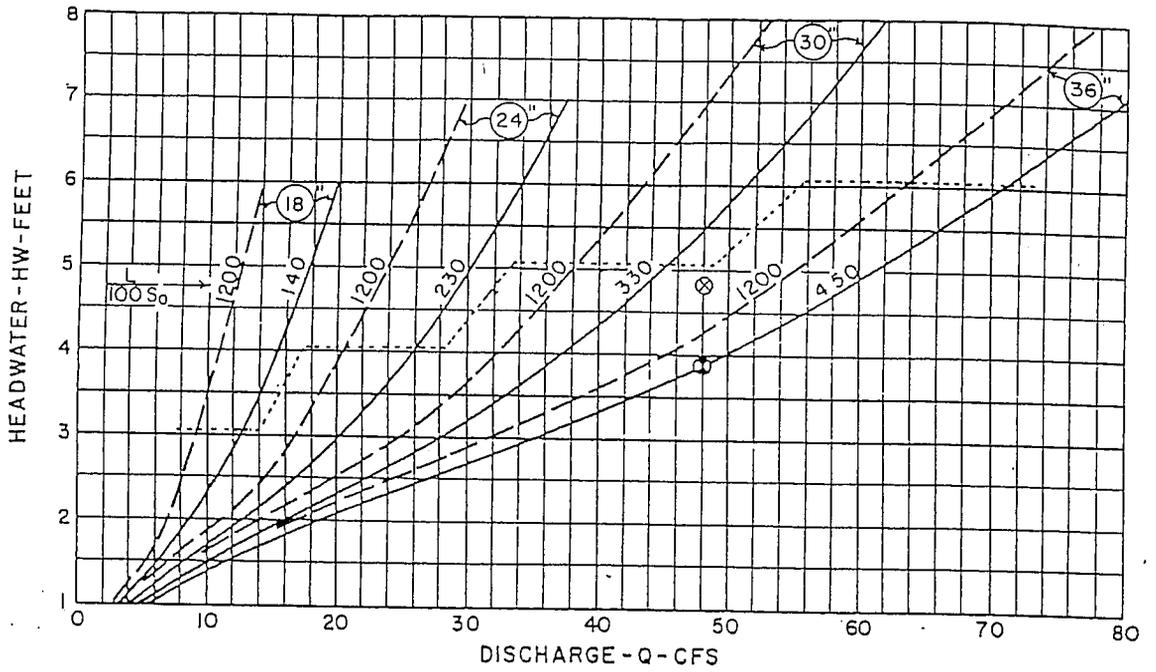
EXAMPLE

- ⊗ GIVEN:
43 CFS; AHW = 4.9 FT.
L = 72 FT.; $S_0 = 0.003$
- ⊗ SELECT 36" UNPAVED
HW = 4.4 FT.

CULVERT CAPACITY
STANDARD
CIRCULAR CORR. METAL PIPE
HEADWALL ENTRANCE
18" TO 36" ○

BUREAU OF PUBLIC ROADS JAN 1963

CHART 6-12



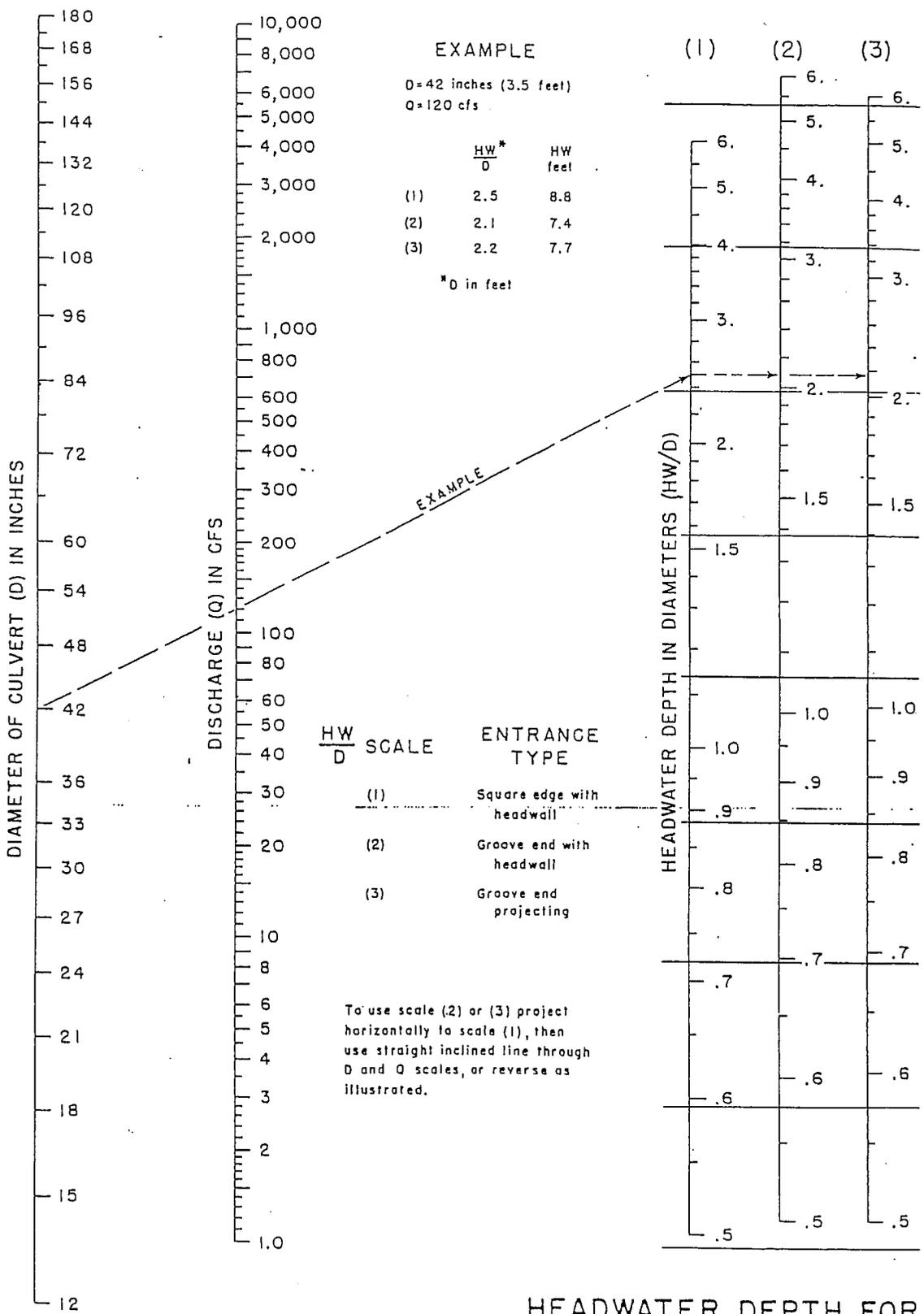
EXAMPLE

⊗ GIVEN:
48 CFS; AHW = 4.8 FT.
L = 60 FT; $S_0 = 0.003$

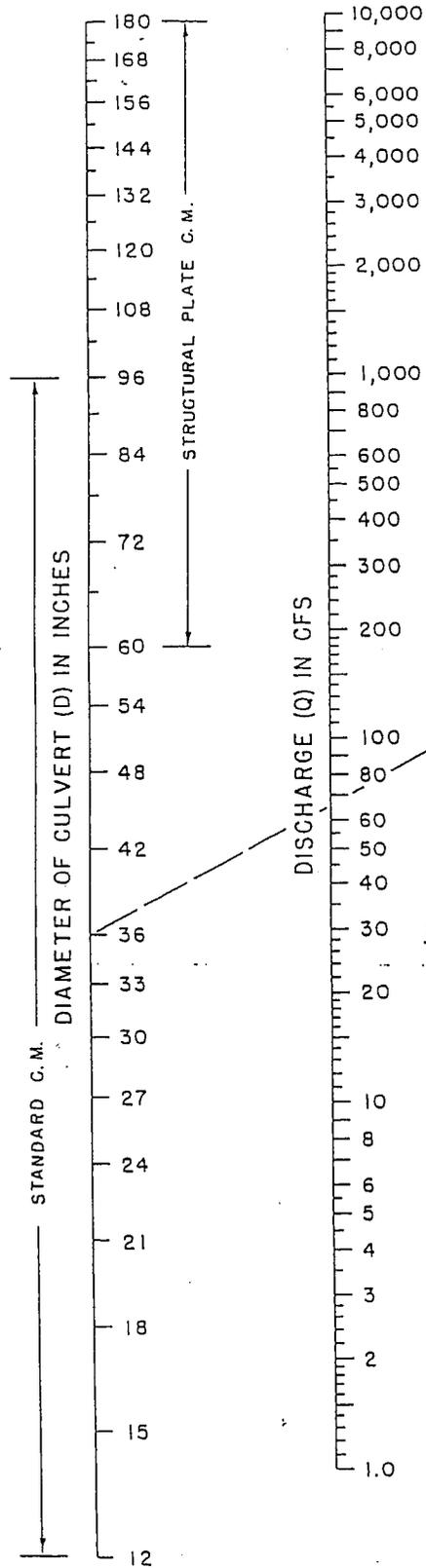
⊙ SELECT 36"
HW = 3.9 FT.

CULVERT CAPACITY
CIRCULAR CONCRETE PIPE
SQUARE-EDGED ENTRANCE
18" TO 66" ○

BUREAU OF PUBLIC ROADS JAN. 1963



HEADWATER DEPTH FOR
 CONCRETE PIPE CULVERTS
 WITH INLET CONTROL



EXAMPLE

D = 36 inches (3.0 feet)
 Q = 66 cfs

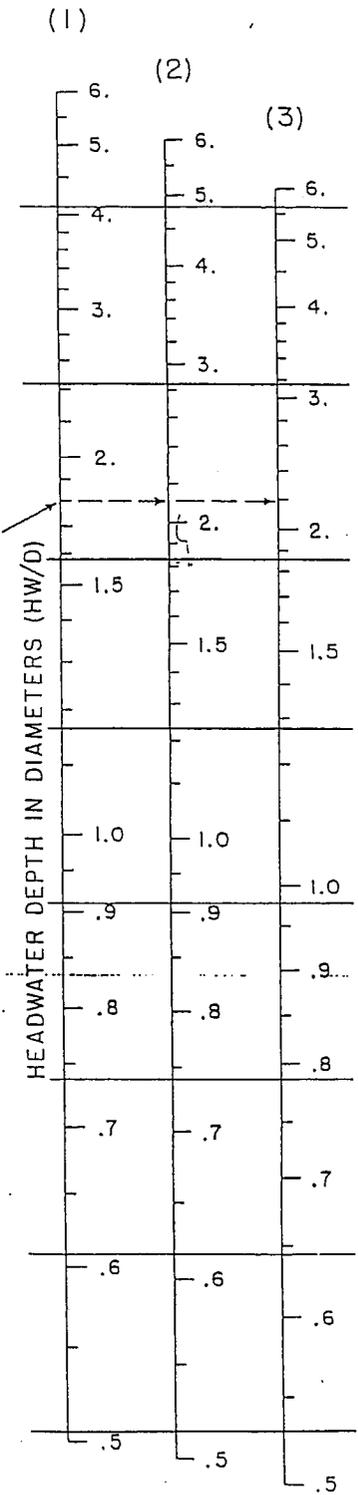
| | $\frac{HW}{D}$ | HW (feet) |
|-----|----------------|-----------|
| (1) | 1.8 | 5.4 |
| (2) | 2.1 | 6.3 |
| (3) | 2.2 | 6.6 |

* D in feet

EXAMPLE

| $\frac{HW}{D}$ SCALE | ENTRANCE TYPE |
|----------------------|-----------------------------|
| (1) | Headwall |
| (2) | Mitered to conform to slope |
| (3) | Projecting |

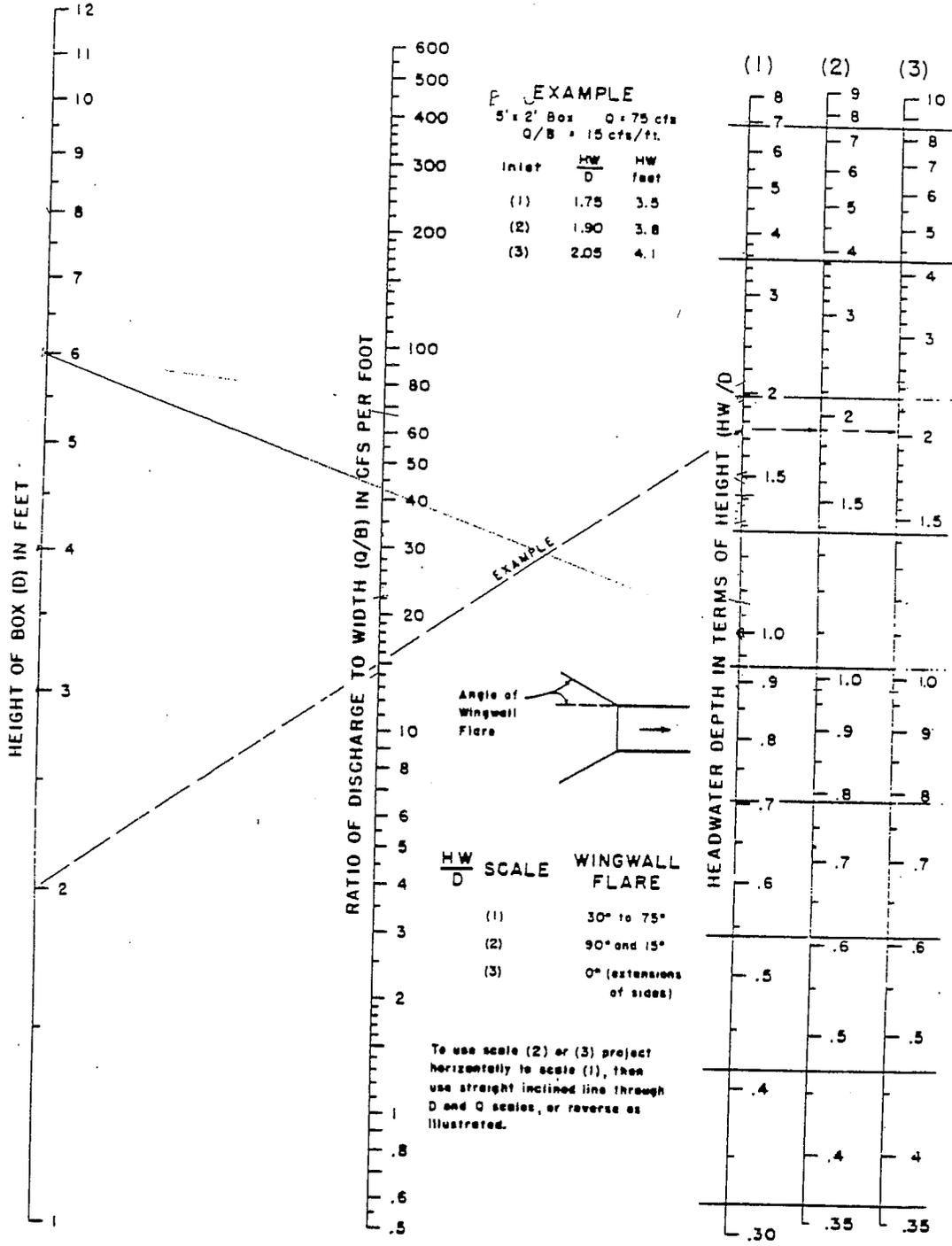
To use scale (2) or (3) project horizontally to scale (1), then use straight inclined line through D and Q scales, or reverse as illustrated.



HEADWATER DEPTH FOR
 C. M. PIPE CULVERTS
 WITH INLET CONTROL

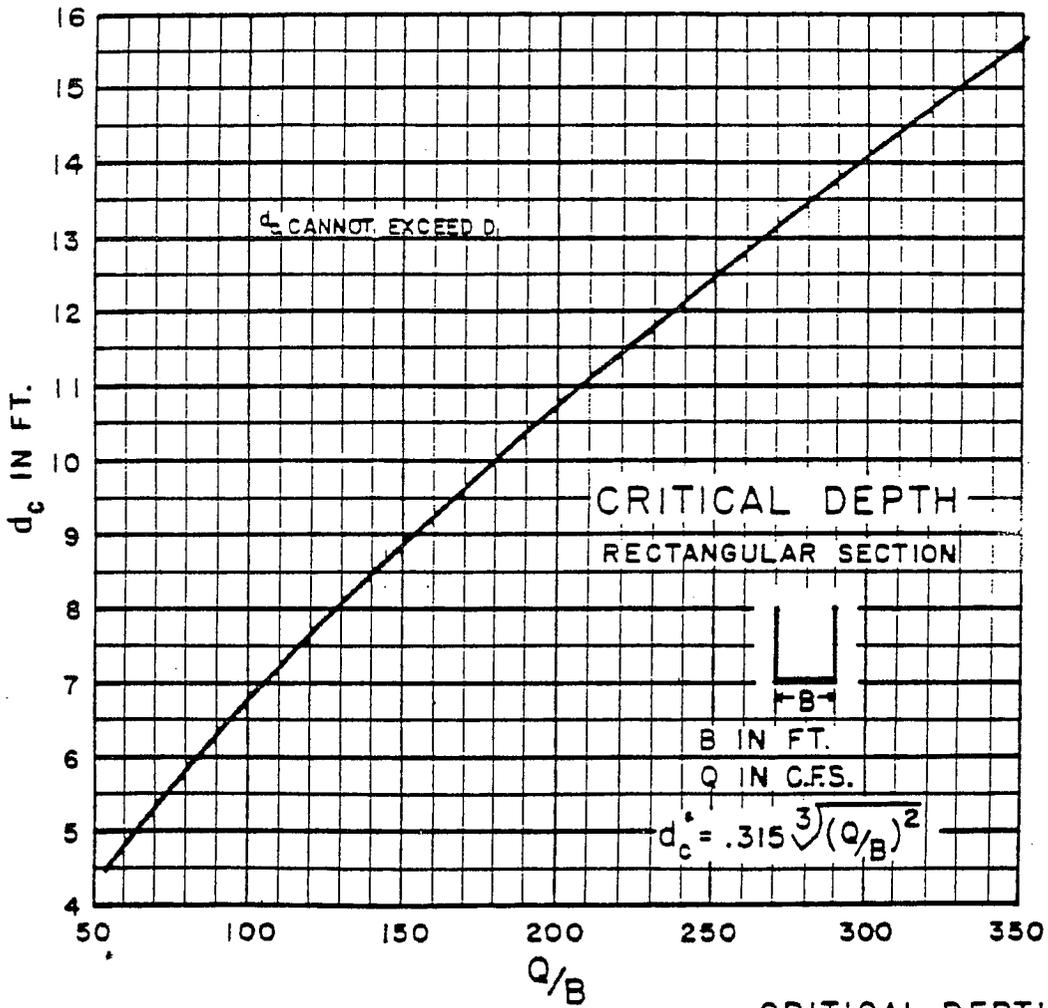
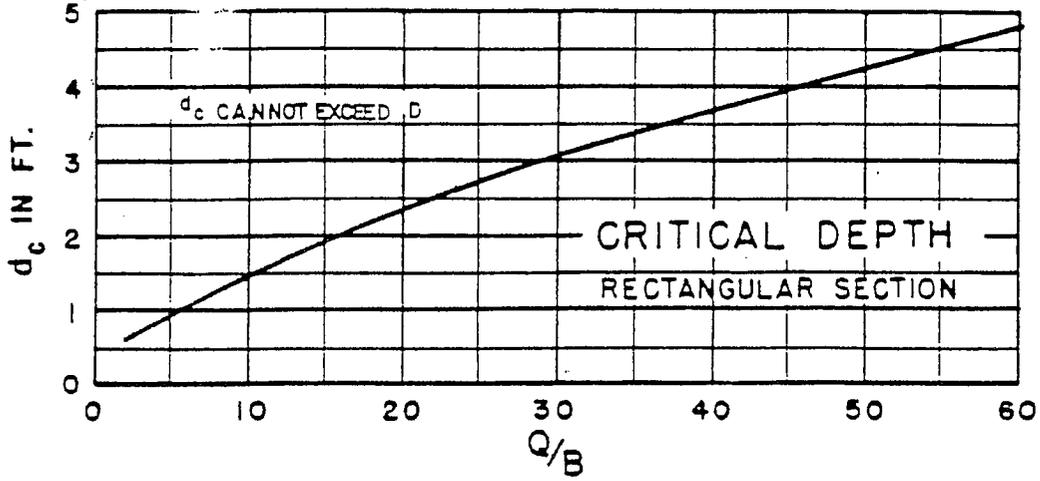


CHART 8



HEADWATER DEPTH FOR BOX CULVERTS WITH INLET CONTROL

CHAR 14



BUREAU OF PUBLIC

JAN 1963

5-38

CRITICAL DEPTH
RECTANGULAR SECTION