**Planning and Community Development Department**
2880 International Circle
**Colorado Springs, Colorado 80910**
Phone: 719.520.6300
Fax: 719.520.6695
Website www.elpasoco.com

# DEVIATION REQUEST AND DECISION FORM

Updated: 6/26/2019

## PROJECT INFORMATION

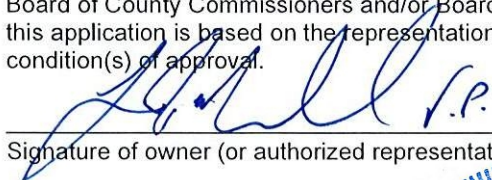| | |
|---|---|
| Project Name : | **Retreat at TimberRidge Filing No. 3** |
| Schedule No.(s) : | 52214-00-001, 52280-00-039, 52272-00-007, 52272-00-008, 52220-00-026, portion of 52220-00-023 |
| Legal Description : | See attached |

## APPLICANT INFORMATION

| | |
|---|---|
| Company : | Classic Companies |
| Name : | Loren Moreland |
| | ☒ Owner ☐ Consultant ☐ Contractor |
| Mailing Address : | 2138 Flying Horse Club Dr. |
| | Colorado Springs, CO 80921 |
| Phone Number : | 719-592-9333 |
| FAX Number : | N/A |
| Email Address : | Lmoreland@classichomes.com |

## ENGINEER INFORMATION

| | | |
|---|---|---|
| Company : | Classic Consulting | |
| Name : | Marc A. Whorton, P.E. | Colorado P.E. Number : 37155 |
| Mailing Address : | 619 N. Cascade Ave., Suite 200 | |
| | Colorado Springs, CO 80903 | |
| Phone Number : | 719-785-2802 | |
| FAX Number : | N/A | |
| Email Address : | Mwhorton@classicconsulting.net | |

## OWNER, APPLICANT, AND ENGINEER DECLARATION

To the best of my knowledge, the information on this application and all additional or supplemental documentation is true, factual and complete. I am fully aware that any misrepresentation of any information on this application may be grounds for denial. I have familiarized myself with the rules, regulations and procedures with respect to preparing and filing this application. I also understand that an incorrect submittal will be cause to have the project removed from the agenda of the Planning Commission, Board of County Commissioners and/or Board of Adjustment or delay review until corrections are made, and that any approval of this application is based on the representations made in the application and may be revoked on any breach of representation or condition(s) of approval.

_____     _____
Signature of owner (or authorized representative)          Date  4/22/2024

Engineer's Seal, Signature
And Date of Signature
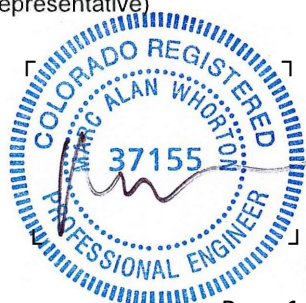
4/22/2024

**DEVIATION REQUEST (**Attach diagrams, figures, and other documentation to clarify request)

ECM Section 3.3.2.A,

A deviation from the standards of or in Section **Chapter 6  6.4.1 and Table 6-4** of the Drainage Criteria Manual (DCM) is requested.

Identify the specific DCM standard which a deviation is requested:

Rural Minor Collector – Arroya Lane
Allowable culvert overtopping – major drainage system maximum depth of 12"

State the reason for the requested deviation:

The adjacent property owner directly north of Arroya Lane currently has a private driveway with access onto Arroya Lane 125' east of the culvert crossing of Sand Creek.  The current roadway and culvert crossing design required several temporary construction and permanent drainage easements from this property owner.  After many discussions and meetings, this neighbor is unwilling to grant any easements for work on his property.

Thus, we have revised the roadway and culvert crossing design to accommodate no disturbance on the adjacent property.  In order to make this design work by keeping his current private driveway location in tact yet still provide an adequate 100-yr. culvert crossing of Sand Creek, overtopping depth of a small portion of this roadway will exceed the max. 12" ponding for the Sand Creek DBPS and FEMA 100-yr. flows. (2170 cfs and 2600 cfs, respectively)

Incidentally, the more recent Sterling Ranch MDDP 100-yr. flows are 1468 cfs, which meet current overtopping criteria.

Explain the proposed alternative and compare to the DCM standards (May provide applicable regional or national standards used as basis):

Alternatively, we suggest that the SR MDDP 100-yr. flows are the most recently approved drainage study for this reach of Sand Creek and thus, meet current overtopping criteria.

However, the deviation being requested is for the Sand Creek DBPS and FEMA flows having an overtopping depth that exceed the current criteria of 12" for this type of roadway.

More specifically:  SC DBPS 100-yr. flow of 2170 cfs will have a max. depth at the low-point in Arroya Lane. of 1.70'
            FEMA 100-yr. flow of 2600 cfs will have a max. depth at the low-point in Arroya Lane of 2.09'

Provide Sterling Ranch MDDP overtopping values also

Address alternative of using 3 box culverts and why that isn't recommended due to hydrology issues.

**LIMITS OF CONSIDERATION**
(At least one of the conditions listed below must be met for this deviation request to be considered.)

☐  The DCM standard is inapplicable to the particular situation.
☒  Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.
☐  A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.

*check this box*

Provide justification:

> In this specific situation, the natural topography adjacent to the Sand Creek channel along with the geographic location of the adjacent properties private driveway make the required Arroya roadway and drainage improvements undue hardships without the ability of gaining off-site easements from the adjacent property owner.
>
> However, the SR MDDP 100-yr. flows of 1468 cfs are the most recently approved drainage study for this reach of Sand Creek and do indeed meet current overtopping criteria.

*Address alternative of using 3 box culverts and why that isn't recommended due to hydrology issues and increased maintenance costs. If there is a construction constraint mention that but I wouldn't say there is a geographic constraint if a 3rd culvert could be added.*

**CRITERIA FOR APPROVAL**

Per ECM section 5.8.7 the request for a deviation may be considered if the request is **not based exclusively on financial considerations**.  The deviation must not be detrimental to public safety or surrounding property.  The applicant must include supporting information demonstrating compliance with **all of the following criteria**:

The deviation will achieve the intended result with a comparable or superior design and quality of improvement.

> This deviation is not based on financial considerations as we were prepared to construct a larger culvert design but could not acquire the off-site easements.  We even offered $ for these easements but the adjacent owner would not even put a value on the easements.
>
> The proposed deviation, with additional warning signage and buried rip-rap embankment protection for this roadway overtopping will result in a comparable design for the roadway.
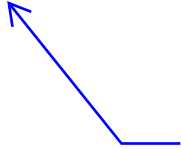
The deviation will not adversely affect safety or operations.

> With the additional warning signage and buried rip-rap embankment protection proposed, this deviation will not affect safety or operations.

*I would also state that the SR MDDP and draft CWCB floodplain values show that the previous DBPS and FEMA 100-year flows are excessive.*

The deviation will not adversely affect maintenance and its associated cost.

Other than the two additional signs and buried rip-rap protection, the roadway design remains the same.

Address alternative of using 3 box culverts and why that isn't recommended due to increased maintenance costs.

The deviation will not adversely affect aesthetic appearance.

The roadway design visually remains the same and does not affect the aesthetic appearance.
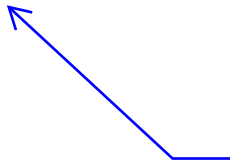
Address alternative of using 3 box culverts (if feasible) and what the aesthetic impact would be.

The deviation meets the design intent and purpose of the DCM standards.

This deviation seems to meet the design intent and purpose of the DCM as we are proposing to use slightly higher overtopping depth for a short stretch of roadway.

Also, as mentioned earlier, the SR MDDP 100-yr. flows of 1468 cfs are the most recently approved drainage study for this reach of Sand Creek and do indeed meet current overtopping criteria.

provide the overtopping depth

The deviation meets the control measure requirements of Part I.E.3 and Part I.E.4 of the County's MS4 permit, as applicable.

This deviation has no affect on the County's MS4 permit as the collected runoff from this stretch of roadway will still be routed directly into a proposed SWQ facility.

**REVIEW AND RECOMMENDATION:**

ECM Section 3.3.2.A, DCM

**Approved by the ECM Administrator** <u>Chapter 6 6.4.1 and Table 6-4</u>

This request has been determined to have met the criteria for approval.  A deviation from Section _____ of the ECM is hereby granted based on the justification provided.

**Denied by the ECM Administrator**

This request has been determined not to have met criteria for approval.  A deviation from Section _____ of the ECM is hereby denied.

**ECM ADMINISTRATOR COMMENTS/CONDITIONS**:

Provide exhibits:
- Overtopping location excerpt from CDs
- Profile depth comparison with each flow and maybe a rating curve.

**ARROYA LANE CULVERT CALCULATIONS**

# HY-8 Culvert Analysis Report

## Crossing Discharge Data

Discharge Selection Method: User Defined

### Table 1 - Summary of Culvert Flows at Crossing: Arroya Lane

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | Box Culverts Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 7235.87 | SR MDDP 10 yr. | 581.00 | 581.00 | 0.00 | 1 |
| 7236.11 | DBPS 10 yr. | 630.00 | 630.00 | 0.00 | 1 |
| 7239.67 | SR MDDP 100 yr. | 1468.00 | 1300.34 | 167.37 | 8 |
| 7240.54 | SC DBPS 100 yr. | 2170.00 | 1438.87 | 730.27 | 3 |
| 7240.93 | FEMA | 2600.00 | 1496.86 | 1102.71 | 4 |
| 7238.84 | Overtopping | 1159.20 | 1159.20 | 0.00 | Overtopping |

## Culvert Data: Box Culverts

### Site Data - Box Culverts

Site Data Option: Culvert Invert Data

Inlet Station: 100.00 ft

Inlet Elevation: 7231.50 ft

Outlet Station: 165.00 ft

Outlet Elevation: 7230.70 ft

Number of Barrels: 2

### Culvert Data Summary - Box Culverts

Barrel Shape: Concrete Box

Barrel Span: 12.00 ft

Barrel Rise: 6.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge (0º flare) Wingwall (Ke=0.7)

Inlet Depression: None

## Roadway Data for Crossing: Arroya Lane

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

### Irregular Roadway Cross-Section

| Coord No. | Station (ft) | Elevation (ft) |
|---|---|---|
| 0 | 1000.00 | 7240.44 |
| 1 | 1025.00 | 7239.69 |
| 2 | 1050.00 | 7239.17 |
| 3 | 1075.00 | 7238.89 |
| 4 | 1091.73 | 7238.84 |
| 5 | 1100.00 | 7238.85 |
| 6 | 1125.00 | 7239.05 |
| 7 | 1150.00 | 7239.49 |
| 8 | 1175.00 | 7240.16 |
| 9 | 1200.00 | 7241.07 |

Roadway Surface: Paved

Roadway Top Width: 45.00 ft

Crossing - Arroya Lane, Design Discharge - 1468.0 cfs (SR MDDP 100 YR.)
Culvert - Box Culverts, Culvert Discharge - 1300.4 cfs

MAX. WSE = 7239.67
0.83' MAX. PONDING

LP ELEV. AT FL = 7238.84
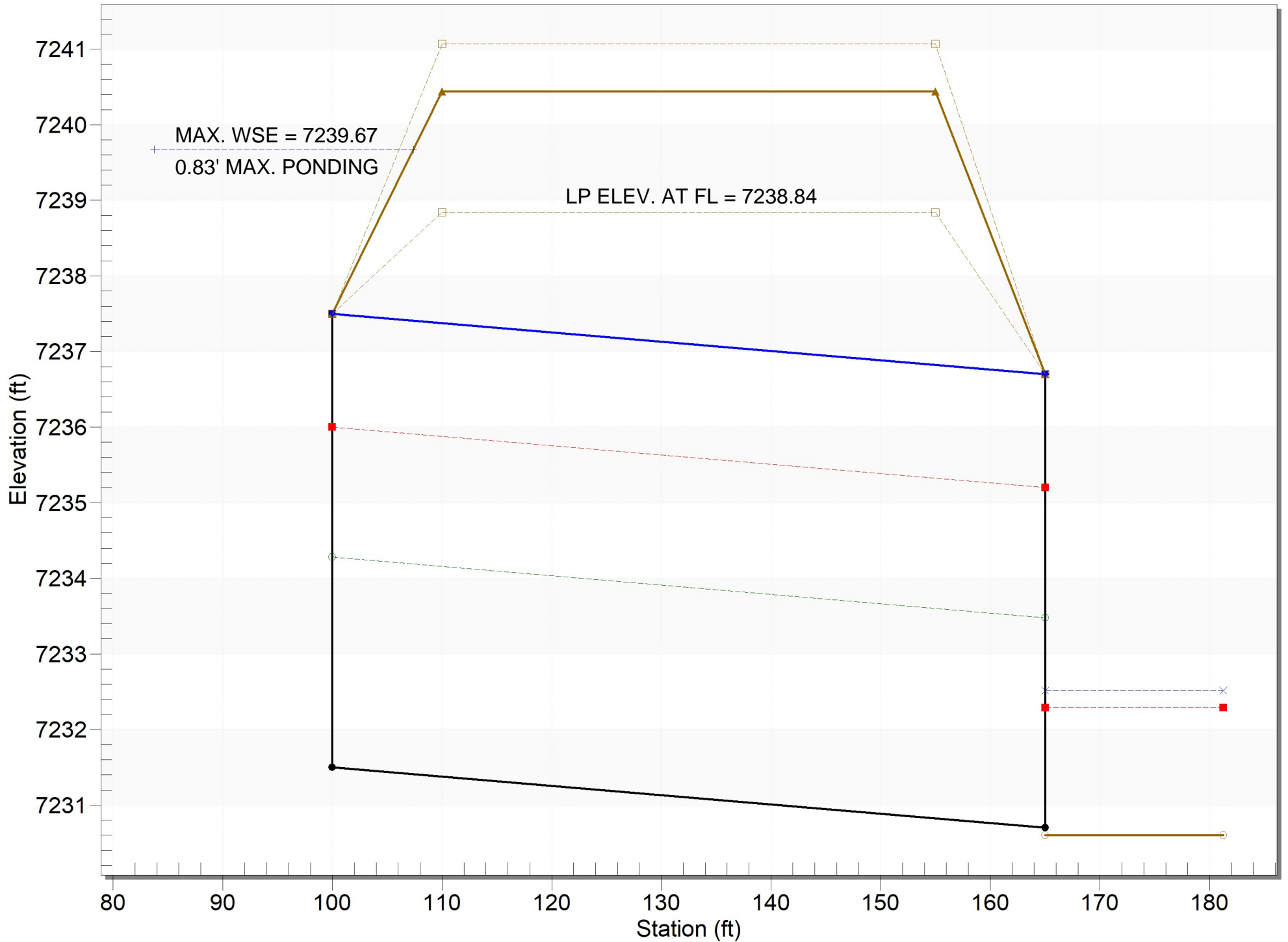
Crossing - Arroya Lane, Design Discharge - 2170.0 cfs (SC DBPS 100 YR.)
Culvert - Box Culverts, Culvert Discharge - 1438.9 cfs

MAX. WSE = 7240.54
1.70' MAX. PONDING

LP ELEV. AT FL = 7238.84

Elevation (ft)

Station (ft)
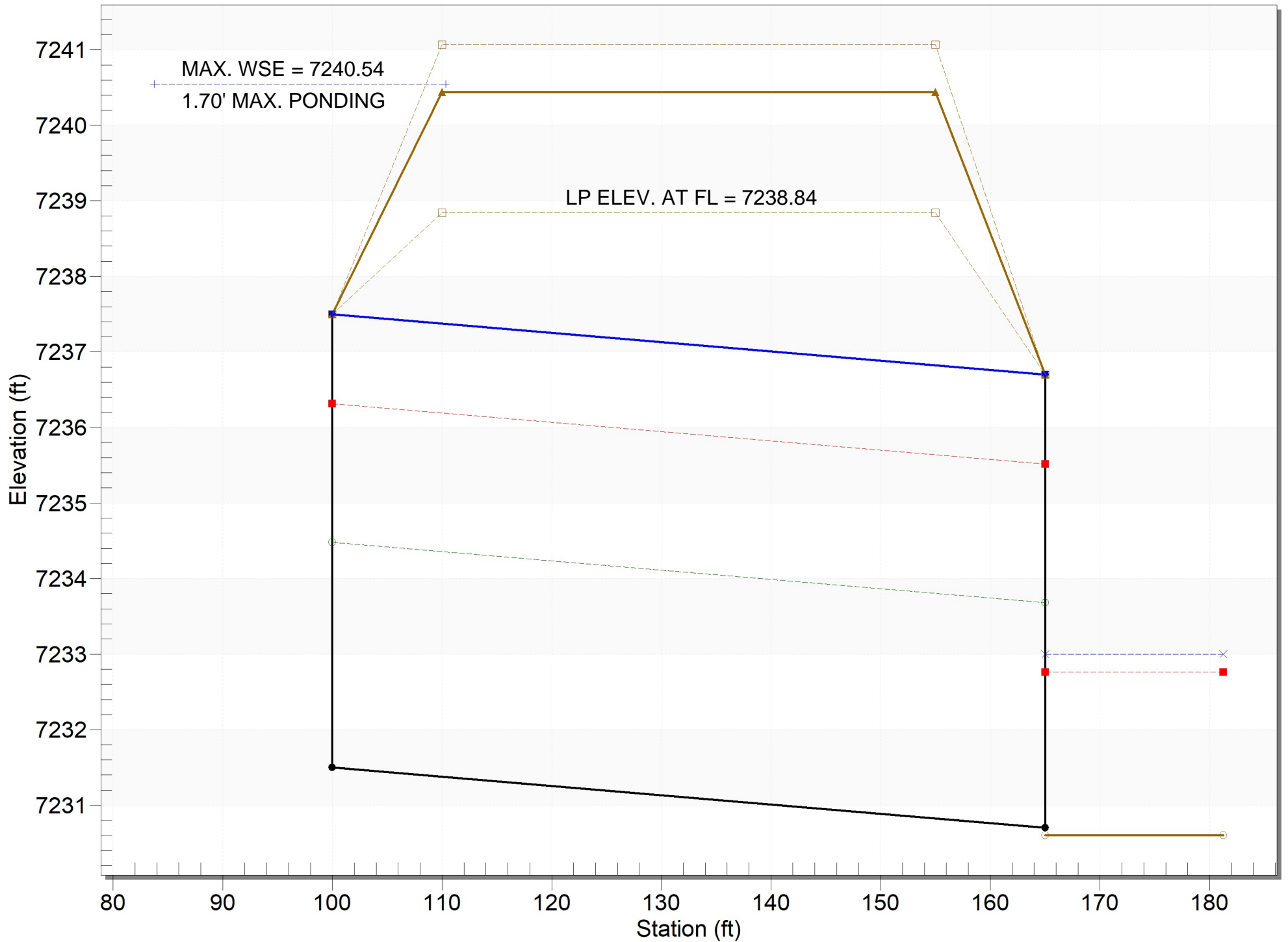
# Crossing - Arroya Lane, Design Discharge - 2600.0 cfs (FEMA 100 YR.)

## Culvert - Box Culverts, Culvert Discharge - 1496.8 cfs



MAX. WSE = 7240.93

2.09' MAX. PONDING

LP ELEV. AT FL = 7238.84

Elevation (ft)

Station (ft)
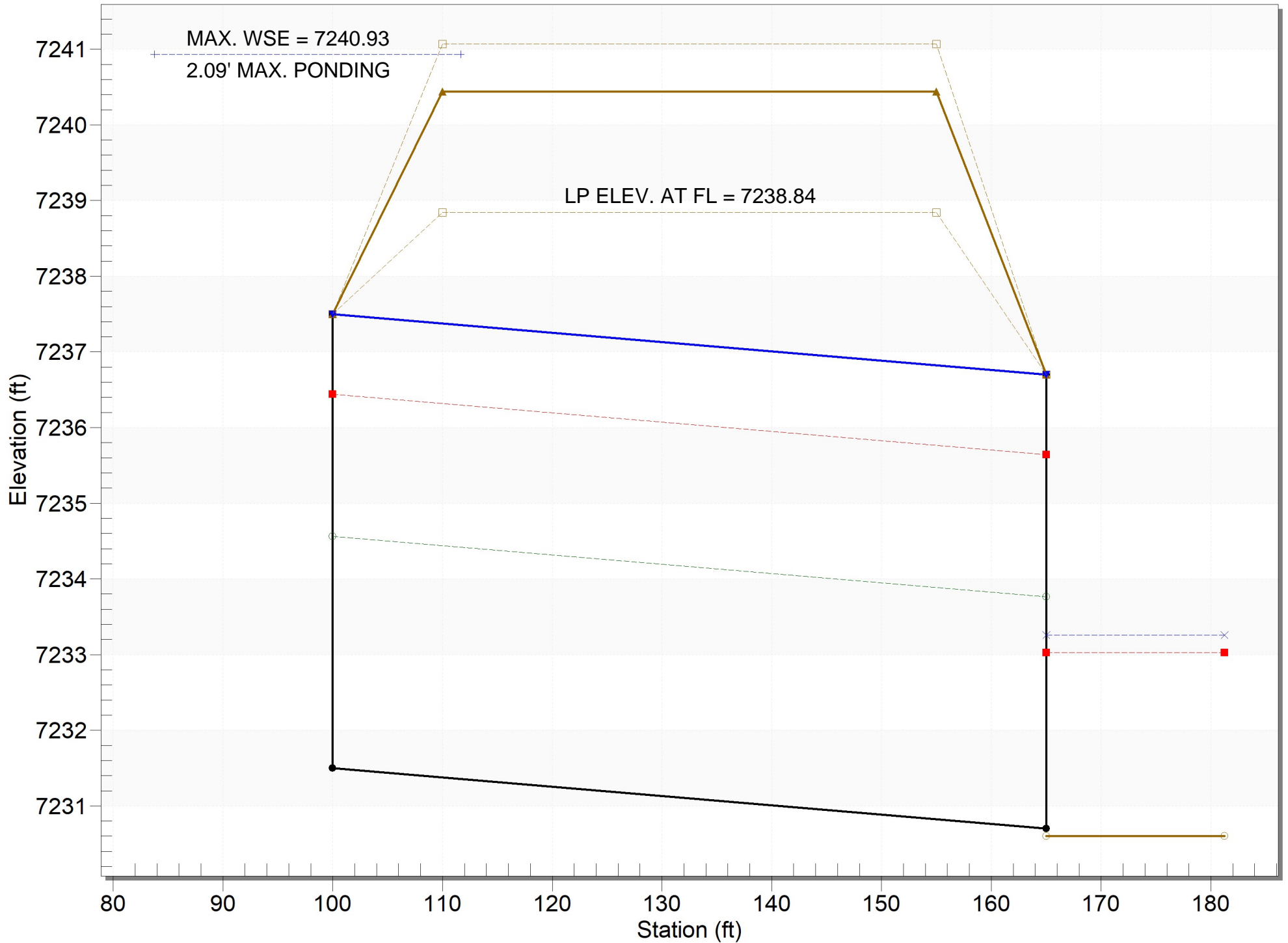
## Figure 13-12c.  Emergency Spillway Protection
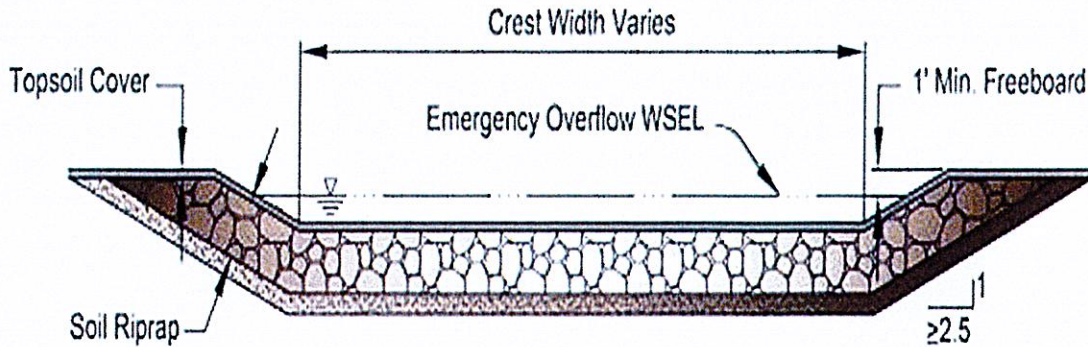


## Figure 13-12d.  Riprap Types for Emergency Spillway Protection



Riprap sizes are based on method described in USNRC Report NUREG/CR-4651 Vol. 2 assuming soil riprap and no interstitial flow.
$(Cf = 2.0, \eta = 0.0)$

TYPE M RIP-RAP PROTECTION REQUIRED
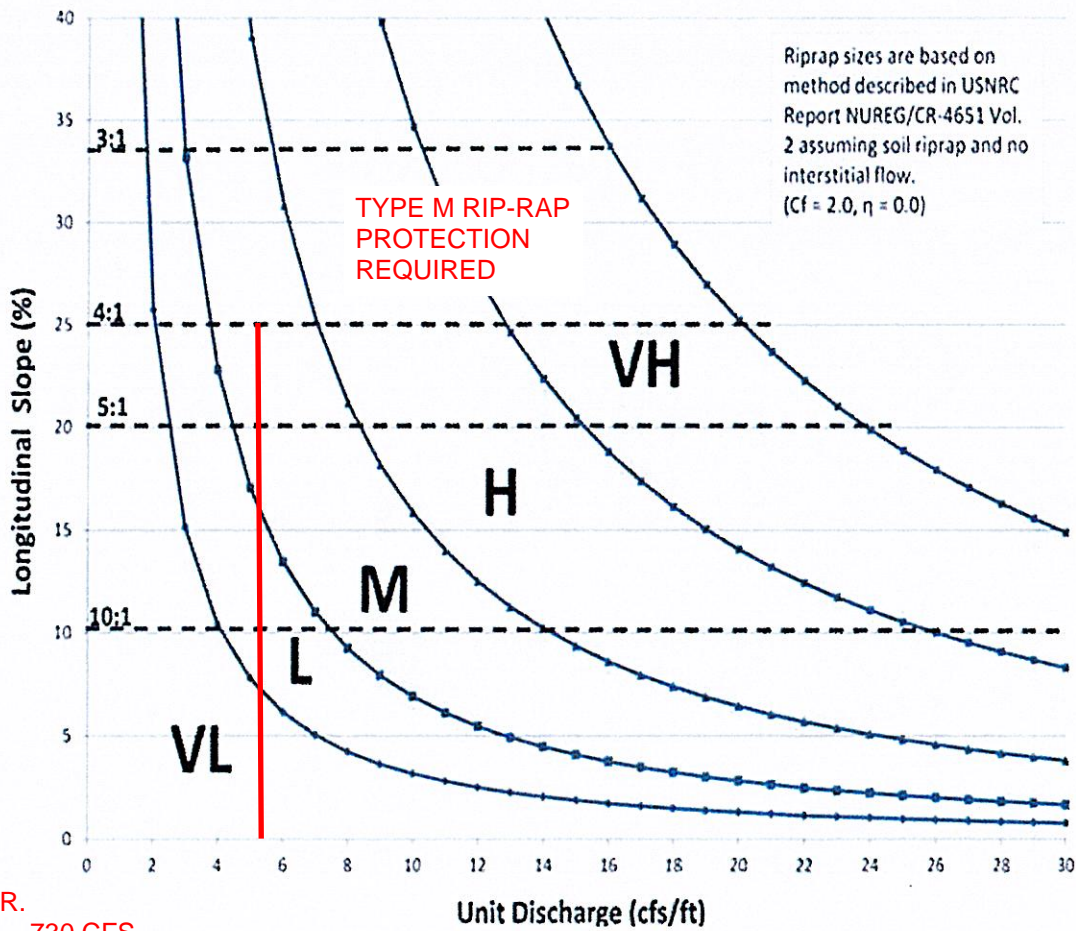
SC DBPS 100-YR. OVERTOPPING = 730 CFS

FEMA 100-YR. OVERTOPPING = 1,103 CFS

ROADWAY DISCHARGE WIDTH = 200'

ROADWAY UNIT DISCHARGE MAX. = 5.5 CFS/FT.

# DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

*MHFD-Culvert, Version 4.00 (May 2020)*

**Project: RETREAT AT TIMBERRIDGE FILING NO. 3**

**ID: DUAL 6'X12' CBC'S**
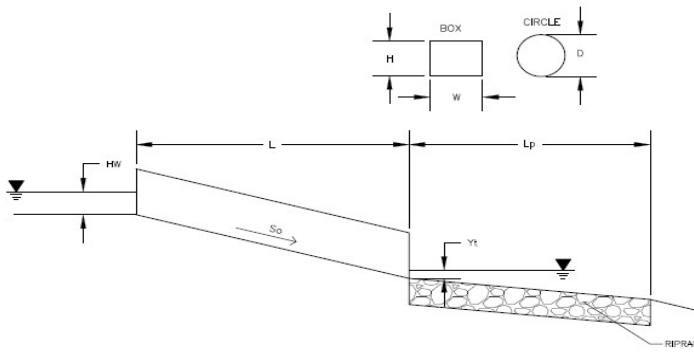


**Soil Type:**

Choose One:
- ◉ Sandy
- ○ Non-Sandy

**Supercritical Flow! Using Adjusted Rise to calculate protection type.**

## Design Information:

| | | | |
|---|---|---|---|
| Design Discharge | $Q =$ | 1486 | cfs |

**Circular Culvert:**

| | | | |
|---|---|---|---|
| Barrel Diameter in Inches | $D =$ | | inches |
| Inlet Edge Type (Choose from pull-down list) | | | |

**OR:**

**Box Culvert:** **OR**

| | | | |
|---|---|---|---|
| Barrel Height (Rise) in Feet | $H$ (Rise) $=$ | 6 | ft |
| Barrel Width (Span) in Feet | $W$ (Span) $=$ | 12 | ft |
| Inlet Edge Type (Choose from pull-down list) | Square Edge w/ 90 deg. Headwall & 15 deg. Flared Wingwall | | |
| Number of Barrels | # Barrels $=$ | 2 | |
| Inlet Elevation | Elev IN $=$ | 7231.5 | ft |
| Outlet Elevation **OR** Slope | Elev OUT $=$ | 7230.7 | ft |
| Culvert Length | $L =$ | 65 | ft |
| Manning's Roughness | $n =$ | 0.013 | |
| Bend Loss Coefficient | $k_b =$ | 0 | |
| Exit Loss Coefficient | $k_x =$ | 1 | |
| Tailwater Surface Elevation | $Y_{t, Elevation} =$ | | ft |
| Max Allowable Channel Velocity | $V =$ | 5 | ft/s |

## Calculated Results:

| | | | |
|---|---|---|---|
| Culvert Cross Sectional Area Available | $A =$ | 72.00 | ft$^2$ |
| Culvert Normal Depth | $Y_n =$ | 3.05 | ft |
| Culvert Critical Depth | $Y_c =$ | 4.92 | ft |
| Froude Number | $Fr =$ | 2.05 | **Supercritical!** |
| Entrance Loss Coefficient | $k_e =$ | 0.20 | |
| Friction Loss Coefficient | $k_f =$ | 0.13 | |
| Sum of All Loss Coefficients | $k_s =$ | 1.33 | ft |

**Headwater:**

| | | | |
|---|---|---|---|
| Inlet Control Headwater | $HW_I =$ | 8.92 | ft |
| Outlet Control Headwater | $HW_O =$ | 6.85 | ft |
| **Design Headwater Elevation** | **HW =** | **7240.42** | ft |
| **Headwater/Diameter OR Headwater/Rise Ratio** | **HW/H=** | **1.49** | |

**Outlet Protection:**

| | | | |
|---|---|---|---|
| Flow/(Span * Rise^1.5) | Q/WH^1.5 $=$ | 4.21 | ft$^{0.5}$/s |
| Tailwater Surface Height | $Y_t =$ | 2.40 | ft |
| Tailwater/Rise | Yt/H $=$ | 0.40 | |
| Expansion Factor | 1/(2*tan(Θ)) $=$ | 2.12 | |
| Flow Area at Max Channel Velocity | $A_t =$ | 297.20 | ft$^2$ |
| Width of Equivalent Conduit for Multiple Barrels | $W_{eq} =$ | 24.00 | ft |
| **Length of Riprap Protection** | **$L_p =$** | **60** | ft |
| **Width of Riprap Protection at Downstream End** | **T =** | **53** | ft |
| Adjusted Rise for Supercritical Flow | $H_a =$ | 4.52 | ft |
| Minimum Theoretical Riprap Size | $d_{50}$ min$=$ | 9 | in |
| Nominal Riprap Size | $d_{50}$ nominal$=$ | 12 | in |
| **MHFD Riprap Type** | **Type =** | **M** | |