# CITY OF ALBUQUERQUE

*Planning Department*
David Campbell, Director

*Mayor Timothy M. Keller*

November 6, 2018

Eric Froberg, PE
Tylin International
500 4th Street NW, Suite 403
Albuquerque, NM, 87102

**RE: Indian School Road Undercrossing**
**Drainage Report**
**Engineer's Stamp Date: 11/06/18**
**Hydrology File: J15D099**

Dear Mr. Froberg:

Based upon the information provided in your submittal received 10/11/2018 and AMAFCA's approval email on 11/02/18, the Drainage Report is approved for DRC Work Order..

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov .

Sincerely,

Renée C. Brissette

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

# City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 3/2018)

**Project Title:** Indian School Road Undercrossing Building Permit #: _____ Hydrology File #: _____

DRB#: _____ EPC#: _____ Work Order#: _____

Legal Description: Indian School Road Undercrossing

City Address: *Indian School Road Undercrossing* - Indian School Road and North Diversion Channel

**Applicant:** TYLIN INTERNATIONAL Contact: Eric Froberg, P.E.

Address: 500 4th Street NW, Suite 403

Phone#: (505) 948-8099 Fax#: (505) 247-2362 E-mail: eric.froberg@tylin.com

**Other Contact:** _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Check all that Apply:

IS THIS A RESUBMITTAL?: ____ Yes X No

**DEPARTMENT:**

X HYDROLOGY/ DRAINAGE

____ TRAFFIC/ TRANSPORTATION

**TYPE OF SUBMITTAL:**

____ ENGINEER/ARCHITECT CERTIFICATION

____ PAD CERTIFICATION

____ CONCEPTUAL G & D PLAN

____ GRADING PLAN

____ DRAINAGE MASTER PLAN

X DRAINAGE REPORT

____ FLOODPLAIN DEVELOPMENT PERMIT APPLIC

____ ELEVATION CERTIFICATE

____ CLOMR/LOMR

____ TRAFFIC CIRCULATION LAYOUT (TCL)

____ TRAFFIC IMPACT STUDY (TIS)

____ OTHER (SPECIFY) _____

____ PRE-DESIGN MEETING?

**TYPE OF APPROVAL/ACCEPTANCE SOUGHT:**

____ BUILDING PERMIT APPROVAL

____ CERTIFICATE OF OCCUPANCY

____ PRELIMINARY PLAT APPROVAL

____ SITE PLAN FOR SUB'D APPROVAL

____ SITE PLAN FOR BLDG. PERMIT APPROVAL

____ FINAL PLAT APPROVAL

____ SIA/ RELEASE OF FINANCIAL GUARANTEE

____ FOUNDATION PERMIT APPROVAL

____ GRADING PERMIT APPROVAL

____ SO-19 APPROVAL

____ PAVING PERMIT APPROVAL

____ GRADING/ PAD CERTIFICATION

____ WORK ORDER APPROVAL

____ CLOMR/LOMR

____ FLOODPLAIN DEVELOPMENT PERMIT

X OTHER (SPECIFY) DRC Review & Approval

DATE SUBMITTED: 10/1/18 By: Eric Froberg

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COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: _____

FEE PAID: _____

TY·LIN INTERNATIONAL
engineers | planners | scientists

*Subject:* *Final Drainage Memo for North Diversion Channel Undercrossing at Indian School Road, Albuquerque, New Mexico*
*Federal Control No. A300143*
*City of Albuquerque Project No. 7703.75*

*November 6, 2018*

This memo documents the drainage improvements for the Indian School Road Undercrossing. Included within this memo is the hydrologic data and hydraulic calculations for the channel improvements based on the proposed multi-modal improvements. A Pre-vs. Post-design analysis was performed to determine the impact the proposed improvements will have on the channel hydraulics.

**SITE DESCRIPTION**

The Indian School Road Undercrossing project is located in Albuquerque, New Mexico. The North Diversion Channel Trail exists along the west bank of the North Diversion Channel (NDC) with an at-grade crossing at Indian School Road. The project study area limits along the NDC extend 500 feet upstream and downstream of the Indian School Road bridge crossing. See **Figure 1**, below, for project location.


**Figure 1 - Project Location**

**PROPOSED IMPROVEMENTS**

The proposed improvements to the NDC at Indian School Road include the design of a multi-use trail undercrossing of the existing Indian School Road Bridge. The proposed notch located in the west bank of the NDC would begin at the top of bank approximately 350 feet upstream (south) of the Indian School Road Bridge. The undercrossing dips below the bank on the west side of the channel and crosses under the Indian School Road Bridge with sufficient headroom to allow full multi-use access and per Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) requirements. The proposed notch continues downstream (north) approximately 450 feet, returning and matching existing ground at the top of bank.

Along this reach of the NDC, the existing channel is a concrete lined trapezoidal channel with a 25-foot bottom width and 2:1 side slopes. The channel is approximately 20 feet in depth and has an average longitudinal slope of 0.0030 ft/ft. The existing alignment of the channel consist of a tangent section leading up to and below the Indian School Road Bridge. North of the bridge, the channel begins to curve with an approximately radius of 2000 feet. Overall, the channel has consist bottom width, slope and depth. See **Figure 2** for the North Diversion Channel at Indian School Road.

**Figure 2 - North Diversion Channel – Looking Upstream (South)**

## HYDROLOGY

The United States Army Corps of Engineers' (USACE) "Albuquerque Arroyos Feasibility Study" provides the tributary flows within the North Diversion Channel. Table A-18 of the study represents, for Storm Centering #1, the 10, 50, 100 and 500-year storm events. The 500-year tributary flow in the channel is 4,000 cfs.

The City of Albuquerque (the City), AMAFCA and USACE concur that runoff from the contributing UNM North Campus watershed and the discharge from the Broadway Pump Station be added to USACE tributary flow. This was estimated to increase the 500-year contributing flow from 4,000 cfs to 5,000 cfs.

**Table 1** shows the design flow rates used in the hydraulic analysis for the Indian School Road Undercrossing.

**Table 1 – North Diversion Channel USACE Tributary vs. Design Flow Rates**

| Design Storm | USACE Tributary Flow [cfs] | Design Flow [cfs] (provided) |
|---|---|---|
| 10-year | 600 | 1,000 |
| 100-year | 2,400 | 2,800 |
| 500-year | 4,000 | 5,000 |

The correspondence between the City, AMAFCA and USACE are provided in **Appendix A**.

## HYDRAULIC CALCULATIONS

HEC-RAS models of the existing and proposed conditions were prepared to determine the overall hydraulic effects of the proposed improvements on the channel using the design flows provided. The existing model was developed using topographic survey and mapping prepared by Cobb Fendley. The HEC-RAS cross section locations are shown on **Exhibit 1** of **Appendix C.**

The first model (existing conditions) HEC-RAS input, output and results are located in **Appendix B**.

A second model, the proposed conditions, was developed modeling the channel with the proposed undercrossing. A third model was developed to provide a more conservative approach that represents potential debris blockage or building up against the safety railing. The third model, proposed conditions with obstructions, blocks out the notch as an obstruction to the full width and to a height equal to the top of the proposed safety railing. The HEC-RAS input, output and results for both proposed conditions are located in **Appendix B**.

**Table 2** shows a comparison of the existing, proposed and proposed with obstructions conditions with the models run with a subcritical flow regime.

**Table 2 - Effect of Underpass on North Diversion Channel (Subcritical Flow Regime)**

| Description | HEC-RAS Station | Design Storm | Existing WSE [ft] | Proposed WSE *(Δ WSE from Existing)* [ft] | | Freeboard [ft] | Proposed w/ Obstructions WSE *(Δ WSE from Existing)* [ft] | | Freeboard [ft] |
|---|---|---|---|---|---|---|---|---|---|
| Upstream end of model | 10+90 | 10-yr | 5100.09 | 5100.09 | - | 13.75 | 5100.09 | - | 13.75 |
| | | 100-yr | 5103.16 | 5103.16 | - | 10.68 | 5103.16 | - | 10.68 |
| | | 500-yr | 5105.66 | 5105.66 | - | 8.18 | 5106.22 | *(+0.56)* | 7.62 |
| Beginning of Notch | 9+45 | 10-yr | 5099.48 | 5099.48 | - | 14.35 | 5099.48 | - | 14.35 |
| | | 100-yr | 5102.71 | 5102.54 | *(-0.17)* | 11.29 | 5102.89 | *(0.18)* | 10.94 |
| | | 500-yr | 5105.69 | 5105.03 | *(-0.66)* | 8.80 | 5106.37 | *(0.68)* | 7.46 |
| Upstream of Bridge | 6+00 | 10-yr | 5099.11 | 5099.10 | *(-0.01)* | 14.36 | 5099.11 | - | 14.35 |
| | | 100-yr | 5103.06 | 5102.34 | *(-0.72)* | 11.12 | 5103.10 | *(+0.04)* | 10.36 |
| | | 500-yr | 5106.09 | 5105.01 | *(-1.08)* | 8.45 | 5106.53 | *(+0.44)* | 6.93 |
| Downstream of Bridge | 4+50 | 10-yr | 5097.39 | 5097.38 | *(-0.01)* | 16.20 | 5097.38 | *(-0.01)* | 16.20 |
| | | 100-yr | 5100.45 | 5101.44 | *(+0.99)* | 12.14 | 5100.37 | *(-0.08)* | 13.21 |
| | | 500-yr | 5103.02 | 5104.22 | *(+1.20)* | 9.36 | 5102.93 | *(-0.09)* | 10.65 |
| End of Notch | 0+89 | 10-yr | 5096.11 | 5096.11 | - | 17.82 | 5096.11 | - | 17.82 |
| | | 100-yr | 5099.18 | 5099.18 | - | 14.75 | 5099.18 | - | 14.75 |
| | | 500-yr | 5101.69 | 5101.68 | *(-0.01)* | 12.25 | 5101.68 | *-0.01* | 12.25 |
| Downstream end of model | 0 | 10-yr | 5095.83 | 5095.83 | - | 18.05 | 5095.83 | - | 18.05 |
| | | 100-yr | 5098.88 | 5098.88 | - | 15.00 | 5098.88 | - | 15.00 |
| | | 500-yr | 5101.38 | 5101.38 | - | 12.50 | 5101.38 | - | 12.50 |

*Bottom Bridge Chord Elevation at Channel Centerline = 5113.59±

By reviewing the results of the three models, each presented critical flow conditions, with Froude numbers at or equal to 1 for an extent of the channel reach. This resulted in running an additional model for each condition using a mixed flow regime with normal depth and critical depth boundary conditions. The mixed flow regime allows the model to better transition from subcritical to supercritical flow.

**Table 3** shows a comparison of the existing, proposed and proposed with obstructions conditions with the models run with a mixed flow regime.

**Table 3 - Affect of Underpass on North Diversion Channel (Mixed Flow Regime)**

| Description | HEC-RAS Station | Design Storm | Existing WSE [ft] | Proposed WSE *(Δ WSE from Existing)* [ft] | | Freeboard [ft] | Proposed w/ Obstructions WSE *(Δ WSE from Existing)* [ft] | | Freeboard [ft] |
|---|---|---|---|---|---|---|---|---|---|
| Upstream end of model | 10+90 | 10-yr | 5100.07 | 5100.07 | - | 13.77 | 5100.07 | - | 13.77 |
| | | 100-yr | 5103.16 | 5103.16 | - | 10.68 | 5103.16 | - | 10.68 |
| | | 500-yr | 5105.66 | 5105.66 | - | 8.18 | 5105.66 | - | 8.18 |
| Beginning of Notch | 9+45 | 10-yr | 5099.16 | 5099.23 | *(+0.07)* | 14.60 | 5099.23 | *(+0.07)* | 14.60 |
| | | 100-yr | 5102.03 | 5101.94 | *(-0.09)* | 11.89 | 5101.94 | *(-0.09)* | 11.89 |
| | | 500-yr | 5104.53 | 5104.37 | *(-0.16)* | 9.46 | 5105.72 | *(+1.19)* | 8.11 |
| Upstream of Bridge | 6+00 | 10-yr | 5098.66 | 5098.67 | *(+0.01)* | 14.79 | 5098.67 | *(+0.01)* | 14.79 |
| | | 100-yr | 5102.55 | 5102.34 | *(-0.21)* | 11.12 | 5102.55 | - | 10.91 |
| | | 500-yr | 5105.52 | 5105.01 | *(-0.51)* | 8.45 | 5105.91 | *(+0.39)* | 7.55 |
| Downstream of Bridge | 4+50 | 10-yr | 5097.08 | 5097.08 | - | 16.50 | 5097.08 | - | 16.50 |
| | | 100-yr | 5099.46 | 5101.44 | *(+1.98)* | 12.14 | 5099.37 | *(-0.09)* | 14.21 |
| | | 500-yr | 5101.90 | 5104.22 | *(+2.32)* | 9.36 | 5101.91 | *(+0.01)* | 11.67 |
| End of Notch | 0+89 | 10-yr | 5095.89 | 5095.90 | *(+0.01)* | 18.03 | 5095.90 | *(+0.01)* | 18.03 |
| | | 100-yr | 5098.63 | 5098.94 | *(+0.31)* | 14.99 | 5098.53 | *(-0.10)* | 15.40 |
| | | 500-yr | 5101.09 | 5101.24 | *(+0.15)* | 12.69 | 5100.77 | *(-0.32)* | 13.16 |
| Downstream end of model | 0 | 10-yr | 5095.67 | 5095.67 | - | 18.21 | 5095.67 | - | 18.21 |
| | | 100-yr | 5098.32 | 5098.87 | *(+0.55)* | 15.01 | 5098.34 | *(+0.02)* | 15.54 |
| | | 500-yr | 5100.64 | 5100.79 | *(+0.15)* | 13.09 | 5100.53 | *(-0.11)* | 13.35 |

*Bottom Bridge Chord Elevation at Channel Centerline = 5113.59±

A review of the mixed flow regime results show that the overall effect of the undercrossing with obstructions on the system is minimal. On average, there is a 0.3-foot change in water surface elevation for the 500-year storm (0.1-foot change for the 100-year storm and 0.01-foot change for the 10-year storm) with the greatest change occurring at the beginning of the notch.

The "proposed with obstructions" condition freeboard, for the 500-year storm, was an average of 8.0 feet upstream and an average of 12.7 feet downstream of the Indian School Road Bridge. The bottom chord of the Indian School Bridge is approximately 5113.59 upstream and 5116.16 downstream at the centerline of the channel. Including the change in water surface elevation because of the proposed undercrossing, the freeboard underneath the bridge structure is greater than or equal to 9 feet.

Additionally, the Indian School Road Undercrossing has been designed to be above the 10 year WSE at all times.

**PHYSICAL MODELING**

The following is an excerpt from the "North Diversion Channel Physical Modeling: Bike Notch Improvements Between Vineyard Arroyo Confluence past Osuna Bridge", prepared for AMAFCA on September 21, 2001 by the UNM Hydraulic Laboratory:

> "The Corps requires that channel modifications not jeopardize necessary storm water conveyance at the bridges. The University of New Mexico Hydraulics Lab was utilized in 1992 to investigate such bike notches in the NDC and again in 1997 for the South Diversion Channel. The 1992 report concluded that recessed bike paths do not adversely impact flow for subcritical reaches. Furthermore, if the channel is substantially subcritical, physical modeling is not needed. The 1997 report, for a channel with a Froude number of 1.92, also showed the recessed bike path did not adversely impact flow. "

The results of the Indian School Road Undercrossing HEC-RAS models show the overall effect of the undercrossing on the channel hydraulics are minimal. The channel hydraulics normalize at the upstream and downstream end of the channel reach. The 500-Yr freeboard upstream and downstream of the bridge varies from 7.5 to 13.4 feet and at the bridge is at least 9 feet. There are no capacity concerns within the North Diversion Channel, based on the HEC-RAS model, within our study limits.

The Indian School Road Undercrossing is similar to other bike notch projects constructed within the North Diversion Channel, such as the Osuna Road Channel Notch (COA Project No. 5575.93 - A300950). Previous physical models were developed for such projects to evaluate the effects at those locations, which showed no impact to the North Diversion Channel. The USACE has provided AMAFCA and the City of Albuquerque with a letter stating no physical modeling and no formal Section 408 permit is required for the design and construction of the Indian School Road Undercrossing.

Please refer to **Appendix A** for a copy of the USACE letter.

**SUMMARY**

This memo documents the Pre-vs. Post hydraulic analysis of the Indian School Road Undercrossing channel improvements. The Indian School Road Undercrossing is a multi-use trail undercrossing of the existing Indian School Road bridge that ties into the existing trail 350 feet upstream and 450 downstream along the west bank of the NDC. The results of the HEC-RAS models show an average 0.3-foot change in water surface elevation for the 500-year storm, concluding that the overall effect of the undercrossing on the channel hydraulics are minor.

Sincerely,

ERIC J. FROBERG NEW MEXICO 18855 PROFESSIONAL ENGINEER 11/06/18

Eric Froberg, P.E.
Sr. Project Manager

TATE J. JENSEN NEW MEXICO 25020 PROFESSIONAL ENGINEER 11/06/18

Tate Jensen, P.E.
Project Engineer

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engineers | planners | scientists

# APPENDIX A

## Hydrologic Data and Concurrence Letters

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
4101 JEFFERSON PLAZA NE
ALBUQUERQUE, NM 87109-3435

June 25, 2018

Engineering and Construction Division
Geotechnical and Environmental Engineering Branch

Mr. Jerry Lovato, P.E.
Executive Engineer
Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)
2600 Prospect N.E.
Albuquerque, NM 87107

Dear Mr. Lovato:

On June 12, 2018 U.S. Army Corps of Engineers, Albuquerque District (USACE) received from AMAFCA a an initial 408 review letter concerning two proposed projects on the North Diversion Channel (NDC) near or at the Indian School Road crossing over the NDC.

The first proposed project is the continued updating of the biking trail system with a proposed NDC notch under Indian School Road. The proposed notch is similar to notches allowed and installed elsewhere along NDC. Physical models were developed to evaluate effects at the other locations which showed no impact to the flood capacity of the NDC. As such, no physical model will be required for the proposed Indian School Road notch and no formal Section 408 permission is required for installation of this notch. Please include the notch as part of the modelling for the proposed water quality structure.

. The second proposed project is the installation of a water quality structure in the NDC just upstream of Indian School Road crossing over the NDC. USACE concurs with the use of 5000 cfs for modeling the NDC ultimate design flowrate capacity at this location. The proposed water quality structure will require a formal Section 408 Permission request as it will be a new modification to the NDC. Please keep USACE involved in the design process of this structure so we may decrease any delays caused by the formal Section 408 review process.

If you have any questions, please contact me at (505)342-3427.

Sincerely,

Bruce Jordan, P.E.
Levee Safety Program Manager

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority
2600 Prospect N.E., Albuquerque, NM 87107
Phone: (505) 884-2215 Fax: (505) 884-0214
Website: www.amafca.org

June 6, 2018

Mr. Bruce Jordan, P.E.
Levee Safety Program Manager
408 Permit Coordinator
U.S. Army Corps of Engineers, Albuquerque District
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Re: North Diversion Channel – Bike Notch at Indian School Road

Dear Mr. Jordan:

The City of Albuquerque is proposing to complete the bike notch system in the North Diversion Channel by installing one at Indian School Road. Attached are exhibits showing the work area and proposed cross-section of the notch.

Additionally, to better comply with EPA requirements for our MS4 permit, AMAFCA staff is contemplating the construction of an in-line water quality structure within the NDC on AMAFCA-owned property just south of Indian School. Both the bike notch and water quality structure could be modeled as one project at UNM's Hydraulic lab, if necessary.

AMAFCA has reviewed the USACE's "Albuquerque Arroyos Feasibility Study" to determine a flow rate for modeling purposes. Attached is an exhibit showing the worst case (storm centering 1) that provides a 500-yr flowrate from the Campus Wash at the North Diversion Channel of 4000 cfs. Adding contributing watersheds from the UNM North Campus and the discharge from the Broadway Pump Station, the City and AMAFCA seeks your concurrence of using 5000 cfs for the design flowrate.

We are seeking the proper clearance to begin construction in early 2019. Please contact me at 884-2215 if you have any questions on the project.

Sincerely,
AMAFCA

Bradley L. Bingham

Bradley L Bingham, P.E.
Drainage Engineer

cc: AMAFCA File 030 021764
John Mackenzie, PE - City of Albuquerque
Eric Froberg, PE, TY Lin, International
Correspondence File

# City of Albuquerque

P.O. Box 1293 Albuquerque, New Mexico, 87103

RECEIVED
MAY 14 2018
BY:

*Department of Municipal Development*
Patrick Montoya, Director

Timothy M. Keller, Mayor

May 11, 2018

Jerry Lovato, PE
Executive Engineer
AMAFCA
2600 Prospect Avenue
Albuquerque, NM 87107

**RE: Notch at Indian School and the North Diversion Channel**

Dear Mr. Lovato,

The City of Albuquerque has federal funding programmed in 2019 in the Transportation Improvement Plan (TIP) to construct a notch at the north Diversion Channel near Indian School. We have met with you and your staff to discuss this project and this letter is sent as notification for the eventual request for a Clean Water Act permit from the Corp of Engineers (COE).

We understand the requirements of AMAFCA and the COE and will continue to coordinate with your office during the development of the project. The City greatly appreciates AMAFCA support in our efforts to complete this last trail under-crossing in the North Diversion Channel.

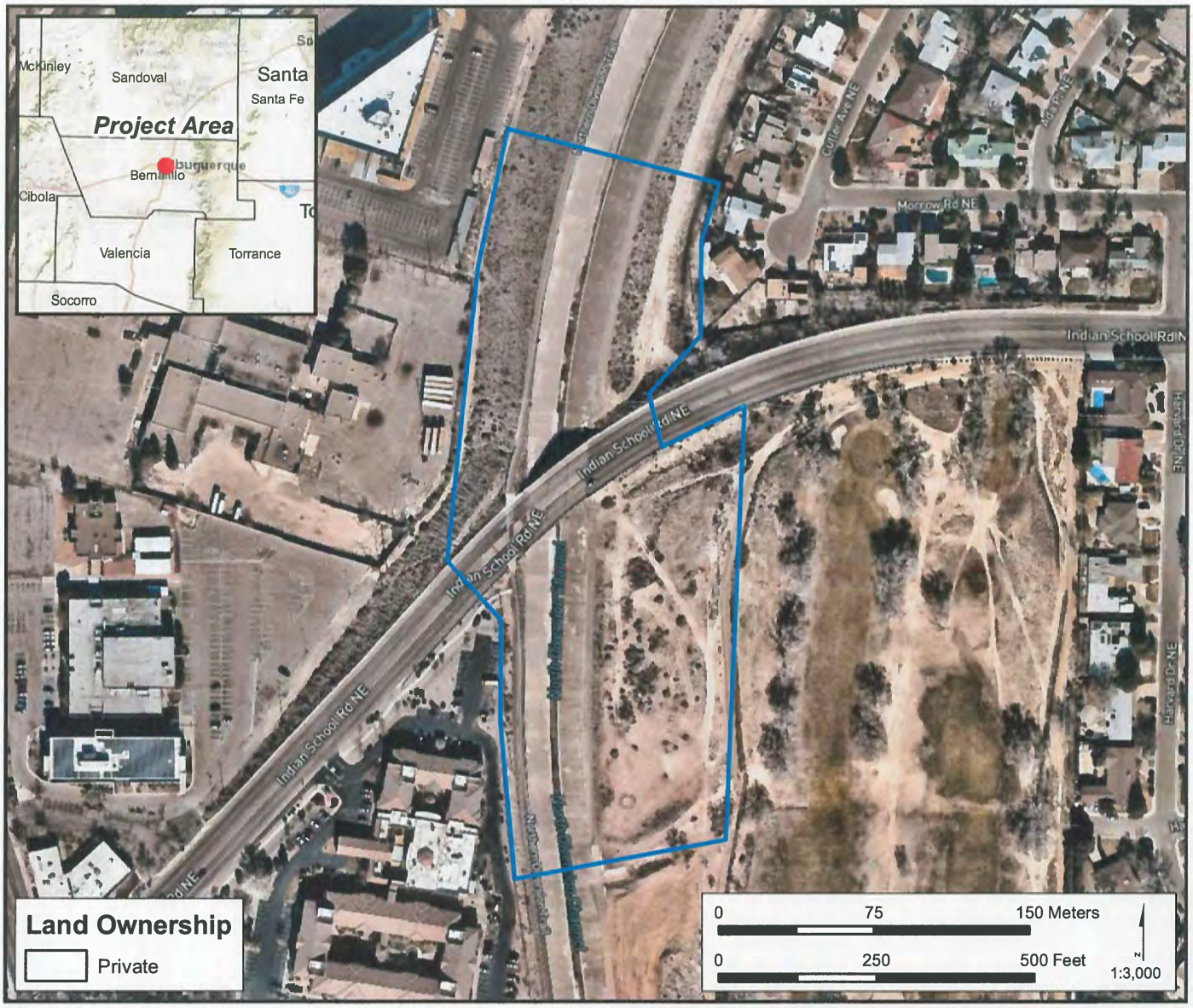
Should you have any questions about the proposed project, please feel free to contact me at 768-3503. Ty Lin has been retained to prepare the design of the project and our contact there is Eric Froberg who can be reached at 948-8099.

We look forward to working with you and your staff on this project.

Sincerely,

Eric Michalski
Project Manager
Department of Municipal Development

Cc: Brad Bingham, PE, Drainage Engineer, AMAFCA

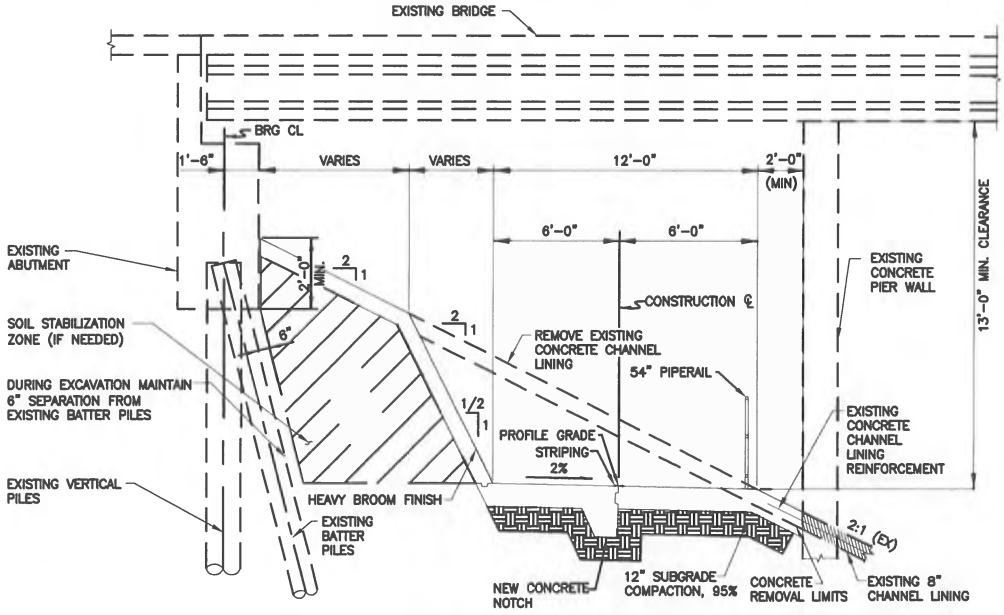



Project Area

*Project Area: 9.66 acres (3.91 hectares)*

*Albuquerque West &*
*Albuquerque East, NM;*
*7.5' USGS Quadrangles;*
*Albuquerque Grant*
*T 10N, R03E W; Sec. 09 & 16*
*Bernalillo County, New Mexico*


PLAN VIEW OF NOTCH UNDER INDIAN SCHOOL RD. BRIDGES




TYPICAL SECTION OF NOTCH UNDER INDIAN SCHOOL RD. BRIDGES

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engineers | planners | scientists
500 4th Street NW, Suite 403
Albuquerque, NM 87102

JOB NO. 221890.10

## TABLE A-18

### TRIBUTARY FLOWS AT THE NORTH DIVERSION CHANNEL CENTERING #1 - FUTURE CONDITIONS

| LOCATION | 10.0% CHANCE (cfs) | 2.0% CHANCE (cfs) | 1.0% CHANCE (cfs) | 0.2% CHANCE (cfs) |
|---|---|---|---|---|
| Campus Wash | | | | |
| @ Eubank Blvd | 700 | 1200 | 1400 | 1900 |
| @ Kirtland Basin | 900 | 1700 | 2100 | 2900 |
| @ Highland Basin | 900 | 2100 | 2500 | 3500 |
| @ Diversion Channel | 600 | 1800 | 2400 | 4000 |
| Princeton Basin Pumping Station | | | | |
| @ Diversion Channel | 900 | 1400 | 1700 | 2200 |
| Embudo Arroyo | | | | |
| @ Embudo Dam | 200 | 500 | 700 | 1000 |
| @ Piedra Lisa Dam | 80 | 200 | 200 | 300 |
| @ Eubank Blvd | 1200 | 2100 | 2500 | 3800 |
| @ Interstate 40 | 4000 | 6300 | 7300 | 9700 |
| @ Diversion Channel | 6700 | 10800 | 12300 | 16100 |
| Comanche Basin Pumping Station | | | | |
| @ Diversion Channel | 400 | 800 | 900 | 1200 |
| Hahn Arroyo | | | | |
| @ San Mateo | 1300 | 2300 | 2700 | 3700 |
| @ Diversion Channel | 1900 | 3400 | 4100 | 5600 |
| Grantline Channel @ Diversion | 400 | 700 | 800 | 1100 |
| Vineyard Arroyo @ Diversion | 400 | 800 | 900 | 1300 |
| Bear Canyon Arroyo | | | | |
| @ John Robert Dam | 200 | 800 | 1000 | 1100 |
| @ Arroyo del Oso Dam | 900 | 1600 | 1900 | 2700 |
| @ Diversion Channel | 600 | 1200 | 1400 | 1900 |
| South Pino Arroyo | | | | |
| @ South Pino Dam | 200 | 500 | 700 | 800 |
| @ Moon Street | 400 | 700 | 900 | 1200 |
| @ Diversion Channel | 900 | 1600 | 2000 | 2700 |
| North Pino Arroyo | | | | |
| @ Louisiana Blvd | 400 | 700 | 800 | 1100 |
| @ Interstate 25 | 700 | 1300 | 1500 | 2100 |
| @ Diversion Channel | 800 | 1500 | 1700 | 2500 |
| Domingo Baca Arroyo | | | | |
| @ North Domingo Baca Dam | 100 | 200 | 300 | 400 |
| @ South Domingo Baca Dam | 90 | 300 | 400 | 700 |
| @ Interstate 25 | 1100 | 1900 | 2300 | 3200 |
| @ Diversion Channel | 1200 | 2100 | 2500 | 3600 |
| La Cueva Arroyo | | | | |
| @ Interstate 25 | 600 | 1100 | 1400 | 2000 |
| @ Diversion Channel | 700 | 1300 | 1500 | 2000 |
| Camino Arroyo | | | | |
| @ Interstate 25 | 500 | 1000 | 1300 | 1800 |
| @ Diversion Channel | 500 | 1100 | 1300 | 1900 |

# NORTH DIVERSION CHANNEL / INDIAN SCHOOL STORMWATER QUALITY POND


**Sponsors:**

AMAFCA

UNM

| DISTRICT | |
|---|---|
| AMAFCA | 5 |
| City Council | 2 |
| County Commission | 3 |
| NM Senate | 12 |
| NM House | 18 |

**Potential AMAFCA Funding: $2,521,000**

| 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| | | $150,000 | $1,300,000 | $1,071,000 | |

**Stakeholders:**

UNM, CoA, AMAFCA, North Campus Neighborhood Residents

**Objectives:**

- PROVIDE CHANNEL STABILITY
- PROVIDE/ENHANCE STORMWATER QUALITY

**Total Cost: $2,521,000**

**Description:**

This project will incorporate channel rehabilitation and a stormwater quality facility to allow for surface treatment of runoff from the University of New Mexico. An in-line stormwater quality facility will be constructed to enhance stormwater quality from flows in the North Diversion Channel and may include diversion structures and pond(s) to provide additional water quality and re-use opportunities for the University of New Mexico North Campus Golf Course and surrounding facilities.

TY LIN INTERNATIONAL
engineers | planners | scientists

# APPENDIX B

## Hydraulic Calculations and Results

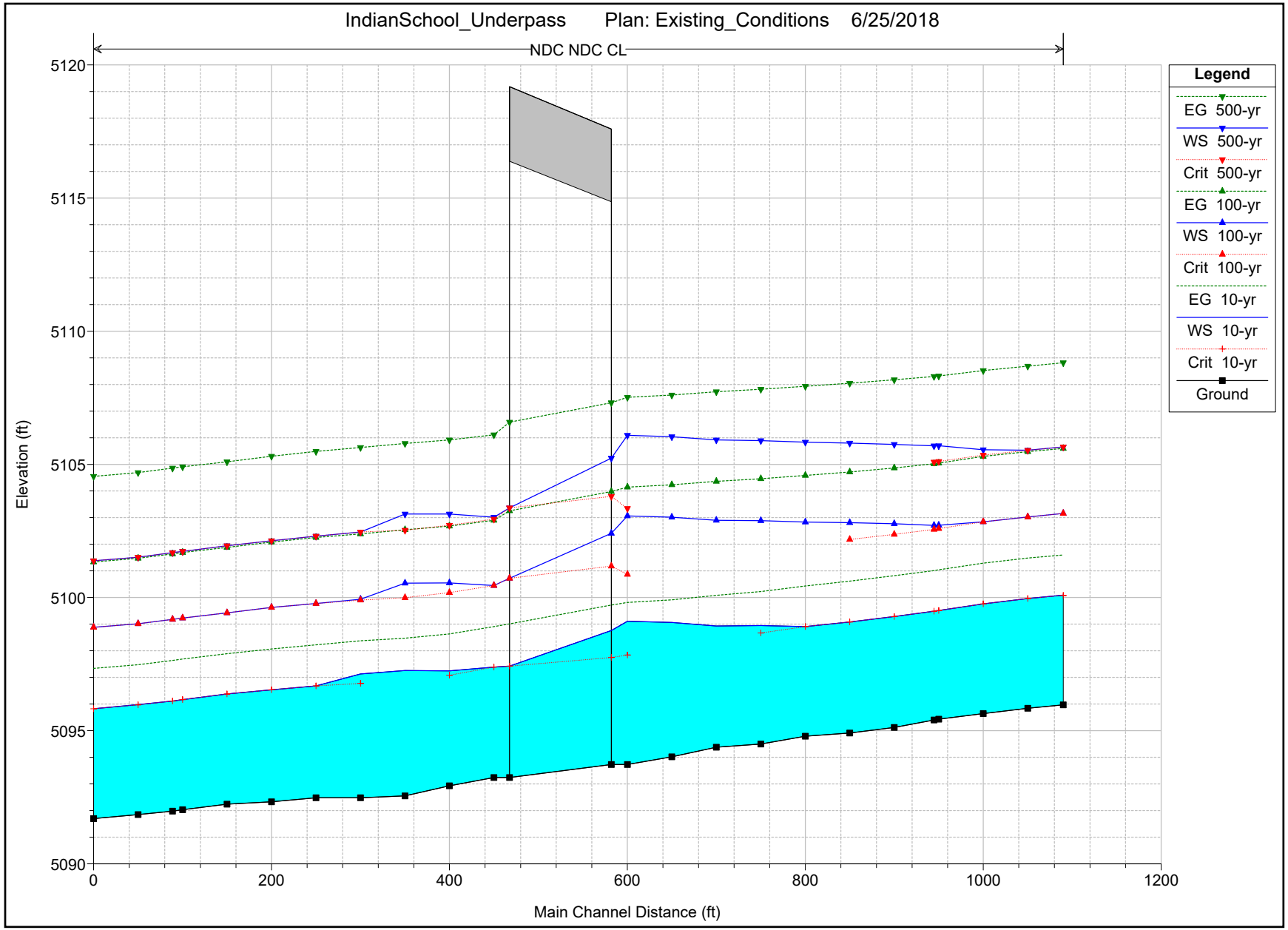
# Existing Conditions - Subcritical Flow Regime

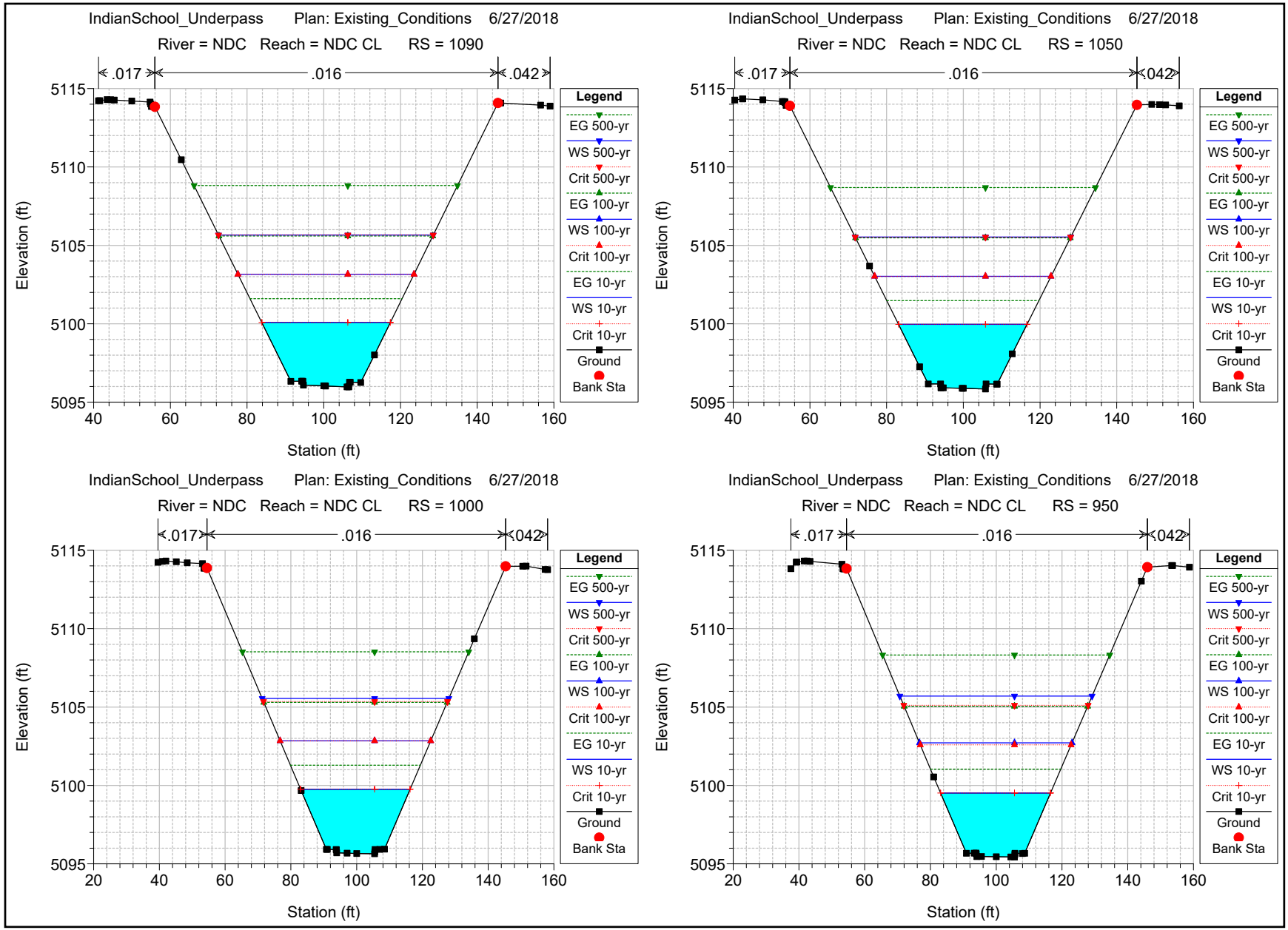
HEC-RAS Plan: Exst_Cond River: NDC Reach: NDC CL

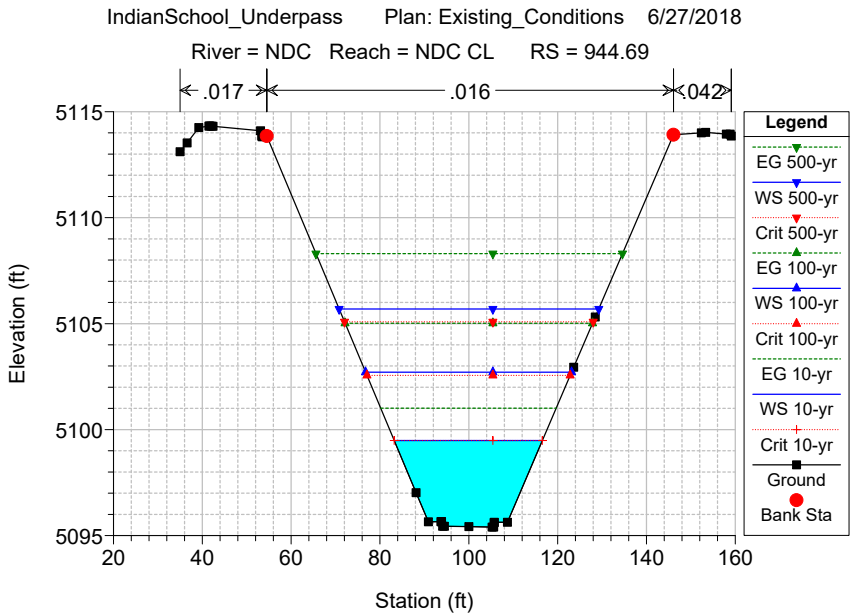
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 1090 | 10-yr | 1000.00 | 5095.97 | 5100.09 | 5100.08 | 5101.60 | 0.002792 | 9.86 | 101.43 | 33.56 | 1.00 |
| NDC CL | 1090 | 100-yr | 2800.00 | 5095.97 | 5103.16 | 5103.16 | 5105.60 | 0.002439 | 12.54 | 223.32 | 45.91 | 1.00 |
| NDC CL | 1090 | 500-yr | 5000.00 | 5095.97 | 5105.66 | 5105.66 | 5108.82 | 0.002270 | 14.26 | 350.72 | 55.98 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 1050 | 10-yr | 1000.00 | 5095.84 | 5099.96 | 5099.96 | 5101.48 | 0.002815 | 9.89 | 101.15 | 33.48 | 1.00 |
| NDC CL | 1050 | 100-yr | 2800.00 | 5095.84 | 5103.03 | 5103.03 | 5105.48 | 0.002464 | 12.57 | 222.84 | 45.98 | 1.01 |
| NDC CL | 1050 | 500-yr | 5000.00 | 5095.84 | 5105.53 | 5105.53 | 5108.69 | 0.002278 | 14.25 | 350.96 | 56.22 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 1000 | 10-yr | 1000.00 | 5095.64 | 5099.76 | 5099.76 | 5101.29 | 0.002830 | 9.93 | 100.74 | 33.31 | 1.01 |
| NDC CL | 1000 | 100-yr | 2800.00 | 5095.64 | 5102.84 | 5102.84 | 5105.30 | 0.002456 | 12.57 | 222.67 | 45.81 | 1.01 |
| NDC CL | 1000 | 500-yr | 5000.00 | 5095.64 | 5105.55 | 5105.35 | 5108.52 | 0.002091 | 13.83 | 361.60 | 56.79 | 0.97 |
| | | | | | | | | | | | | |
| NDC CL | 950 | 10-yr | 1000.00 | 5095.43 | 5099.51 | 5099.51 | 5101.04 | 0.002827 | 9.92 | 100.84 | 33.42 | 1.01 |
| NDC CL | 950 | 100-yr | 2800.00 | 5095.43 | 5102.71 | 5102.59 | 5105.05 | 0.002286 | 12.25 | 228.61 | 46.39 | 0.97 |
| NDC CL | 950 | 500-yr | 5000.00 | 5095.43 | 5105.70 | 5105.11 | 5108.32 | 0.001762 | 12.98 | 385.11 | 58.46 | 0.89 |
| | | | | | | | | | | | | |
| NDC CL | 944.69 | 10-yr | 1000.00 | 5095.40 | 5099.48 | 5099.48 | 5101.01 | 0.002816 | 9.91 | 100.89 | 33.36 | 1.00 |
| NDC CL | 944.69 | 100-yr | 2800.00 | 5095.40 | 5102.71 | 5102.56 | 5105.02 | 0.002257 | 12.20 | 229.51 | 46.39 | 0.97 |
| NDC CL | 944.69 | 500-yr | 5000.00 | 5095.40 | 5105.69 | 5105.09 | 5108.30 | 0.001749 | 12.95 | 385.98 | 58.46 | 0.89 |
| | | | | | | | | | | | | |
| NDC CL | 900 | 10-yr | 1000.00 | 5095.12 | 5099.29 | 5099.29 | 5100.82 | 0.002848 | 9.94 | 100.63 | 33.27 | 1.01 |
| NDC CL | 900 | 100-yr | 2800.00 | 5095.12 | 5102.77 | 5102.37 | 5104.87 | 0.001980 | 11.62 | 241.05 | 47.35 | 0.91 |
| NDC CL | 900 | 500-yr | 5000.00 | 5095.12 | 5105.75 | | 5108.18 | 0.001592 | 12.50 | 400.06 | 59.39 | 0.85 |
| | | | | | | | | | | | | |
| NDC CL | 850 | 10-yr | 1000.00 | 5094.91 | 5099.08 | 5099.08 | 5100.61 | 0.002826 | 9.92 | 100.78 | 33.30 | 1.01 |
| NDC CL | 850 | 100-yr | 2800.00 | 5094.91 | 5102.81 | 5102.18 | 5104.71 | 0.001731 | 11.07 | 253.03 | 48.40 | 0.85 |
| NDC CL | 850 | 500-yr | 5000.00 | 5094.91 | 5105.80 | | 5108.05 | 0.001434 | 12.03 | 415.68 | 60.52 | 0.81 |
| | | | | | | | | | | | | |
| NDC CL | 800 | 10-yr | 1000.00 | 5094.79 | 5098.91 | 5098.91 | 5100.43 | 0.002831 | 9.90 | 101.00 | 33.49 | 1.01 |
| NDC CL | 800 | 100-yr | 2800.00 | 5094.79 | 5102.83 | | 5104.59 | 0.001554 | 10.62 | 263.69 | 49.46 | 0.81 |
| NDC CL | 800 | 500-yr | 5000.00 | 5094.79 | 5105.83 | | 5107.93 | 0.001310 | 11.61 | 430.49 | 61.67 | 0.78 |
| | | | | | | | | | | | | |
| NDC CL | 750 | 10-yr | 1000.00 | 5094.50 | 5098.95 | 5098.67 | 5100.22 | 0.002199 | 9.06 | 110.39 | 34.56 | 0.89 |
| NDC CL | 750 | 100-yr | 2800.00 | 5094.50 | 5102.89 | | 5104.46 | 0.001344 | 10.07 | 278.16 | 50.65 | 0.76 |
| NDC CL | 750 | 500-yr | 5000.00 | 5094.50 | 5105.89 | | 5107.82 | 0.001170 | 11.14 | 448.88 | 62.94 | 0.74 |
| | | | | | | | | | | | | |
| NDC CL | 700 | 10-yr | 1000.00 | 5094.38 | 5098.93 | | 5100.08 | 0.001918 | 8.62 | 115.98 | 35.32 | 0.84 |
| NDC CL | 700 | 100-yr | 2800.00 | 5094.38 | 5102.90 | | 5104.36 | 0.001217 | 9.70 | 288.69 | 51.66 | 0.72 |
| NDC CL | 700 | 500-yr | 5000.00 | 5094.38 | 5105.92 | | 5107.73 | 0.001077 | 10.79 | 463.29 | 64.07 | 0.71 |
| | | | | | | | | | | | | |
| NDC CL | 650 | 10-yr | 1000.00 | 5094.02 | 5099.06 | | 5099.92 | 0.001267 | 7.40 | 135.18 | 37.79 | 0.69 |
| NDC CL | 650 | 100-yr | 2800.00 | 5094.02 | 5103.02 | | 5104.23 | 0.000954 | 8.85 | 316.42 | 53.97 | 0.64 |
| NDC CL | 650 | 500-yr | 5000.00 | 5094.02 | 5106.04 | | 5107.60 | 0.000888 | 10.03 | 498.26 | 66.34 | 0.65 |
| | | | | | | | | | | | | |
| NDC CL | 600 | 10-yr | 1000.00 | 5093.73 | 5099.11 | 5097.84 | 5099.82 | 0.000977 | 6.75 | 148.14 | 39.29 | 0.61 |
| NDC CL | 600 | 100-yr | 2800.00 | 5093.73 | 5103.06 | 5100.87 | 5104.15 | 0.000809 | 8.34 | 335.55 | 55.41 | 0.60 |
| NDC CL | 600 | 500-yr | 5000.00 | 5093.73 | 5106.09 | 5103.34 | 5107.52 | 0.000779 | 9.58 | 522.04 | 67.76 | 0.61 |
| | | | | | | | | | | | | |
| NDC CL | 582 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| NDC CL | 450 | 10-yr | 1000.00 | 5093.24 | 5097.39 | 5097.39 | 5098.91 | 0.002835 | 9.89 | 101.11 | 33.62 | 1.01 |
| NDC CL | 450 | 100-yr | 2800.00 | 5093.24 | 5100.45 | 5100.45 | 5102.90 | 0.002459 | 12.55 | 223.03 | 45.98 | 1.00 |
| NDC CL | 450 | 500-yr | 5000.00 | 5093.24 | 5103.02 | 5102.94 | 5106.11 | 0.002217 | 14.11 | 354.25 | 56.33 | 0.99 |
| | | | | | | | | | | | | |
| NDC CL | 400 | 10-yr | 1000.00 | 5092.93 | 5097.25 | 5097.08 | 5098.63 | 0.002431 | 9.45 | 105.86 | 33.67 | 0.94 |
| NDC CL | 400 | 100-yr | 2800.00 | 5092.93 | 5100.55 | 5100.19 | 5102.68 | 0.002008 | 11.72 | 238.88 | 46.93 | 0.92 |
| NDC CL | 400 | 500-yr | 5000.00 | 5092.93 | 5103.13 | 5102.71 | 5105.92 | 0.001899 | 13.38 | 373.69 | 57.33 | 0.92 |
| | | | | | | | | | | | | |
| NDC CL | 350 | 10-yr | 1000.00 | 5092.55 | 5097.26 | | 5098.47 | 0.002005 | 8.84 | 113.11 | 34.09 | 0.86 |
| NDC CL | 350 | 100-yr | 2800.00 | 5092.55 | 5100.54 | 5099.99 | 5102.54 | 0.001837 | 11.35 | 246.72 | 47.30 | 0.88 |
| NDC CL | 350 | 500-yr | 5000.00 | 5092.55 | 5103.14 | 5102.53 | 5105.79 | 0.001778 | 13.06 | 382.93 | 57.72 | 0.89 |
| | | | | | | | | | | | | |
| NDC CL | 300 | 10-yr | 1000.00 | 5092.48 | 5097.13 | 5096.78 | 5098.37 | 0.002081 | 8.95 | 111.69 | 33.96 | 0.87 |
| NDC CL | 300 | 100-yr | 2800.00 | 5092.48 | 5099.93 | 5099.90 | 5102.39 | 0.002430 | 12.57 | 222.71 | 45.21 | 1.00 |
| NDC CL | 300 | 500-yr | 5000.00 | 5092.48 | 5102.46 | 5102.46 | 5105.64 | 0.002273 | 14.30 | 349.76 | 55.38 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 250 | 10-yr | 1000.00 | 5092.48 | 5096.68 | 5096.68 | 5098.22 | 0.002840 | 9.96 | 100.40 | 32.96 | 1.01 |
| NDC CL | 250 | 100-yr | 2800.00 | 5092.48 | 5099.78 | 5099.78 | 5102.26 | 0.002476 | 12.63 | 221.68 | 45.40 | 1.01 |
| NDC CL | 250 | 500-yr | 5000.00 | 5092.48 | 5102.31 | 5102.31 | 5105.49 | 0.002288 | 14.31 | 349.38 | 55.56 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 200 | 10-yr | 1000.00 | 5092.33 | 5096.54 | 5096.54 | 5098.07 | 0.002839 | 9.93 | 100.73 | 33.25 | 1.01 |
| NDC CL | 200 | 100-yr | 2800.00 | 5092.33 | 5099.63 | 5099.63 | 5102.08 | 0.002453 | 12.56 | 222.86 | 45.72 | 1.00 |
| NDC CL | 200 | 500-yr | 5000.00 | 5092.33 | 5102.13 | 5102.13 | 5105.31 | 0.002286 | 14.29 | 349.93 | 55.81 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 150 | 10-yr | 1000.00 | 5092.24 | 5096.38 | 5096.38 | 5097.89 | 0.002811 | 9.86 | 101.42 | 33.72 | 1.00 |
| NDC CL | 150 | 100-yr | 2800.00 | 5092.24 | 5099.43 | 5099.43 | 5101.88 | 0.002463 | 12.57 | 222.70 | 45.92 | 1.01 |
| NDC CL | 150 | 500-yr | 5000.00 | 5092.24 | 5101.94 | 5101.94 | 5105.10 | 0.002268 | 14.25 | 350.92 | 55.99 | 1.00 |
| | | | | | | | | | | | | |

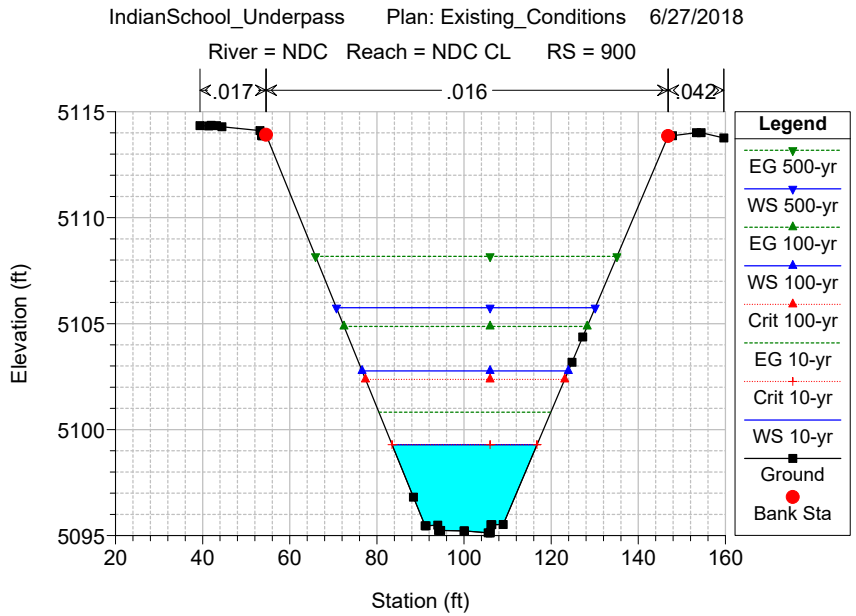
HEC-RAS Plan: Exst_Cond River: NDC Reach: NDC CL (Continued)

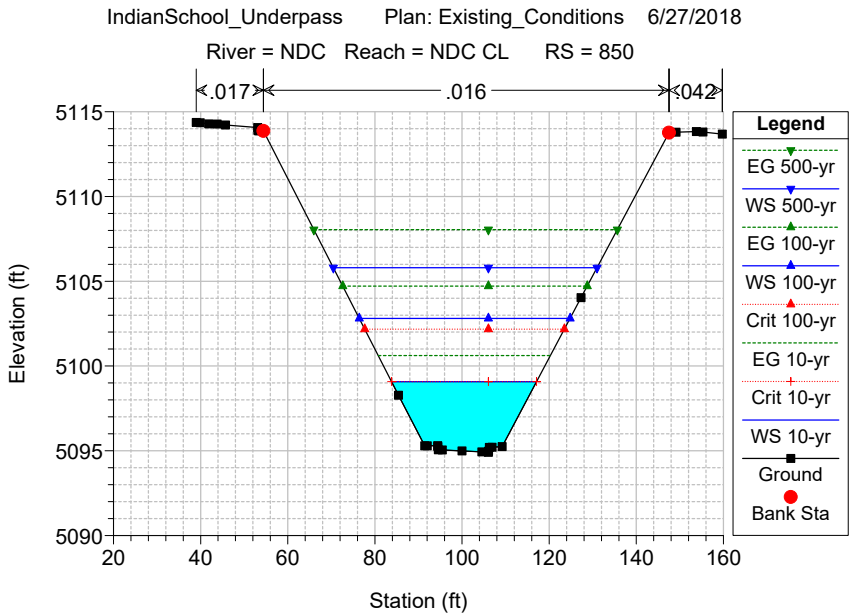
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 100 | 10-yr | 1000.00 | 5092.03 | 5096.17 | 5096.17 | 5097.69 | 0.002819 | 9.89 | 101.09 | 33.55 | 1.00 |
| NDC CL | 100 | 100-yr | 2800.00 | 5092.03 | 5099.23 | 5099.23 | 5101.69 | 0.002459 | 12.58 | 222.50 | 45.79 | 1.01 |
| NDC CL | 100 | 500-yr | 5000.00 | 5092.03 | 5101.73 | 5101.73 | 5104.91 | 0.002283 | 14.30 | 349.67 | 55.80 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 88.79 | 10-yr | 1000.00 | 5091.98 | 5096.11 | 5096.11 | 5097.64 | 0.002830 | 9.91 | 100.93 | 33.52 | 1.01 |
| NDC CL | 88.79 | 100-yr | 2800.00 | 5091.98 | 5099.18 | 5099.18 | 5101.64 | 0.002455 | 12.58 | 222.56 | 45.77 | 1.01 |
| NDC CL | 88.79 | 500-yr | 5000.00 | 5091.98 | 5101.69 | 5101.69 | 5104.86 | 0.002279 | 14.29 | 349.82 | 55.78 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 50 | 10-yr | 1000.00 | 5091.85 | 5095.98 | 5095.97 | 5097.48 | 0.002779 | 9.83 | 101.75 | 33.73 | 1.00 |
| NDC CL | 50 | 100-yr | 2800.00 | 5091.85 | 5099.02 | 5099.02 | 5101.47 | 0.002459 | 12.58 | 222.66 | 45.88 | 1.01 |
| NDC CL | 50 | 500-yr | 5000.00 | 5091.85 | 5101.52 | 5101.52 | 5104.69 | 0.002283 | 14.29 | 349.84 | 55.88 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 0 | 10-yr | 1000.00 | 5091.70 | 5095.83 | 5095.83 | 5097.34 | 0.002814 | 9.87 | 101.27 | 33.66 | 1.00 |
| NDC CL | 0 | 100-yr | 2800.00 | 5091.70 | 5098.88 | 5098.88 | 5101.33 | 0.002453 | 12.56 | 222.91 | 45.93 | 1.01 |
| NDC CL | 0 | 500-yr | 5000.00 | 5091.70 | 5101.38 | 5101.38 | 5104.55 | 0.002280 | 14.28 | 350.17 | 55.96 | 1.01 |

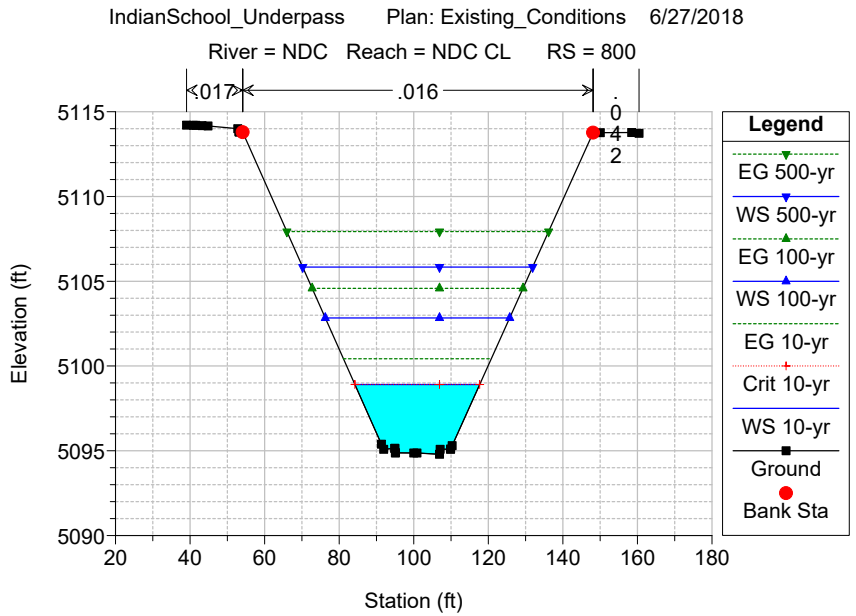

IndianSchool_Underpass Plan: Existing_Conditions 6/25/2018
NDC NDC CL
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Elevation (ft)
5120
5115
5110
5105
5100
5095
5090
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

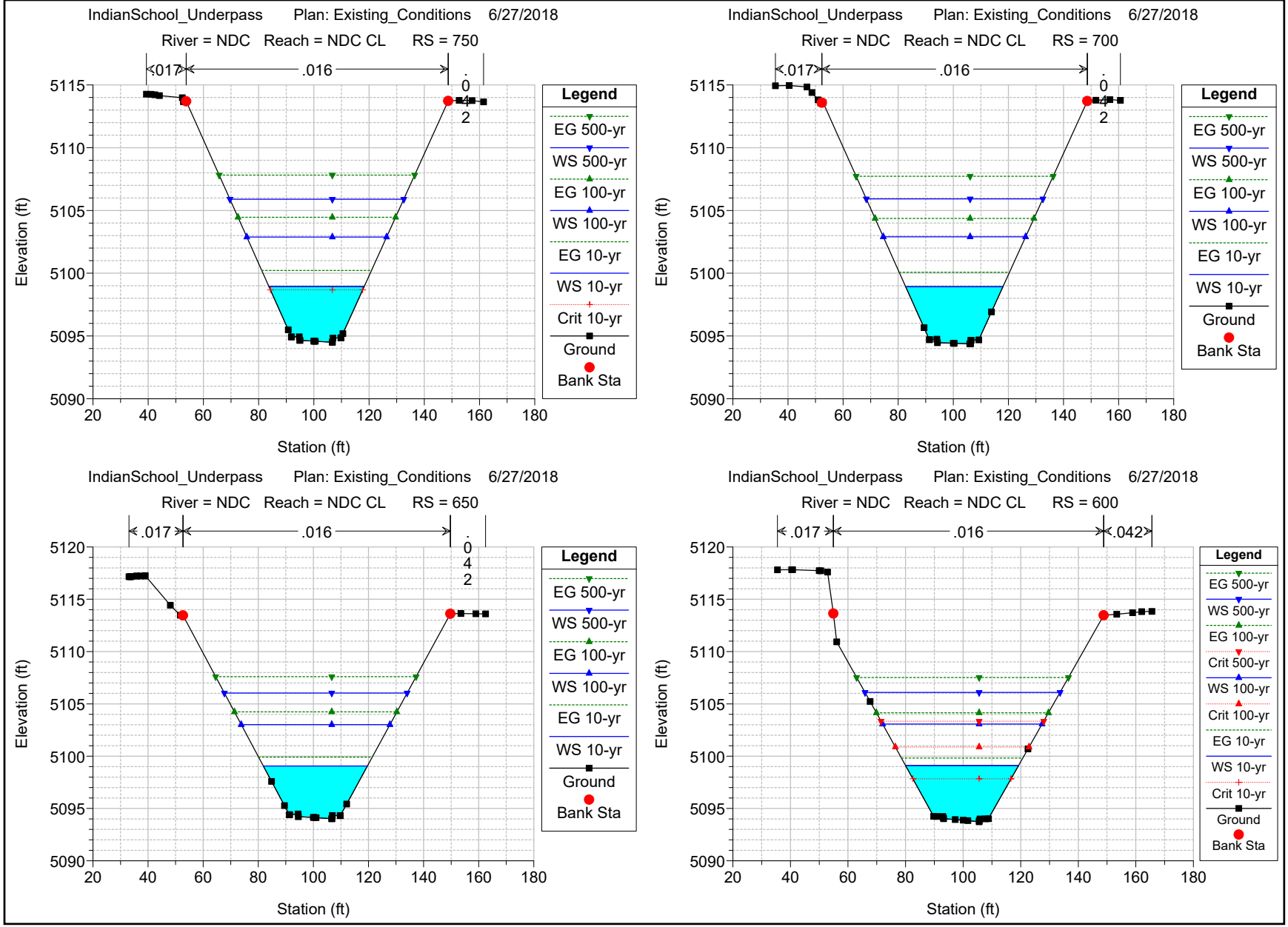

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1090
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1050
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1000
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 950
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

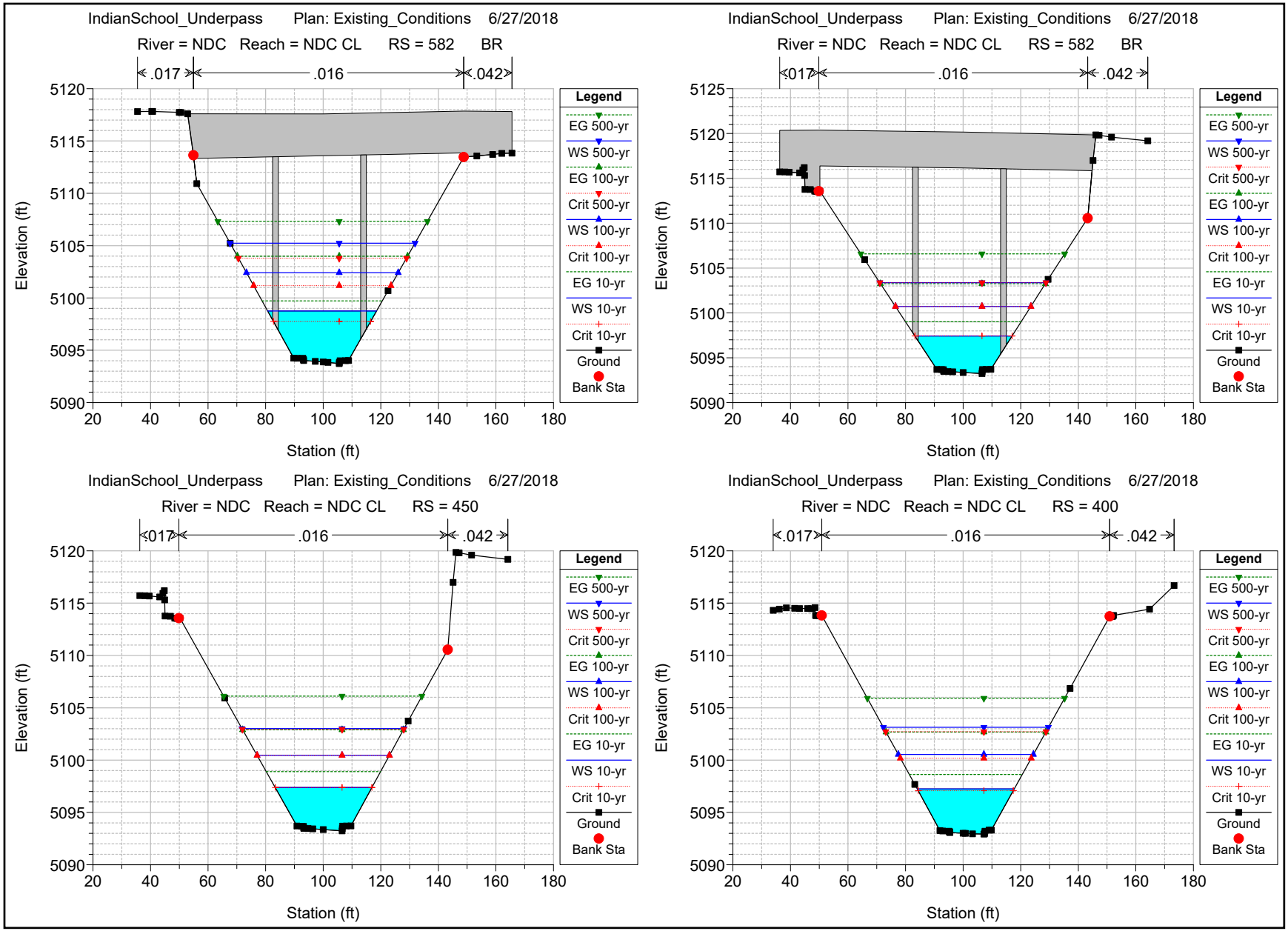

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 944.69
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

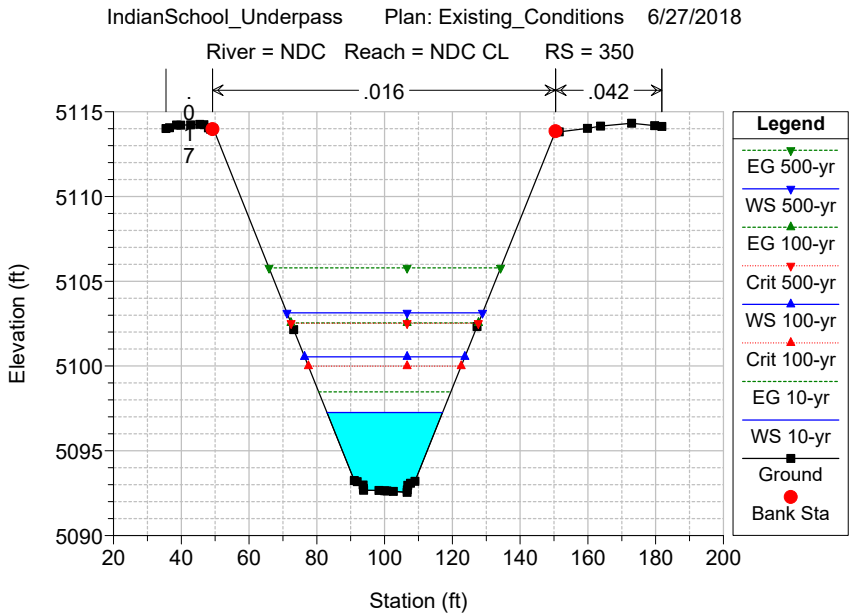

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 900
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

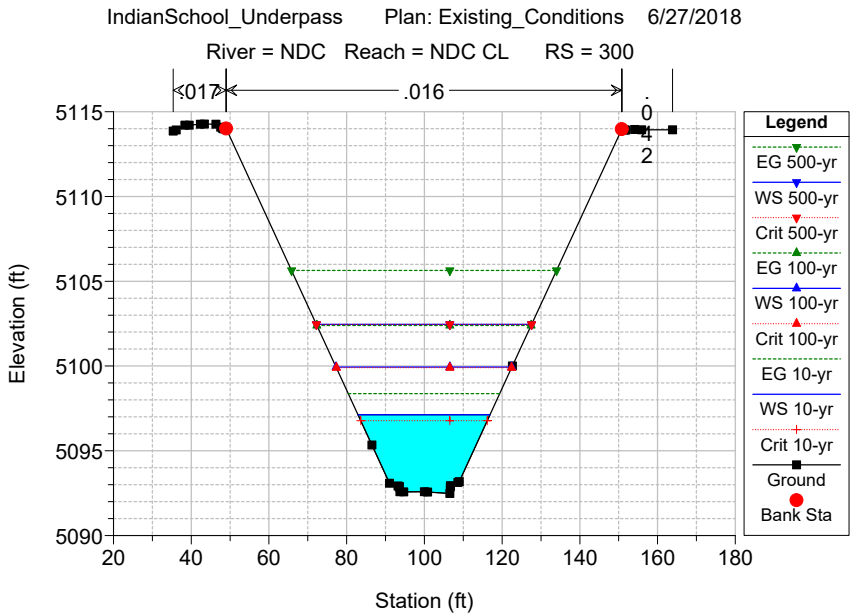

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 850
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

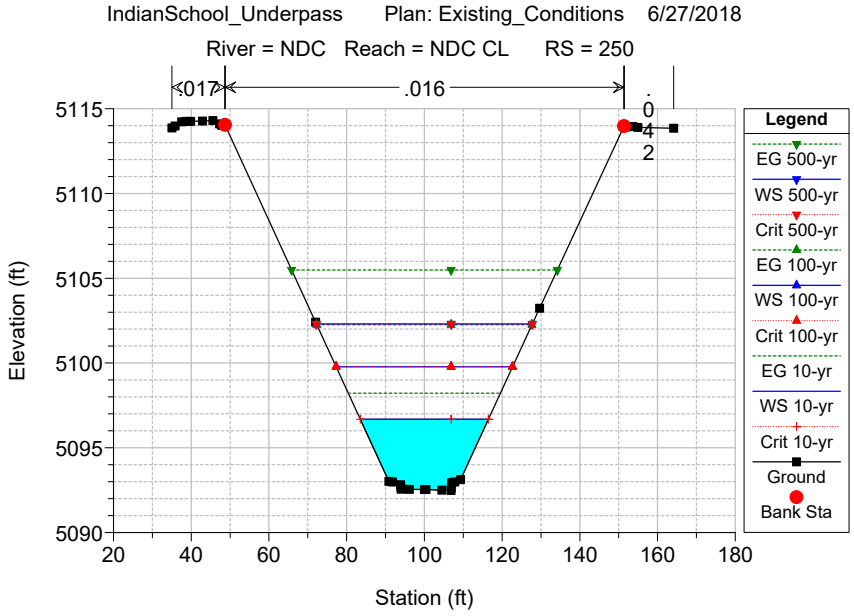

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 800
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

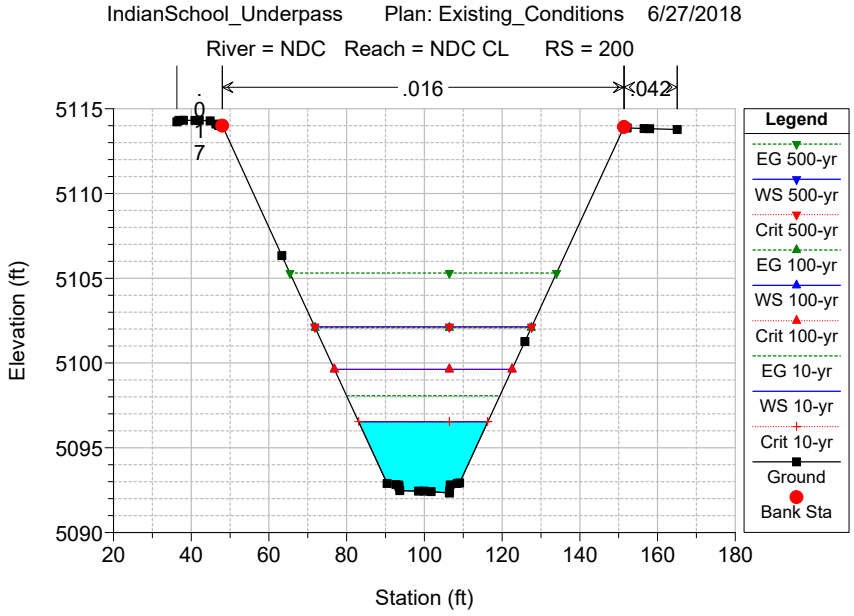

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 750
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 700
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 650
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 600
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

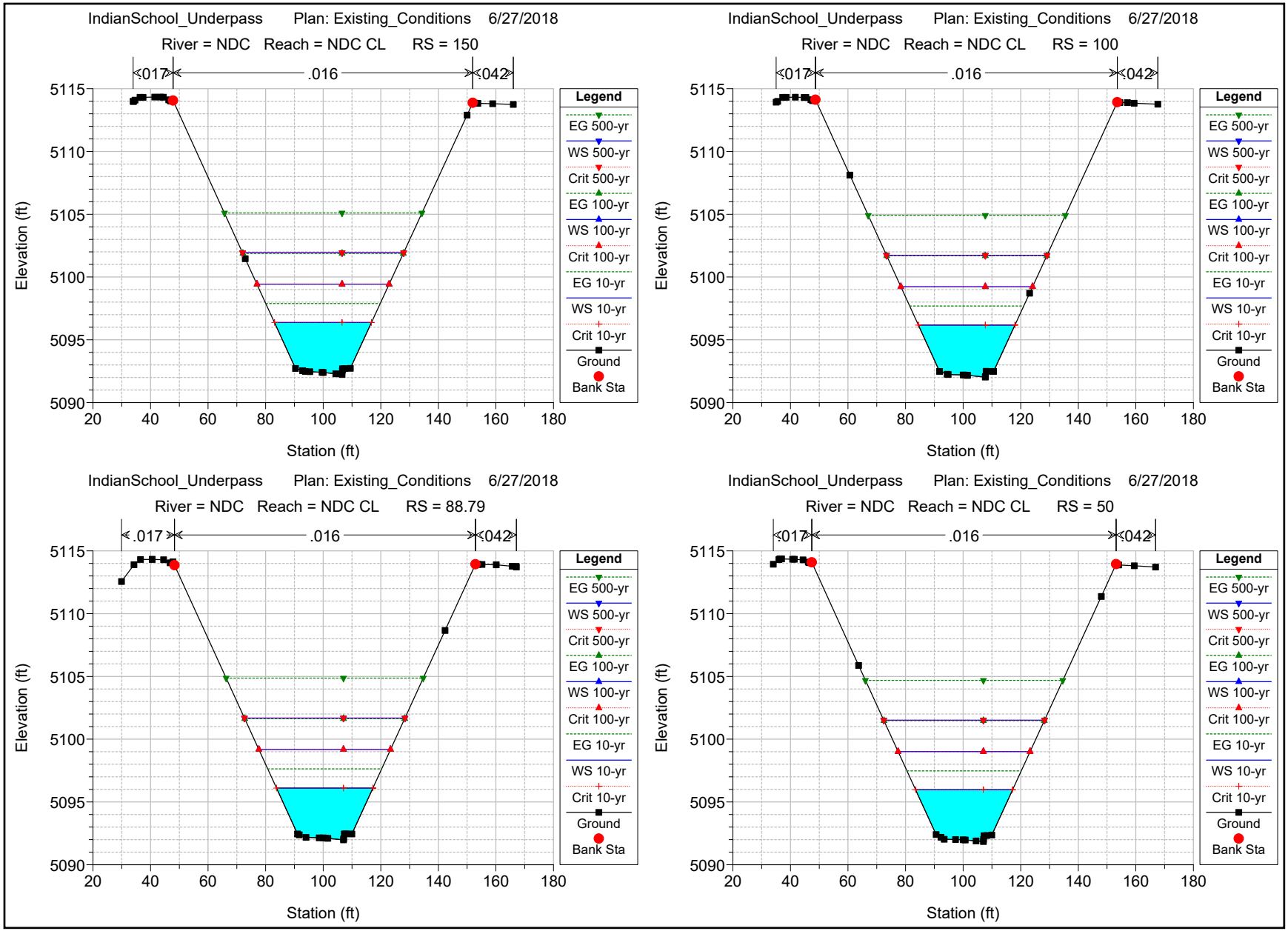

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 450
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 400
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

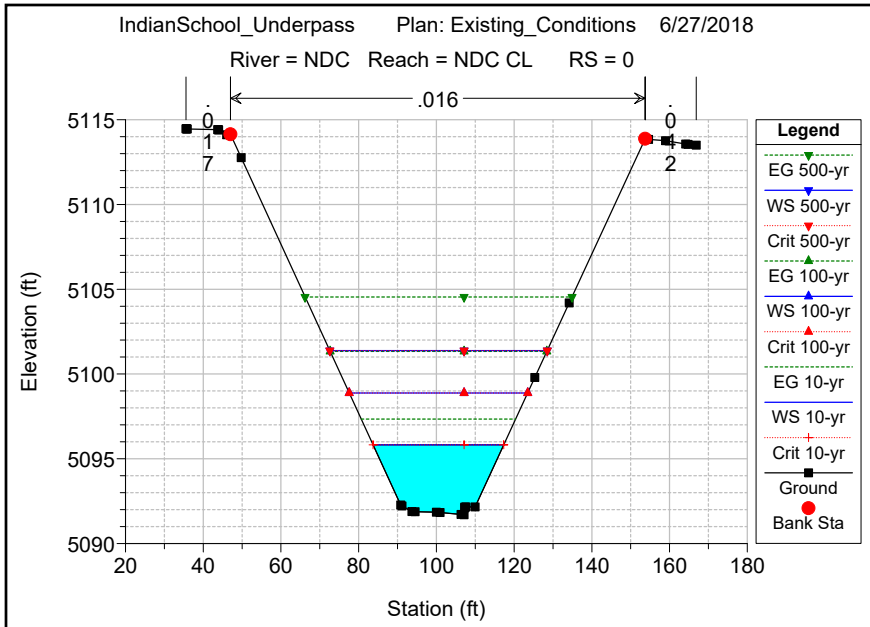

IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 350
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 300
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 250
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 200
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 150
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 100
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 88.79
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 50
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Existing_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 0
.016
.017
.042
Elevation (ft)
5115
5110
5105
5100
5095
5090
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

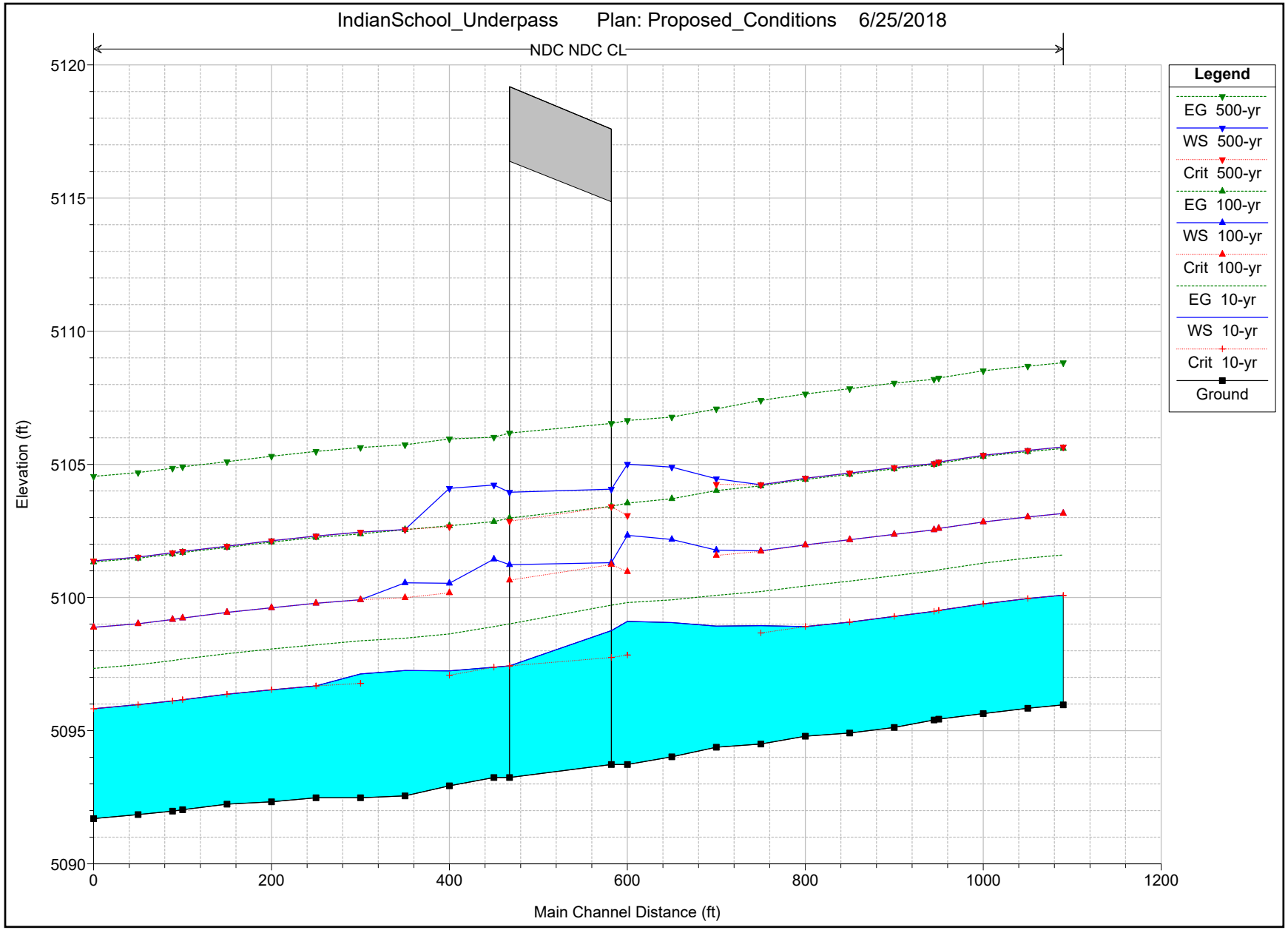
# Proposed Conditions - Subcritical Flow Regime

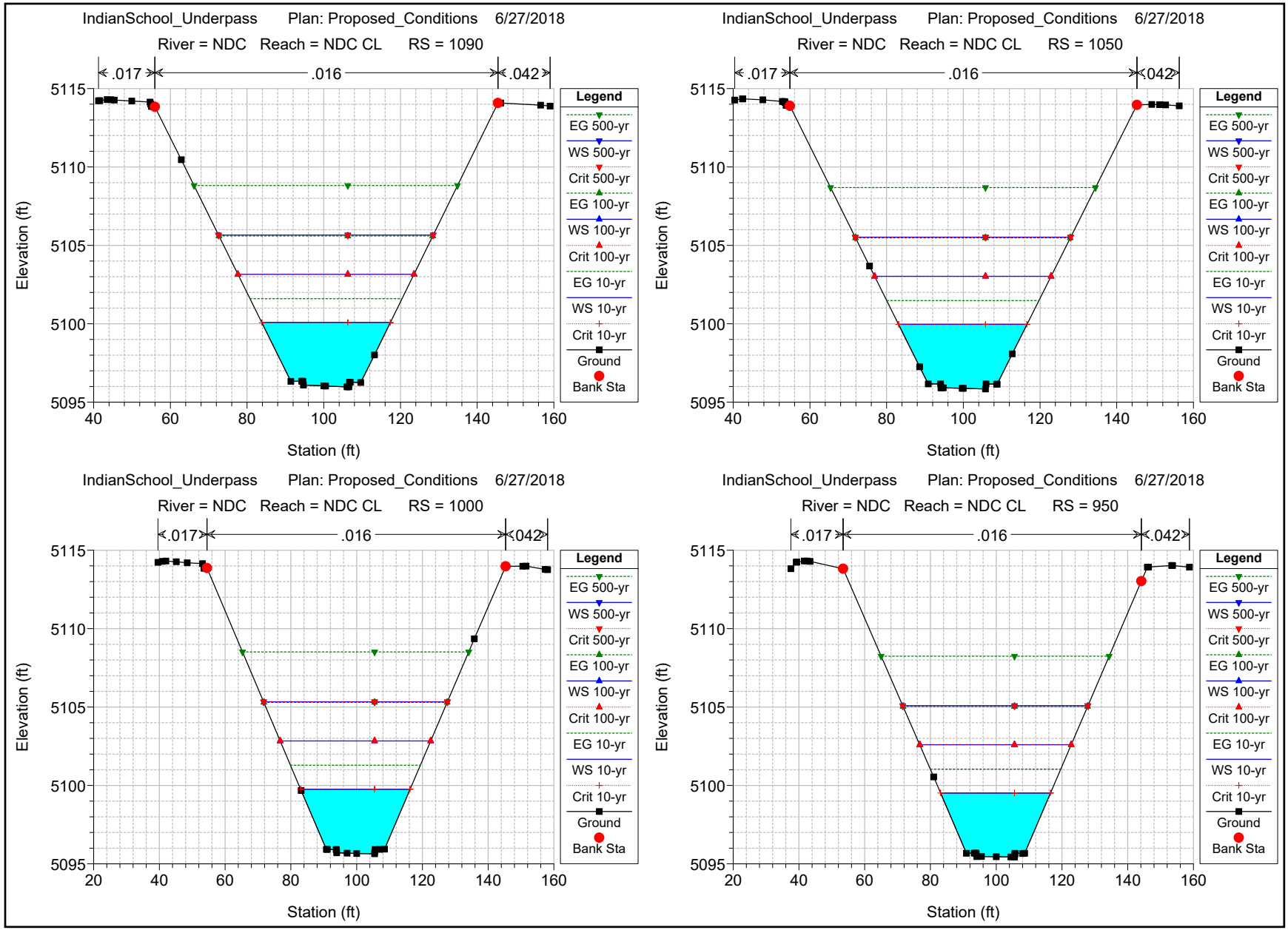
HEC-RAS Plan: Prop_Cond River: NDC Reach: NDC CL

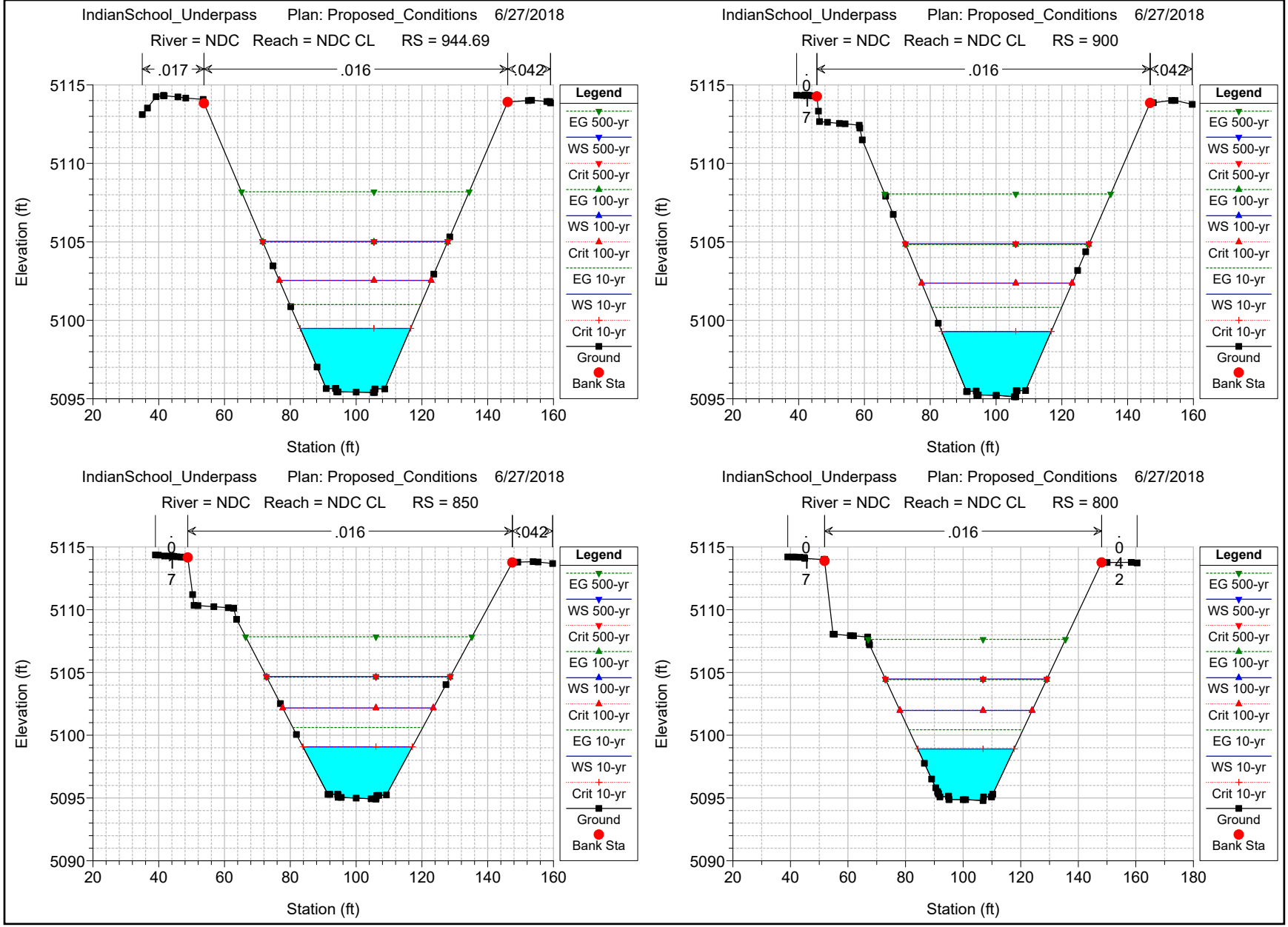
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 1090 | 10-yr | 1000.00 | 5095.97 | 5100.09 | 5100.08 | 5101.60 | 0.002791 | 9.86 | 101.44 | 33.56 | 1.00 |
| NDC CL | 1090 | 100-yr | 2800.00 | 5095.97 | 5103.16 | 5103.16 | 5105.60 | 0.002440 | 12.54 | 223.30 | 45.91 | 1.00 |
| NDC CL | 1090 | 500-yr | 5000.00 | 5095.97 | 5105.66 | 5105.66 | 5108.82 | 0.002270 | 14.26 | 350.72 | 55.98 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 1050 | 10-yr | 1000.00 | 5095.84 | 5099.96 | 5099.96 | 5101.48 | 0.002814 | 9.88 | 101.17 | 33.48 | 1.00 |
| NDC CL | 1050 | 100-yr | 2800.00 | 5095.84 | 5103.03 | 5103.03 | 5105.48 | 0.002462 | 12.56 | 222.88 | 45.99 | 1.01 |
| NDC CL | 1050 | 500-yr | 5000.00 | 5095.84 | 5105.52 | 5105.52 | 5108.69 | 0.002286 | 14.26 | 350.52 | 56.18 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 1000 | 10-yr | 1000.00 | 5095.64 | 5099.76 | 5099.76 | 5101.29 | 0.002829 | 9.92 | 100.76 | 33.31 | 1.01 |
| NDC CL | 1000 | 100-yr | 2800.00 | 5095.64 | 5102.84 | 5102.84 | 5105.30 | 0.002464 | 12.59 | 222.40 | 45.78 | 1.01 |
| NDC CL | 1000 | 500-yr | 5000.00 | 5095.64 | 5105.34 | 5105.34 | 5108.52 | 0.002289 | 14.30 | 349.74 | 55.93 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 950 | 10-yr | 1000.00 | 5095.43 | 5099.52 | 5099.52 | 5101.04 | 0.002817 | 9.90 | 100.97 | 33.43 | 1.00 |
| NDC CL | 950 | 100-yr | 2800.00 | 5095.43 | 5102.59 | 5102.59 | 5105.04 | 0.002451 | 12.55 | 223.14 | 46.06 | 1.01 |
| NDC CL | 950 | 500-yr | 5000.00 | 5095.43 | 5105.09 | 5105.09 | 5108.24 | 0.002282 | 14.25 | 350.79 | 56.34 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 944.69 | 10-yr | 1000.00 | 5095.40 | 5099.48 | 5099.48 | 5101.00 | 0.002816 | 9.89 | 101.08 | 33.55 | 1.00 |
| NDC CL | 944.69 | 100-yr | 2800.00 | 5095.40 | 5102.54 | 5102.54 | 5104.99 | 0.002461 | 12.56 | 222.97 | 46.14 | 1.01 |
| NDC CL | 944.69 | 500-yr | 5000.00 | 5095.40 | 5105.03 | 5105.03 | 5108.19 | 0.002287 | 14.27 | 350.44 | 56.31 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 900 | 10-yr | 1000.00 | 5095.12 | 5099.29 | 5099.29 | 5100.82 | 0.002835 | 9.92 | 100.79 | 33.29 | 1.01 |
| NDC CL | 900 | 100-yr | 2800.00 | 5095.12 | 5102.37 | 5102.37 | 5104.83 | 0.002466 | 12.59 | 222.49 | 45.74 | 1.01 |
| NDC CL | 900 | 500-yr | 5000.00 | 5095.12 | 5104.88 | 5104.88 | 5108.05 | 0.002290 | 14.29 | 349.81 | 55.86 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 850 | 10-yr | 1000.00 | 5094.91 | 5099.08 | 5099.08 | 5100.62 | 0.002847 | 9.95 | 100.51 | 33.26 | 1.01 |
| NDC CL | 850 | 100-yr | 2800.00 | 5094.91 | 5102.17 | 5102.17 | 5104.62 | 0.002449 | 12.56 | 222.85 | 45.80 | 1.00 |
| NDC CL | 850 | 500-yr | 5000.00 | 5094.91 | 5104.67 | 5104.67 | 5107.84 | 0.002283 | 14.28 | 350.04 | 55.94 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 800 | 10-yr | 1000.00 | 5094.79 | 5098.91 | 5098.91 | 5100.43 | 0.002840 | 9.91 | 100.87 | 33.47 | 1.01 |
| NDC CL | 800 | 100-yr | 2800.00 | 5094.79 | 5101.97 | 5101.97 | 5104.43 | 0.002469 | 12.58 | 222.65 | 45.95 | 1.01 |
| NDC CL | 800 | 500-yr | 5000.00 | 5094.79 | 5104.48 | 5104.48 | 5107.64 | 0.002286 | 14.27 | 350.46 | 56.14 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 750 | 10-yr | 1000.00 | 5094.50 | 5098.95 | 5098.67 | 5100.22 | 0.002203 | 9.06 | 110.32 | 34.56 | 0.89 |
| NDC CL | 750 | 100-yr | 2800.00 | 5094.50 | 5101.75 | 5101.73 | 5104.19 | 0.002443 | 12.53 | 223.48 | 46.03 | 1.00 |
| NDC CL | 750 | 500-yr | 5000.00 | 5094.50 | 5104.24 | 5104.24 | 5107.40 | 0.002289 | 14.27 | 350.34 | 56.18 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 700 | 10-yr | 1000.00 | 5094.38 | 5098.93 | | 5100.08 | 0.001922 | 8.63 | 115.89 | 35.32 | 0.84 |
| NDC CL | 700 | 100-yr | 2800.00 | 5094.38 | 5101.78 | 5101.58 | 5104.01 | 0.002174 | 12.00 | 233.43 | 47.06 | 0.95 |
| NDC CL | 700 | 500-yr | 5000.00 | 5094.38 | 5104.46 | 5104.25 | 5107.08 | 0.002126 | 12.99 | 384.93 | 67.65 | 0.96 |
| | | | | | | | | | | | | |
| NDC CL | 650 | 10-yr | 1000.00 | 5094.02 | 5099.06 | | 5099.91 | 0.001272 | 7.41 | 134.98 | 37.76 | 0.69 |
| NDC CL | 650 | 100-yr | 2800.00 | 5094.02 | 5102.18 | | 5103.71 | 0.001586 | 9.92 | 282.36 | 59.84 | 0.80 |
| NDC CL | 650 | 500-yr | 5000.00 | 5094.02 | 5104.90 | | 5106.78 | 0.001240 | 11.00 | 454.43 | 66.83 | 0.74 |
| | | | | | | | | | | | | |
| NDC CL | 600 | 10-yr | 1000.00 | 5093.73 | 5099.10 | 5097.84 | 5099.81 | 0.000980 | 6.76 | 147.97 | 39.26 | 0.61 |
| NDC CL | 600 | 100-yr | 2800.00 | 5093.73 | 5102.34 | 5100.97 | 5103.55 | 0.001083 | 8.82 | 317.61 | 59.88 | 0.67 |
| NDC CL | 600 | 500-yr | 5000.00 | 5093.73 | 5105.01 | 5103.08 | 5106.65 | 0.000993 | 10.28 | 486.50 | 66.71 | 0.67 |
| | | | | | | | | | | | | |
| NDC CL | 582 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| NDC CL | 450 | 10-yr | 1000.00 | 5093.24 | 5097.38 | 5097.38 | 5098.91 | 0.002844 | 9.90 | 101.00 | 33.61 | 1.01 |
| NDC CL | 450 | 100-yr | 2800.00 | 5093.24 | 5101.44 | | 5102.85 | 0.001342 | 9.52 | 294.13 | 57.93 | 0.74 |
| NDC CL | 450 | 500-yr | 5000.00 | 5093.24 | 5104.22 | | 5106.02 | 0.001119 | 10.76 | 464.79 | 64.85 | 0.71 |
| | | | | | | | | | | | | |
| NDC CL | 400 | 10-yr | 1000.00 | 5092.93 | 5097.25 | 5097.08 | 5098.63 | 0.002433 | 9.45 | 105.82 | 33.65 | 0.94 |
| NDC CL | 400 | 100-yr | 2800.00 | 5092.93 | 5100.53 | 5100.18 | 5102.70 | 0.002036 | 11.80 | 237.38 | 46.44 | 0.92 |
| NDC CL | 400 | 500-yr | 5000.00 | 5092.93 | 5104.10 | 5102.66 | 5105.96 | 0.001203 | 10.92 | 457.67 | 66.55 | 0.73 |
| | | | | | | | | | | | | |
| NDC CL | 350 | 10-yr | 1000.00 | 5092.55 | 5097.26 | | 5098.47 | 0.002005 | 8.84 | 113.10 | 34.08 | 0.86 |
| NDC CL | 350 | 100-yr | 2800.00 | 5092.55 | 5100.55 | 5099.99 | 5102.55 | 0.001826 | 11.32 | 247.25 | 47.34 | 0.87 |
| NDC CL | 350 | 500-yr | 5000.00 | 5092.55 | 5102.55 | 5102.55 | 5105.74 | 0.002235 | 14.32 | 349.24 | 54.21 | 0.99 |
| | | | | | | | | | | | | |
| NDC CL | 300 | 10-yr | 1000.00 | 5092.48 | 5097.13 | 5096.78 | 5098.37 | 0.002081 | 8.95 | 111.71 | 33.96 | 0.87 |
| NDC CL | 300 | 100-yr | 2800.00 | 5092.48 | 5099.92 | 5099.92 | 5102.39 | 0.002452 | 12.61 | 221.98 | 45.14 | 1.00 |
| NDC CL | 300 | 500-yr | 5000.00 | 5092.48 | 5102.46 | 5102.46 | 5105.64 | 0.002276 | 14.30 | 349.58 | 55.37 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 250 | 10-yr | 1000.00 | 5092.48 | 5096.68 | 5096.68 | 5098.22 | 0.002836 | 9.96 | 100.45 | 32.96 | 1.01 |
| NDC CL | 250 | 100-yr | 2800.00 | 5092.48 | 5099.78 | 5099.78 | 5102.26 | 0.002465 | 12.61 | 222.05 | 45.43 | 1.01 |
| NDC CL | 250 | 500-yr | 5000.00 | 5092.48 | 5102.31 | 5102.31 | 5105.49 | 0.002285 | 14.31 | 349.51 | 55.57 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 200 | 10-yr | 1000.00 | 5092.33 | 5096.54 | 5096.54 | 5098.07 | 0.002838 | 9.93 | 100.73 | 33.25 | 1.01 |
| NDC CL | 200 | 100-yr | 2800.00 | 5092.33 | 5099.62 | 5099.62 | 5102.08 | 0.002473 | 12.60 | 222.19 | 45.65 | 1.01 |
| NDC CL | 200 | 500-yr | 5000.00 | 5092.33 | 5102.13 | 5102.13 | 5105.31 | 0.002289 | 14.30 | 349.74 | 55.78 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 150 | 10-yr | 1000.00 | 5092.24 | 5096.37 | 5096.37 | 5097.89 | 0.002837 | 9.89 | 101.08 | 33.67 | 1.01 |
| NDC CL | 150 | 100-yr | 2800.00 | 5092.24 | 5099.44 | 5099.44 | 5101.88 | 0.002442 | 12.53 | 223.39 | 45.97 | 1.00 |
| NDC CL | 150 | 500-yr | 5000.00 | 5092.24 | 5101.93 | 5101.93 | 5105.10 | 0.002286 | 14.29 | 349.90 | 55.91 | 1.01 |
| | | | | | | | | | | | | |

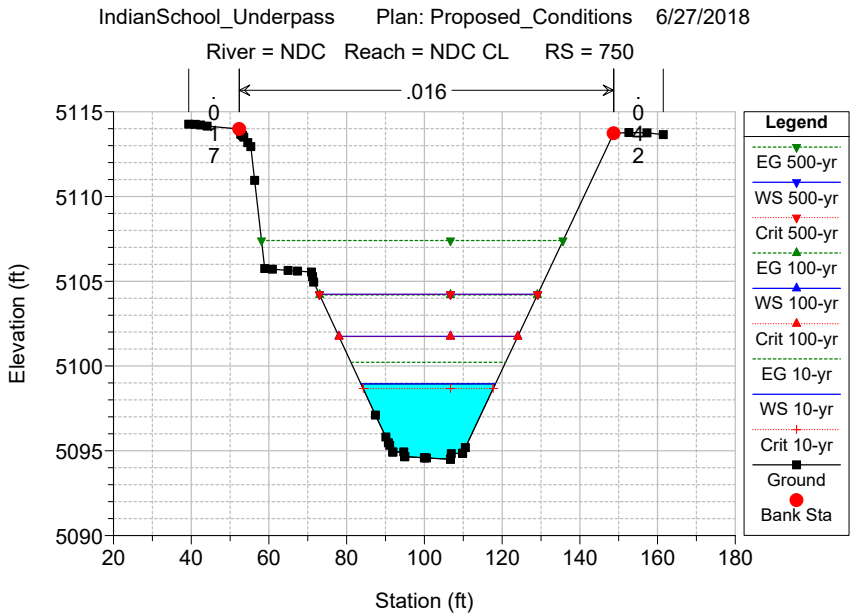
HEC-RAS Plan: Prop_Cond River: NDC Reach: NDC CL (Continued)

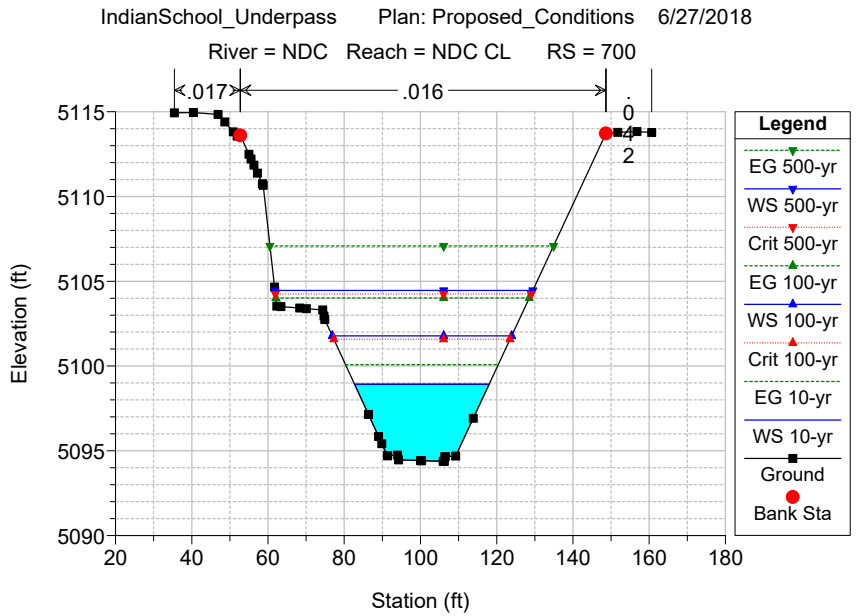
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 100 | 10-yr | 1000.00 | 5092.03 | 5096.16 | 5096.16 | 5097.69 | 0.002830 | 9.91 | 100.95 | 33.54 | 1.01 |
| NDC CL | 100 | 100-yr | 2800.00 | 5092.03 | 5099.23 | 5099.23 | 5101.69 | 0.002456 | 12.58 | 222.62 | 45.81 | 1.01 |
| NDC CL | 100 | 500-yr | 5000.00 | 5092.03 | 5101.73 | 5101.73 | 5104.91 | 0.002281 | 14.30 | 349.77 | 55.81 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 88.79 | 10-yr | 1000.00 | 5091.98 | 5096.11 | 5096.11 | 5097.63 | 0.002817 | 9.89 | 101.11 | 33.56 | 1.00 |
| NDC CL | 88.79 | 100-yr | 2800.00 | 5091.98 | 5099.18 | 5099.18 | 5101.63 | 0.002454 | 12.58 | 222.66 | 45.82 | 1.01 |
| NDC CL | 88.79 | 500-yr | 5000.00 | 5091.98 | 5101.68 | 5101.68 | 5104.85 | 0.002280 | 14.29 | 349.90 | 55.83 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 50 | 10-yr | 1000.00 | 5091.85 | 5095.98 | 5095.97 | 5097.48 | 0.002779 | 9.83 | 101.75 | 33.73 | 1.00 |
| NDC CL | 50 | 100-yr | 2800.00 | 5091.85 | 5099.02 | 5099.02 | 5101.47 | 0.002459 | 12.58 | 222.66 | 45.88 | 1.01 |
| NDC CL | 50 | 500-yr | 5000.00 | 5091.85 | 5101.52 | 5101.52 | 5104.69 | 0.002280 | 14.28 | 350.03 | 55.89 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 0 | 10-yr | 1000.00 | 5091.70 | 5095.83 | 5095.83 | 5097.34 | 0.002814 | 9.87 | 101.27 | 33.66 | 1.00 |
| NDC CL | 0 | 100-yr | 2800.00 | 5091.70 | 5098.88 | 5098.88 | 5101.33 | 0.002453 | 12.56 | 222.91 | 45.93 | 1.01 |
| NDC CL | 0 | 500-yr | 5000.00 | 5091.70 | 5101.38 | 5101.38 | 5104.55 | 0.002282 | 14.28 | 350.04 | 55.95 | 1.01 |

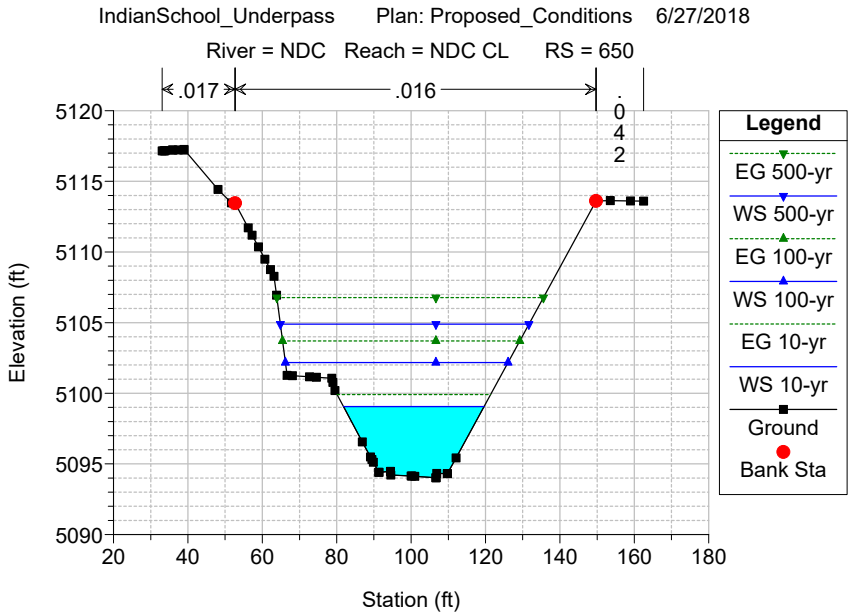

IndianSchool_Underpass Plan: Proposed_Conditions 6/25/2018
NDC NDC CL
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Elevation (ft)
5120
5115
5110
5105
5100
5095
5090
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

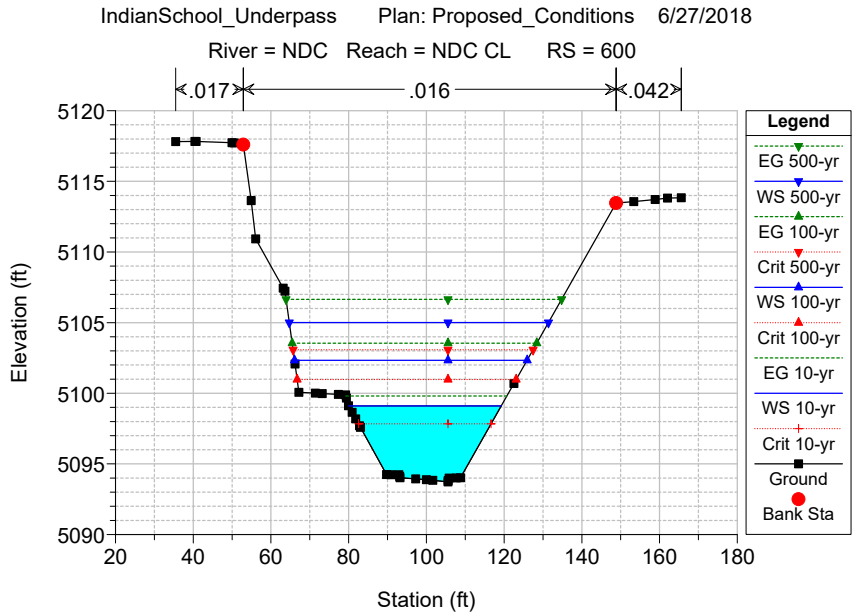

IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1090
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1050
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1000
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 950
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

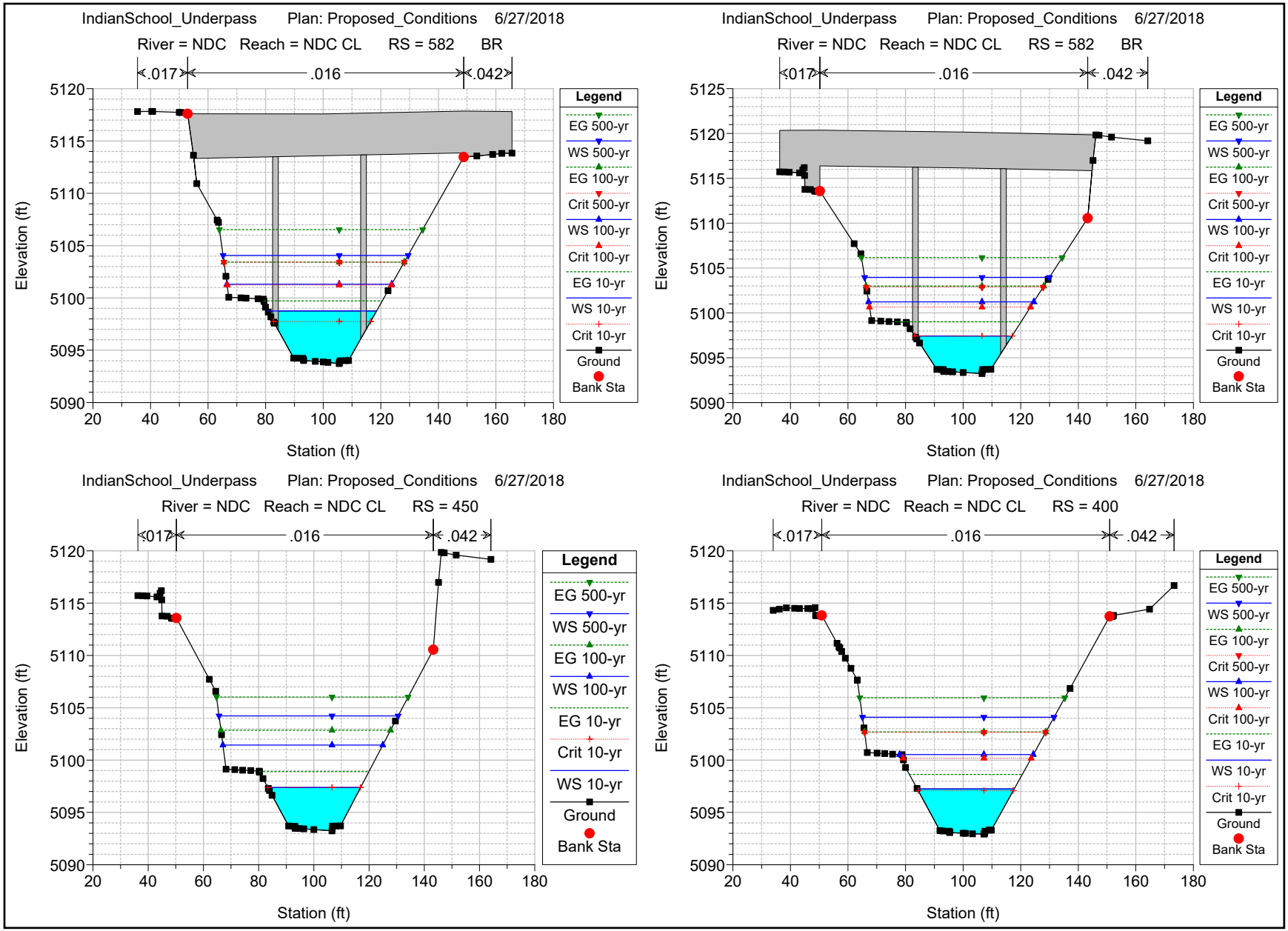

IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 944.69
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 900
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 850
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 800
.016
Elevation (ft)
Station (ft)

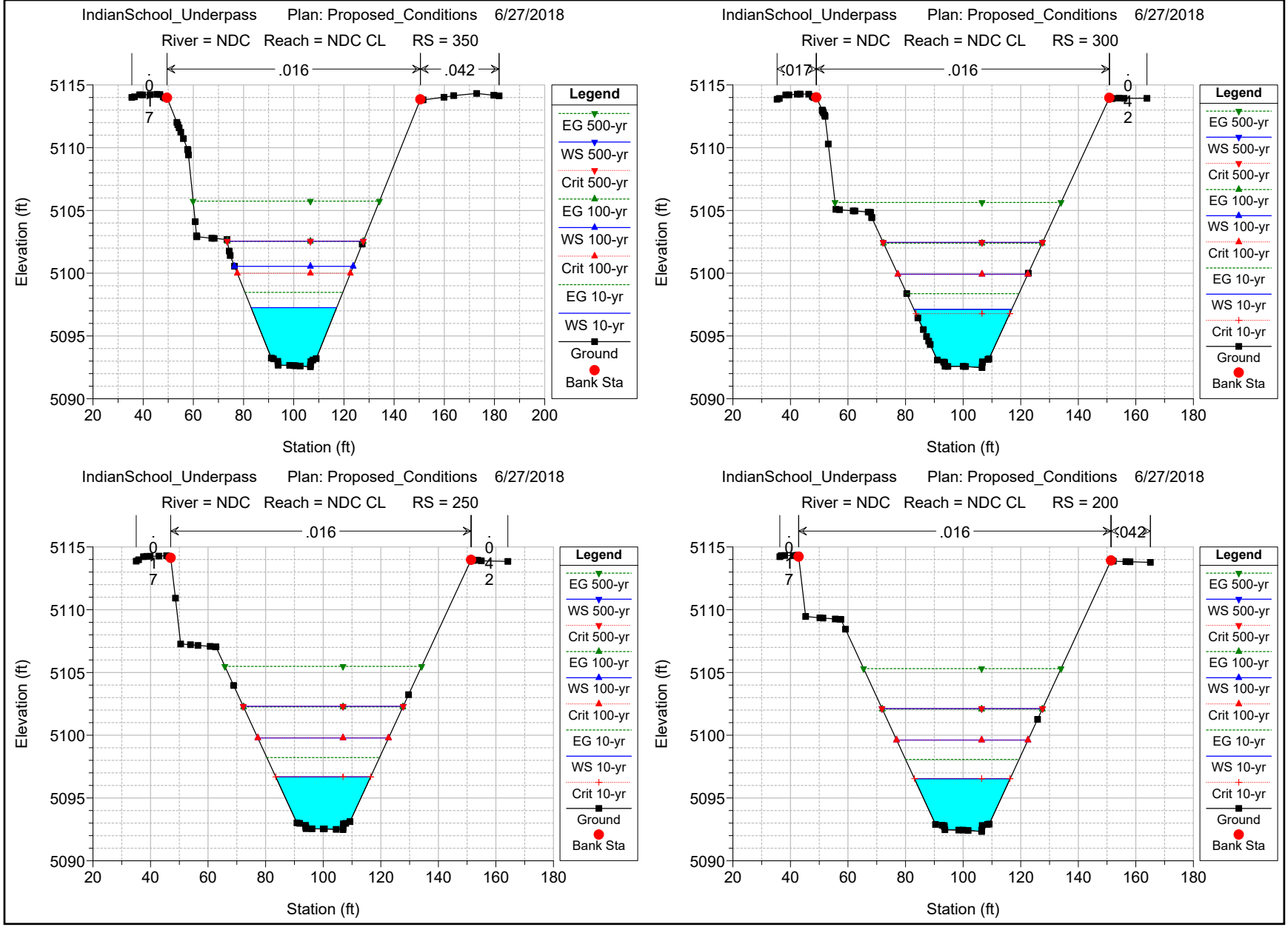

IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 750
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

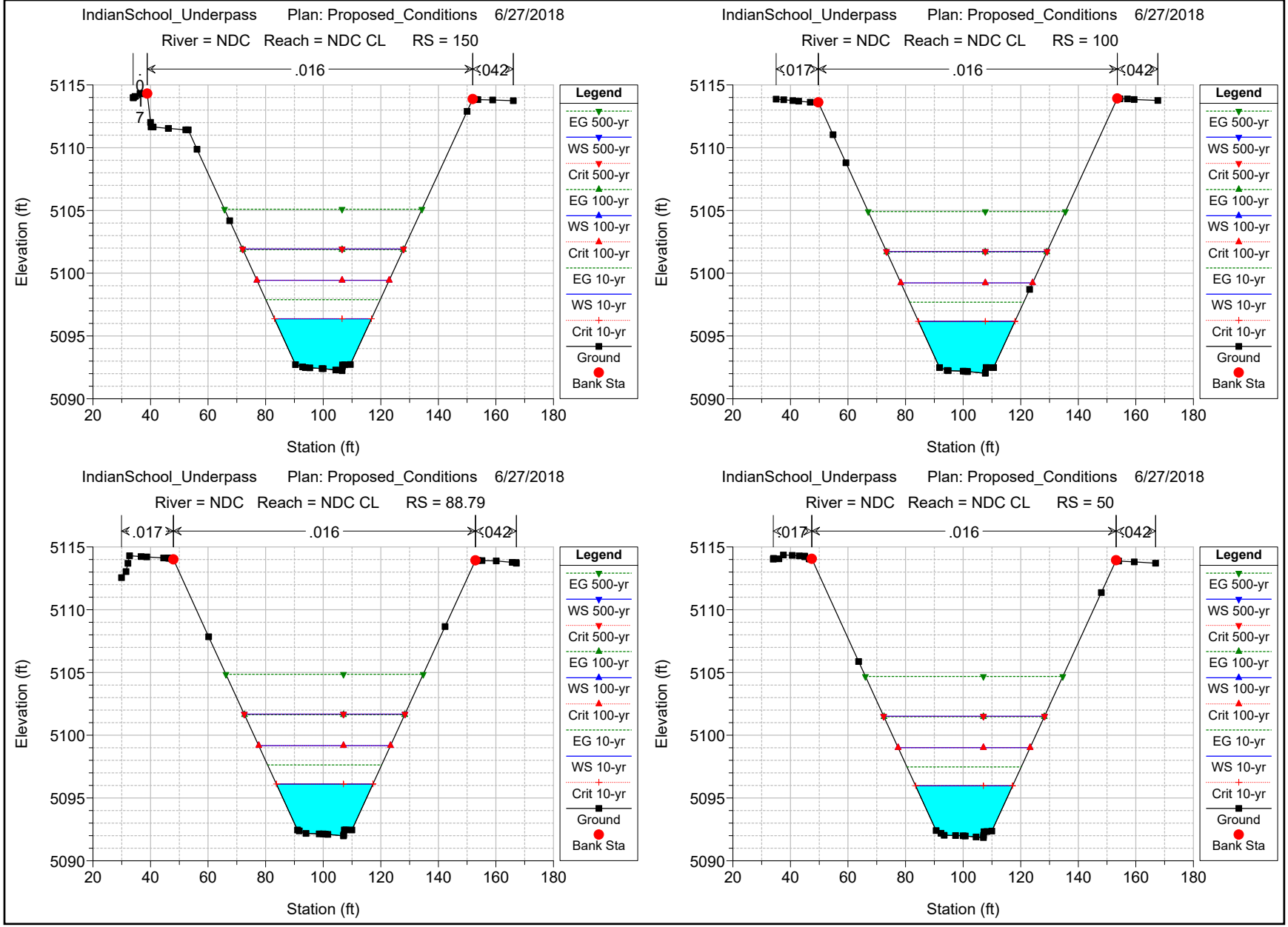

IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 700
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta

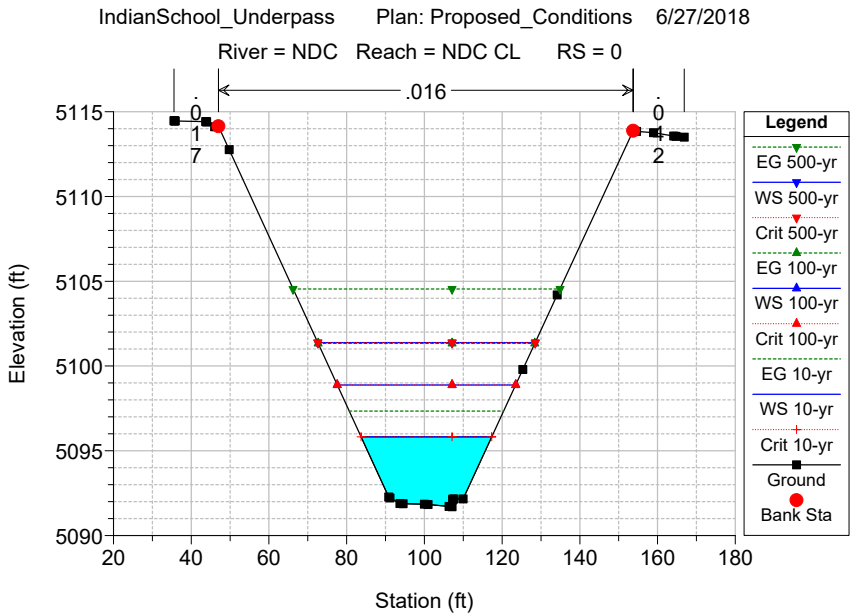

IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 650
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 600
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 450
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 400
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 350
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 300
.017
.016
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 250
.016
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 200
.016
.042


IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 150
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 100
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 88.79
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 50
.017
.016
.042
Elevation (ft)
Station (ft)


IndianSchool_Underpass Plan: Proposed_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 0
.016
.017
.042
Elevation (ft)
Station (ft)
5115
5110
5105
5100
5095
5090
20
40
60
80
100
120
140
160
180
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

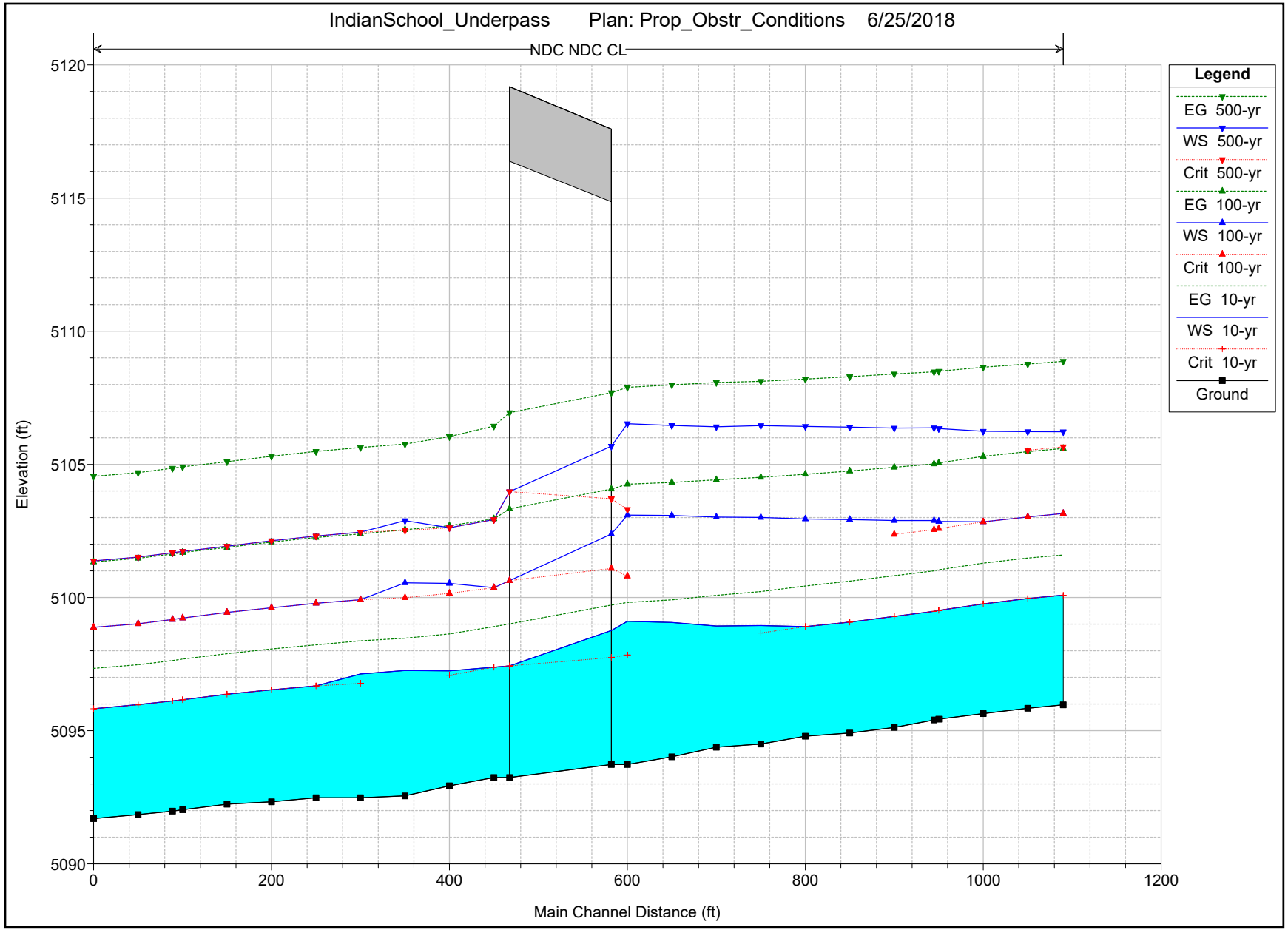
# Proposed Conditions w/ Obstructions - Subcritical Flow Regime

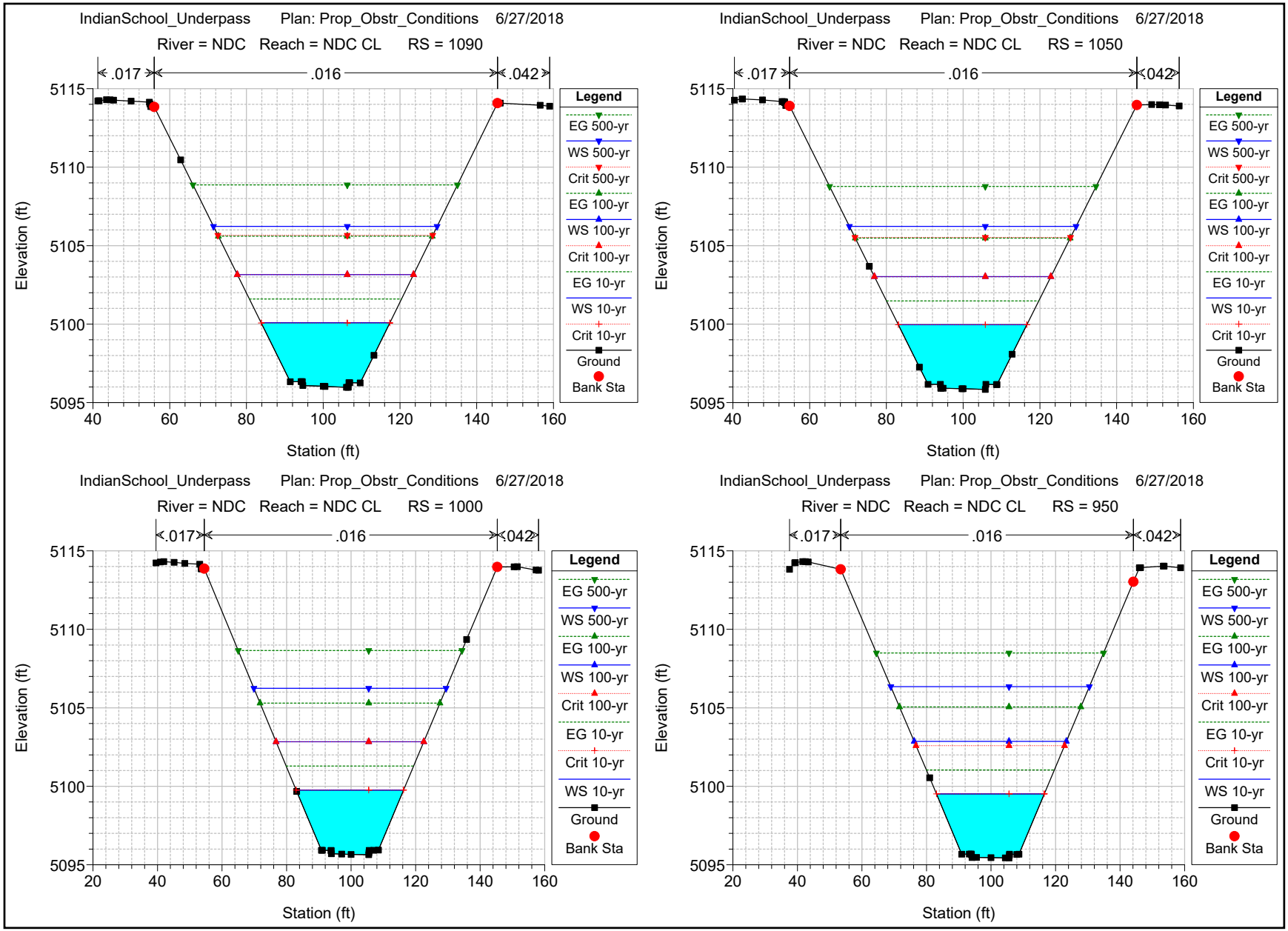
HEC-RAS Plan: Obstr_Cond River: NDC Reach: NDC CL

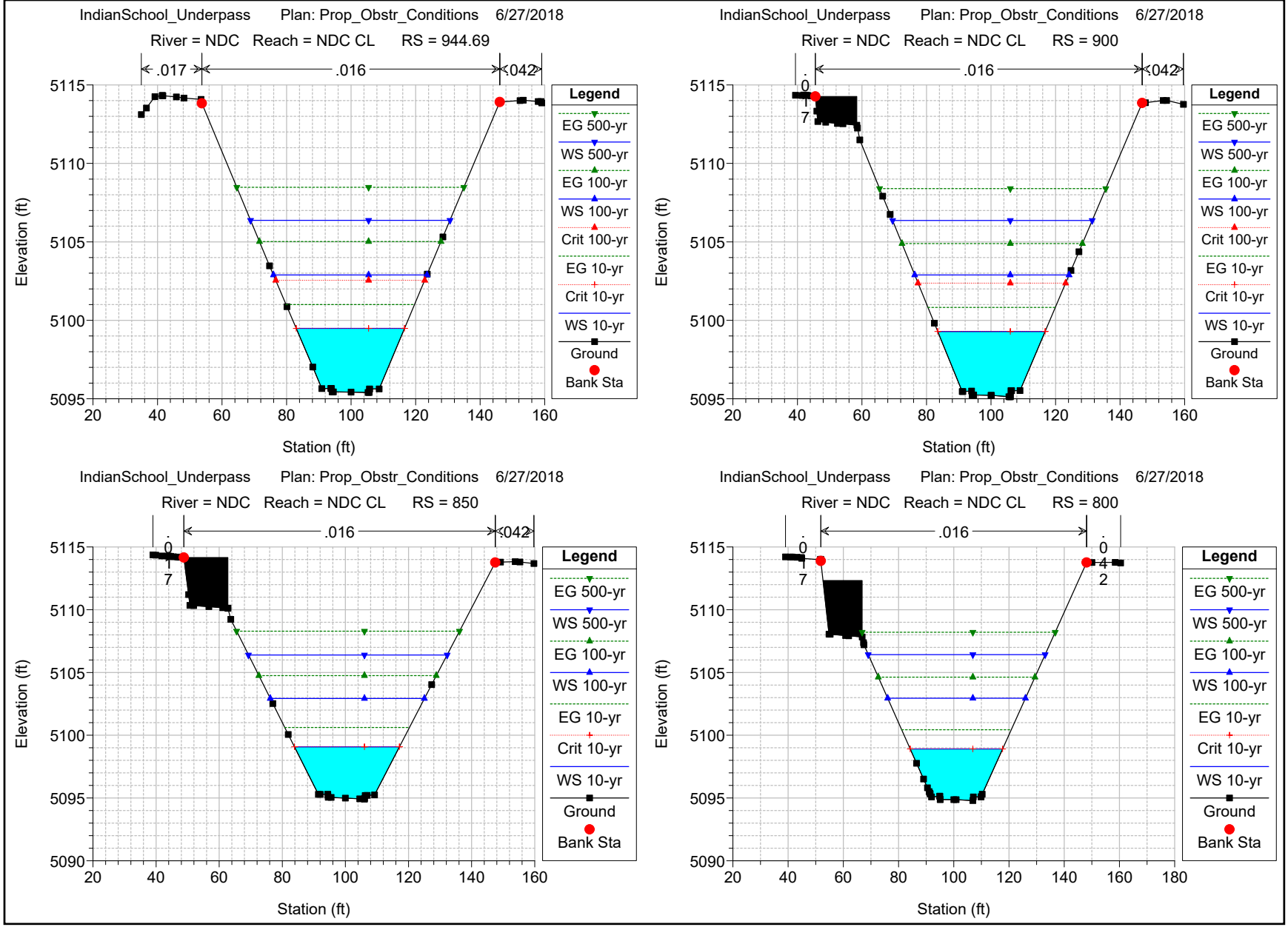
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 1090 | 10-yr | 1000.00 | 5095.97 | 5100.09 | 5100.08 | 5101.60 | 0.002791 | 9.86 | 101.44 | 33.56 | 1.00 |
| NDC CL | 1090 | 100-yr | 2800.00 | 5095.97 | 5103.16 | 5103.16 | 5105.60 | 0.002440 | 12.54 | 223.30 | 45.91 | 1.00 |
| NDC CL | 1090 | 500-yr | 5000.00 | 5095.97 | 5106.22 | 5105.66 | 5108.87 | 0.001787 | 13.05 | 383.10 | 58.26 | 0.90 |
| | | | | | | | | | | | | |
| NDC CL | 1050 | 10-yr | 1000.00 | 5095.84 | 5099.96 | 5099.96 | 5101.48 | 0.002814 | 9.88 | 101.17 | 33.48 | 1.00 |
| NDC CL | 1050 | 100-yr | 2800.00 | 5095.84 | 5103.02 | 5103.02 | 5105.48 | 0.002465 | 12.57 | 222.81 | 45.98 | 1.01 |
| NDC CL | 1050 | 500-yr | 5000.00 | 5095.84 | 5106.23 | 5105.53 | 5108.77 | 0.001698 | 12.78 | 391.15 | 59.06 | 0.88 |
| | | | | | | | | | | | | |
| NDC CL | 1000 | 10-yr | 1000.00 | 5095.64 | 5099.76 | 5099.76 | 5101.29 | 0.002829 | 9.92 | 100.76 | 33.31 | 1.01 |
| NDC CL | 1000 | 100-yr | 2800.00 | 5095.64 | 5102.84 | 5102.84 | 5105.30 | 0.002458 | 12.58 | 222.62 | 45.80 | 1.01 |
| NDC CL | 1000 | 500-yr | 5000.00 | 5095.64 | 5106.24 | | 5108.65 | 0.001572 | 12.44 | 401.83 | 59.59 | 0.84 |
| | | | | | | | | | | | | |
| NDC CL | 950 | 10-yr | 1000.00 | 5095.43 | 5099.52 | 5099.52 | 5101.04 | 0.002817 | 9.90 | 100.97 | 33.43 | 1.00 |
| NDC CL | 950 | 100-yr | 2800.00 | 5095.43 | 5102.86 | 5102.59 | 5105.05 | 0.002116 | 11.89 | 235.48 | 47.15 | 0.94 |
| NDC CL | 950 | 500-yr | 5000.00 | 5095.43 | 5106.34 | | 5108.50 | 0.001358 | 11.77 | 424.97 | 61.52 | 0.79 |
| | | | | | | | | | | | | |
| NDC CL | 944.69 | 10-yr | 1000.00 | 5095.40 | 5099.48 | 5099.48 | 5101.00 | 0.002816 | 9.89 | 101.08 | 33.55 | 1.00 |
| NDC CL | 944.69 | 100-yr | 2800.00 | 5095.40 | 5102.89 | 5102.55 | 5105.02 | 0.002027 | 11.70 | 239.33 | 47.58 | 0.92 |
| NDC CL | 944.69 | 500-yr | 5000.00 | 5095.40 | 5106.37 | | 5108.48 | 0.001317 | 11.64 | 429.61 | 61.78 | 0.78 |
| | | | | | | | | | | | | |
| NDC CL | 900 | 10-yr | 1000.00 | 5095.12 | 5099.29 | 5099.29 | 5100.82 | 0.002835 | 9.92 | 100.79 | 33.29 | 1.01 |
| NDC CL | 900 | 100-yr | 2800.00 | 5095.12 | 5102.89 | 5102.37 | 5104.89 | 0.001857 | 11.35 | 246.79 | 47.84 | 0.88 |
| NDC CL | 900 | 500-yr | 5000.00 | 5095.12 | 5106.36 | | 5108.40 | 0.001252 | 11.44 | 437.18 | 61.87 | 0.76 |
| | | | | | | | | | | | | |
| NDC CL | 850 | 10-yr | 1000.00 | 5094.91 | 5099.08 | 5099.08 | 5100.62 | 0.002847 | 9.95 | 100.51 | 33.26 | 1.01 |
| NDC CL | 850 | 100-yr | 2800.00 | 5094.91 | 5102.93 | | 5104.75 | 0.001630 | 10.83 | 258.63 | 48.86 | 0.83 |
| NDC CL | 850 | 500-yr | 5000.00 | 5094.91 | 5106.40 | | 5108.29 | 0.001140 | 11.05 | 452.58 | 62.94 | 0.73 |
| | | | | | | | | | | | | |
| NDC CL | 800 | 10-yr | 1000.00 | 5094.79 | 5098.91 | 5098.91 | 5100.43 | 0.002840 | 9.91 | 100.87 | 33.47 | 1.01 |
| NDC CL | 800 | 100-yr | 2800.00 | 5094.79 | 5102.95 | | 5104.63 | 0.001467 | 10.40 | 269.34 | 49.91 | 0.79 |
| NDC CL | 800 | 500-yr | 5000.00 | 5094.79 | 5106.43 | | 5108.20 | 0.001048 | 10.70 | 467.50 | 64.07 | 0.70 |
| | | | | | | | | | | | | |
| NDC CL | 750 | 10-yr | 1000.00 | 5094.50 | 5098.95 | 5098.67 | 5100.22 | 0.002198 | 9.06 | 110.40 | 34.57 | 0.89 |
| NDC CL | 750 | 100-yr | 2800.00 | 5094.50 | 5103.00 | | 5104.51 | 0.001266 | 9.85 | 284.29 | 51.15 | 0.74 |
| NDC CL | 750 | 500-yr | 5000.00 | 5094.50 | 5106.46 | | 5108.12 | 0.000929 | 10.34 | 483.64 | 62.78 | 0.66 |
| | | | | | | | | | | | | |
| NDC CL | 700 | 10-yr | 1000.00 | 5094.38 | 5098.93 | | 5100.08 | 0.001915 | 8.62 | 116.05 | 35.34 | 0.84 |
| NDC CL | 700 | 100-yr | 2800.00 | 5094.38 | 5103.02 | | 5104.42 | 0.001142 | 9.49 | 294.91 | 51.87 | 0.70 |
| NDC CL | 700 | 500-yr | 5000.00 | 5094.38 | 5106.41 | | 5108.07 | 0.000894 | 10.34 | 483.78 | 59.18 | 0.64 |
| | | | | | | | | | | | | |
| NDC CL | 650 | 10-yr | 1000.00 | 5094.02 | 5099.06 | | 5099.92 | 0.001267 | 7.40 | 135.15 | 37.78 | 0.69 |
| NDC CL | 650 | 100-yr | 2800.00 | 5094.02 | 5103.08 | | 5104.32 | 0.000915 | 8.92 | 313.73 | 49.24 | 0.62 |
| NDC CL | 650 | 500-yr | 5000.00 | 5094.02 | 5106.46 | | 5107.99 | 0.000989 | 9.90 | 504.85 | 70.85 | 0.65 |
| | | | | | | | | | | | | |
| NDC CL | 600 | 10-yr | 1000.00 | 5093.73 | 5099.11 | 5097.84 | 5099.82 | 0.000977 | 6.75 | 148.14 | 39.28 | 0.61 |
| NDC CL | 600 | 100-yr | 2800.00 | 5093.73 | 5103.10 | 5100.80 | 5104.26 | 0.000818 | 8.64 | 324.07 | 48.30 | 0.59 |
| NDC CL | 600 | 500-yr | 5000.00 | 5093.73 | 5106.53 | 5103.31 | 5107.89 | 0.000825 | 9.37 | 533.35 | 70.60 | 0.60 |
| | | | | | | | | | | | | |
| NDC CL | 582 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| NDC CL | 450 | 10-yr | 1000.00 | 5093.24 | 5097.38 | 5097.38 | 5098.91 | 0.002844 | 9.90 | 101.00 | 33.61 | 1.01 |
| NDC CL | 450 | 100-yr | 2800.00 | 5093.24 | 5100.37 | 5100.37 | 5102.95 | 0.002524 | 12.89 | 217.17 | 42.64 | 1.01 |
| NDC CL | 450 | 500-yr | 5000.00 | 5093.24 | 5102.93 | 5102.93 | 5106.44 | 0.002407 | 15.03 | 332.66 | 47.72 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 400 | 10-yr | 1000.00 | 5092.93 | 5097.25 | 5097.08 | 5098.63 | 0.002433 | 9.45 | 105.82 | 33.65 | 0.94 |
| NDC CL | 400 | 100-yr | 2800.00 | 5092.93 | 5100.53 | 5100.16 | 5102.69 | 0.001997 | 11.81 | 237.17 | 45.61 | 0.91 |
| NDC CL | 400 | 500-yr | 5000.00 | 5092.93 | 5102.62 | 5102.62 | 5106.04 | 0.002347 | 14.84 | 336.90 | 49.83 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 350 | 10-yr | 1000.00 | 5092.55 | 5097.26 | | 5098.47 | 0.002005 | 8.84 | 113.10 | 34.08 | 0.86 |
| NDC CL | 350 | 100-yr | 2800.00 | 5092.55 | 5100.55 | 5099.99 | 5102.55 | 0.001826 | 11.32 | 247.25 | 47.34 | 0.87 |
| NDC CL | 350 | 500-yr | 5000.00 | 5092.55 | 5102.89 | 5102.52 | 5105.76 | 0.001935 | 13.61 | 367.46 | 55.01 | 0.93 |
| | | | | | | | | | | | | |
| NDC CL | 300 | 10-yr | 1000.00 | 5092.48 | 5097.13 | 5096.78 | 5098.37 | 0.002081 | 8.95 | 111.71 | 33.96 | 0.87 |
| NDC CL | 300 | 100-yr | 2800.00 | 5092.48 | 5099.92 | 5099.92 | 5102.39 | 0.002452 | 12.61 | 221.98 | 45.14 | 1.00 |
| NDC CL | 300 | 500-yr | 5000.00 | 5092.48 | 5102.46 | 5102.46 | 5105.64 | 0.002276 | 14.30 | 349.58 | 55.37 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 250 | 10-yr | 1000.00 | 5092.48 | 5096.68 | 5096.68 | 5098.22 | 0.002836 | 9.96 | 100.45 | 32.96 | 1.01 |
| NDC CL | 250 | 100-yr | 2800.00 | 5092.48 | 5099.78 | 5099.78 | 5102.26 | 0.002465 | 12.61 | 222.05 | 45.43 | 1.01 |
| NDC CL | 250 | 500-yr | 5000.00 | 5092.48 | 5102.31 | 5102.31 | 5105.49 | 0.002285 | 14.31 | 349.51 | 55.57 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 200 | 10-yr | 1000.00 | 5092.33 | 5096.54 | 5096.54 | 5098.07 | 0.002838 | 9.93 | 100.73 | 33.25 | 1.01 |
| NDC CL | 200 | 100-yr | 2800.00 | 5092.33 | 5099.62 | 5099.62 | 5102.08 | 0.002473 | 12.60 | 222.19 | 45.65 | 1.01 |
| NDC CL | 200 | 500-yr | 5000.00 | 5092.33 | 5102.13 | 5102.13 | 5105.31 | 0.002289 | 14.30 | 349.74 | 55.78 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 150 | 10-yr | 1000.00 | 5092.24 | 5096.37 | 5096.37 | 5097.89 | 0.002837 | 9.89 | 101.08 | 33.67 | 1.01 |
| NDC CL | 150 | 100-yr | 2800.00 | 5092.24 | 5099.44 | 5099.44 | 5101.88 | 0.002442 | 12.53 | 223.39 | 45.97 | 1.00 |
| NDC CL | 150 | 500-yr | 5000.00 | 5092.24 | 5101.93 | 5101.93 | 5105.10 | 0.002286 | 14.29 | 349.90 | 55.91 | 1.01 |
| | | | | | | | | | | | | |

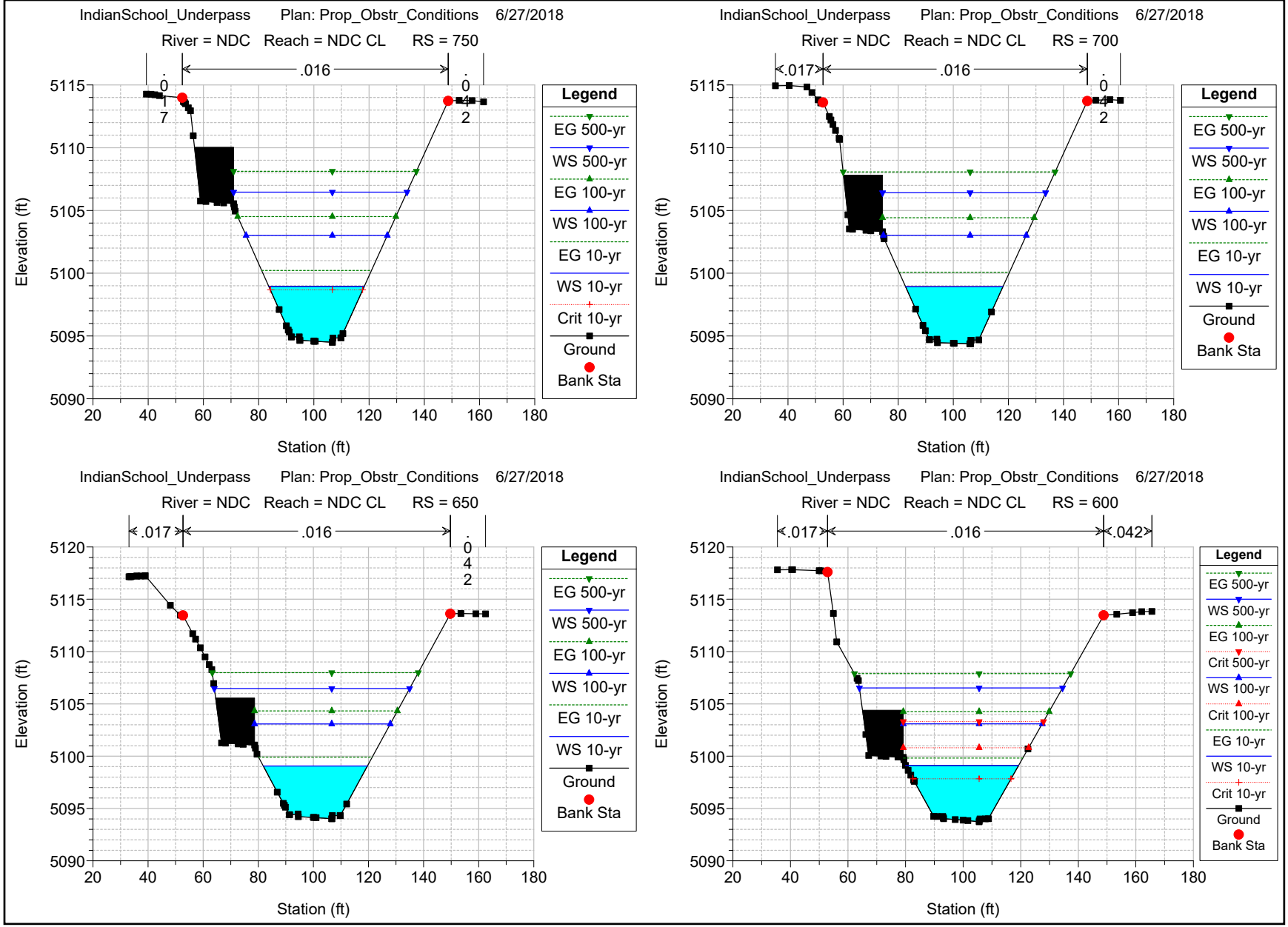
HEC-RAS Plan: Obstr_Cond River: NDC Reach: NDC CL (Continued)

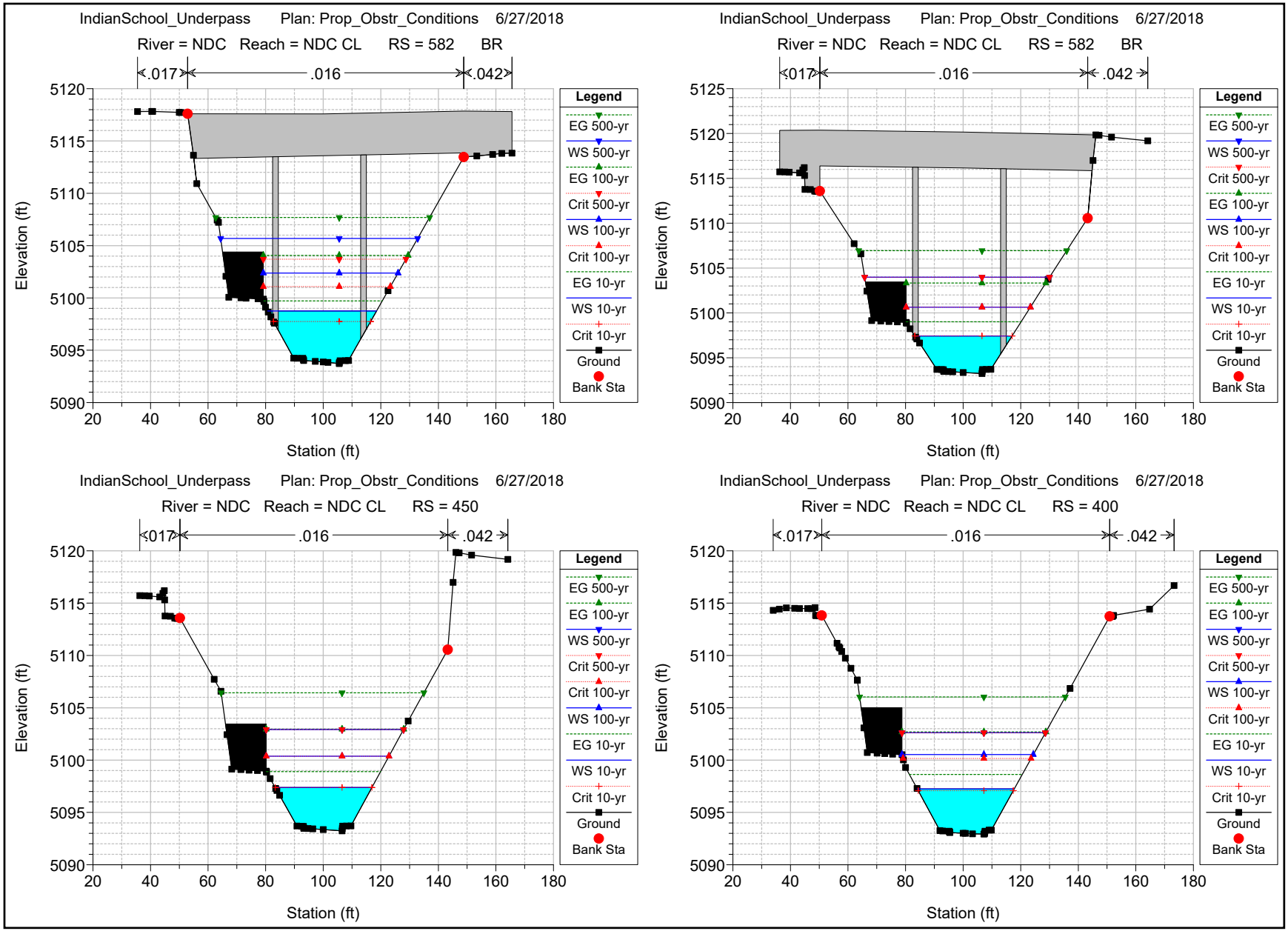
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 100 | 10-yr | 1000.00 | 5092.03 | 5096.16 | 5096.16 | 5097.69 | 0.002830 | 9.91 | 100.95 | 33.54 | 1.01 |
| NDC CL | 100 | 100-yr | 2800.00 | 5092.03 | 5099.23 | 5099.23 | 5101.69 | 0.002456 | 12.58 | 222.62 | 45.81 | 1.01 |
| NDC CL | 100 | 500-yr | 5000.00 | 5092.03 | 5101.73 | 5101.73 | 5104.91 | 0.002281 | 14.30 | 349.77 | 55.81 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 88.79 | 10-yr | 1000.00 | 5091.98 | 5096.11 | 5096.11 | 5097.63 | 0.002817 | 9.89 | 101.11 | 33.56 | 1.00 |
| NDC CL | 88.79 | 100-yr | 2800.00 | 5091.98 | 5099.18 | 5099.18 | 5101.63 | 0.002454 | 12.58 | 222.66 | 45.82 | 1.01 |
| NDC CL | 88.79 | 500-yr | 5000.00 | 5091.98 | 5101.68 | 5101.68 | 5104.85 | 0.002280 | 14.29 | 349.90 | 55.83 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 50 | 10-yr | 1000.00 | 5091.85 | 5095.98 | 5095.97 | 5097.48 | 0.002779 | 9.83 | 101.75 | 33.73 | 1.00 |
| NDC CL | 50 | 100-yr | 2800.00 | 5091.85 | 5099.02 | 5099.02 | 5101.47 | 0.002459 | 12.58 | 222.66 | 45.88 | 1.01 |
| NDC CL | 50 | 500-yr | 5000.00 | 5091.85 | 5101.52 | 5101.52 | 5104.69 | 0.002280 | 14.28 | 350.03 | 55.89 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 0 | 10-yr | 1000.00 | 5091.70 | 5095.83 | 5095.83 | 5097.34 | 0.002814 | 9.87 | 101.27 | 33.66 | 1.00 |
| NDC CL | 0 | 100-yr | 2800.00 | 5091.70 | 5098.88 | 5098.88 | 5101.33 | 0.002453 | 12.56 | 222.91 | 45.93 | 1.01 |
| NDC CL | 0 | 500-yr | 5000.00 | 5091.70 | 5101.38 | 5101.38 | 5104.55 | 0.002282 | 14.28 | 350.04 | 55.95 | 1.01 |

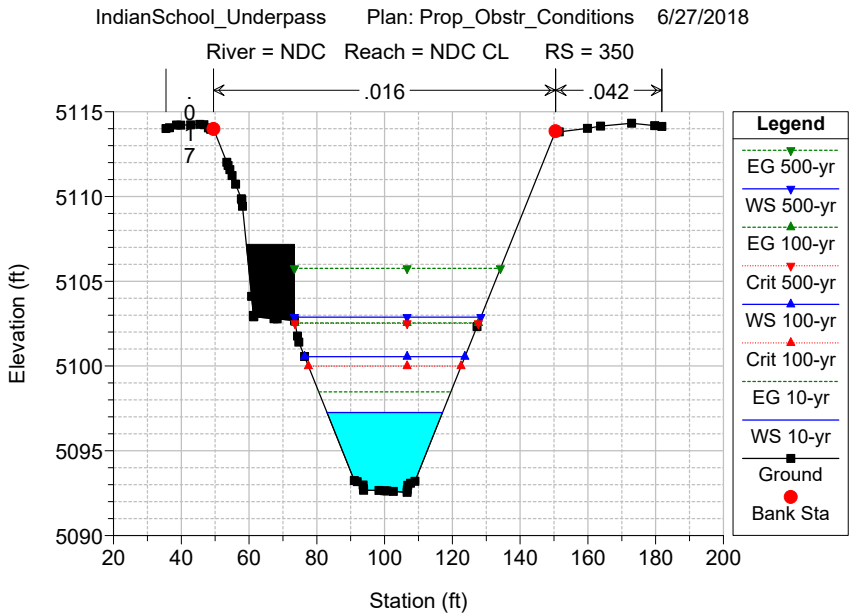

IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/25/2018
NDC NDC CL
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Elevation (ft)
5120
5115
5110
5105
5100
5095
5090
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

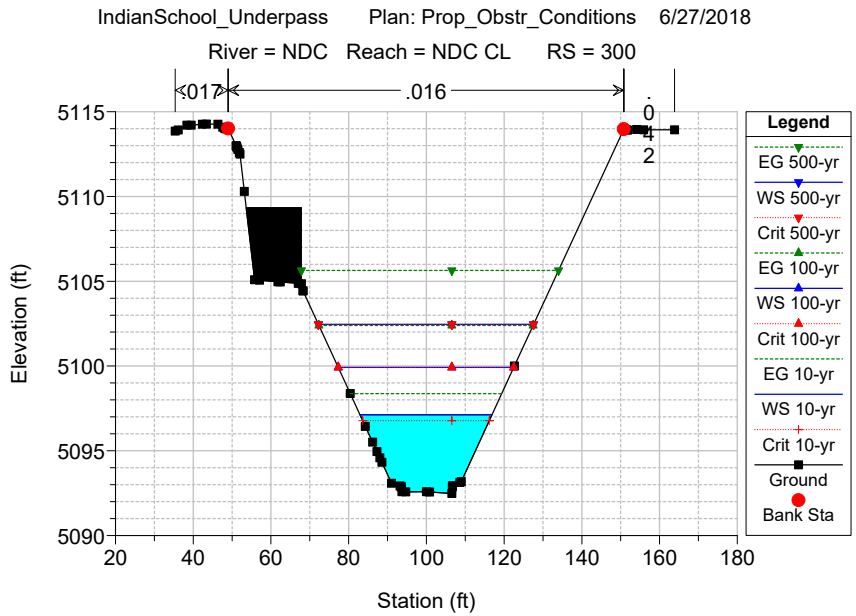

IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1090
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1050
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 1000
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 950
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

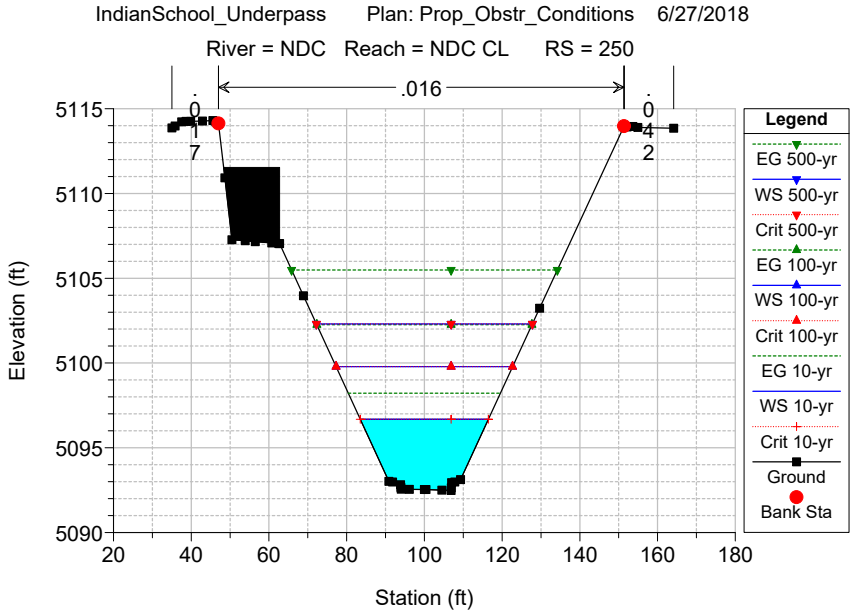

IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 944.69
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 900
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 850
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 800
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

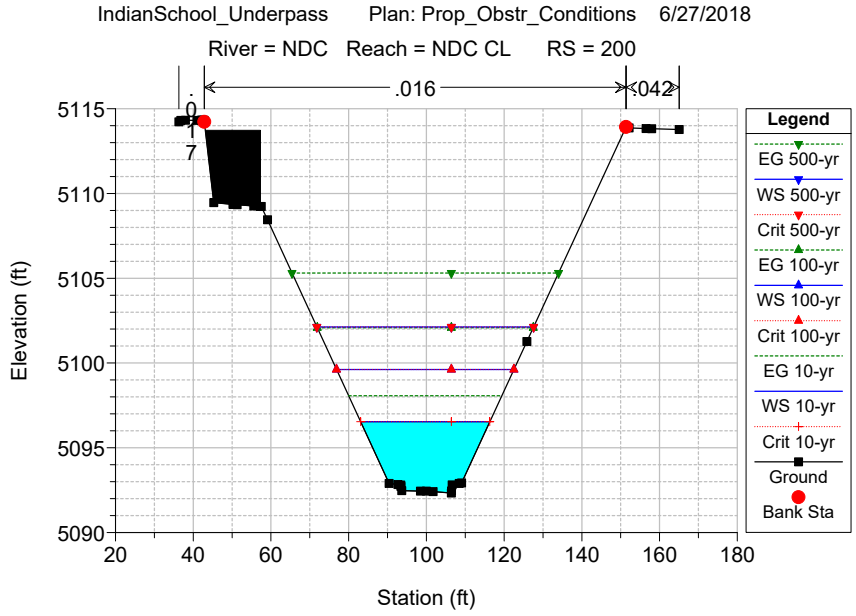

IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 750
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 700
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 650
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 600
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

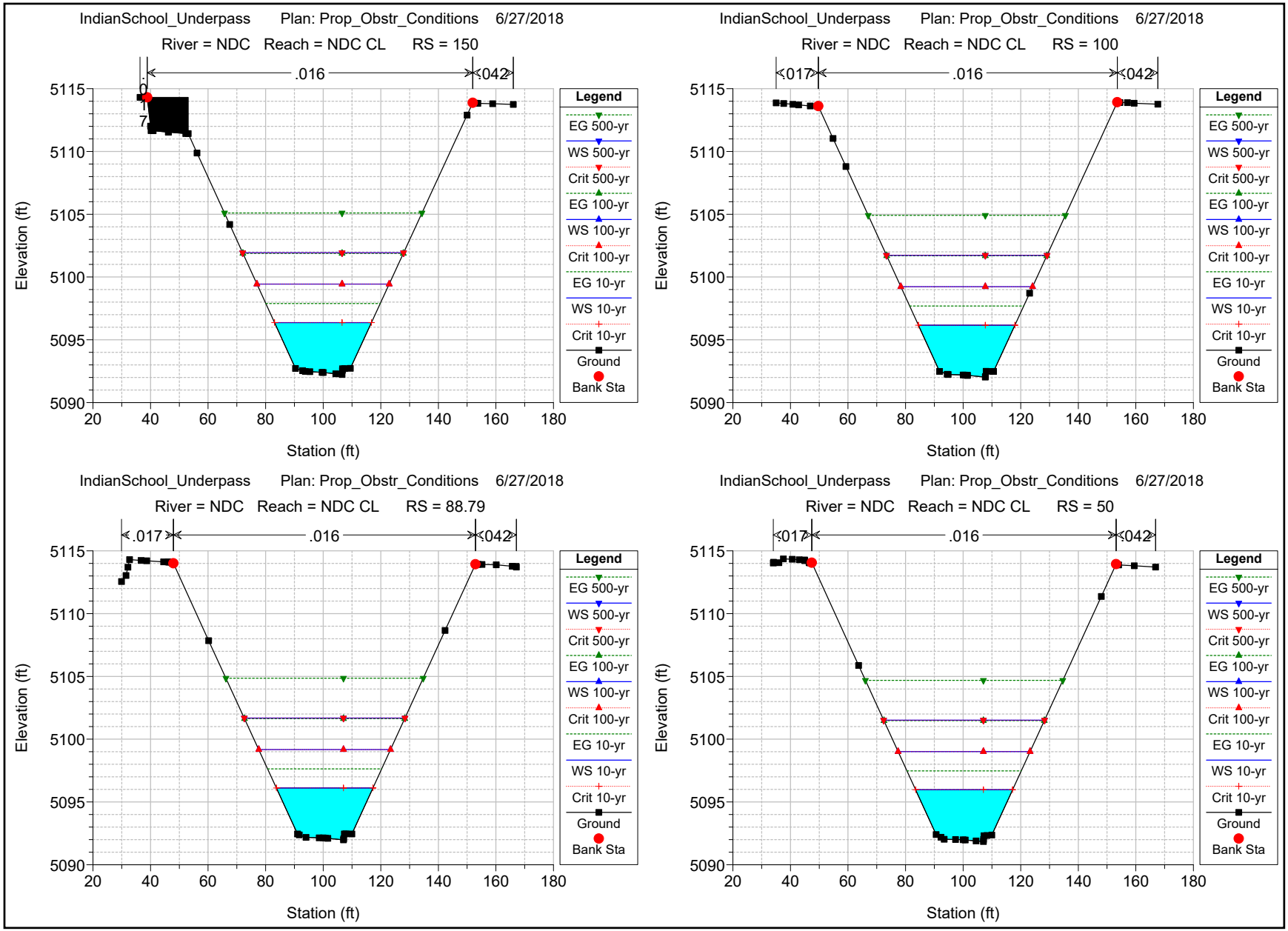

IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 450
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
WS 500-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 400
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
WS 500-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

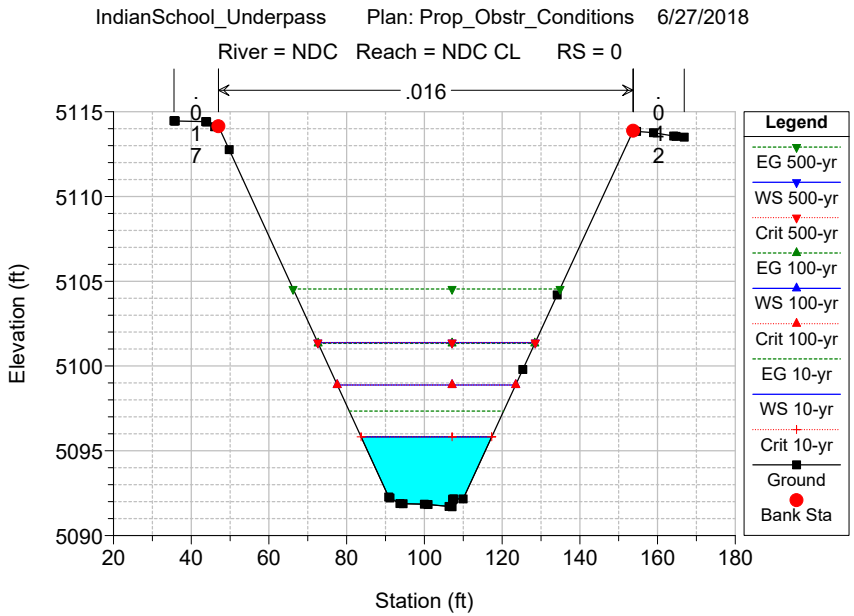

IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 350
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 300
.017
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 250
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 200
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 150
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 100
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 88.79
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 50
.017
.016
.042
Elevation (ft)
Station (ft)


IndianSchool_Underpass Plan: Prop_Obstr_Conditions 6/27/2018
River = NDC Reach = NDC CL RS = 0
.016
.017
.042
Elevation (ft)
Station (ft)
5115
5110
5105
5100
5095
5090
20
40
60
80
100
120
140
160
180
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

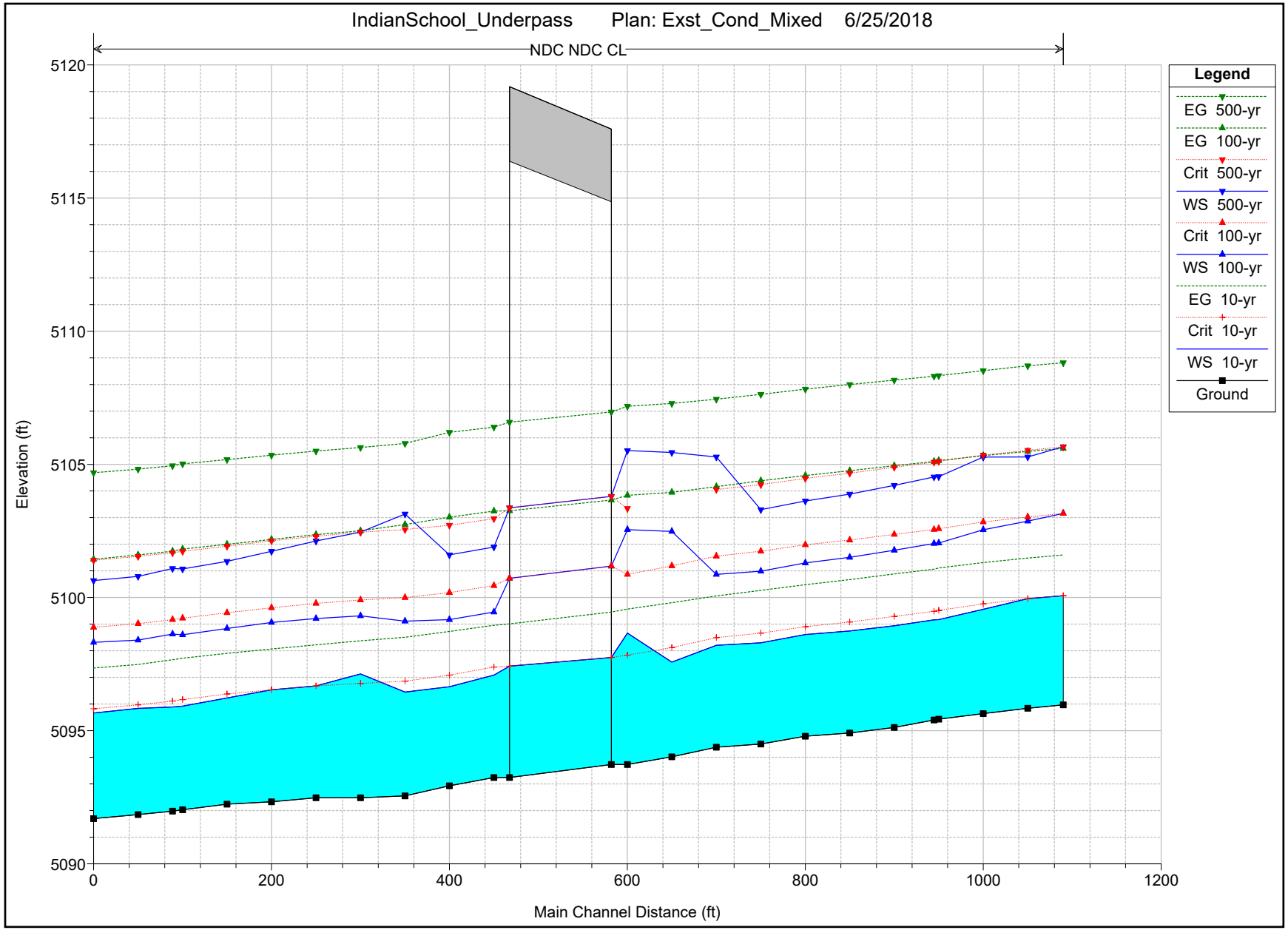
# Existing Conditions - Mixed Flow Regime

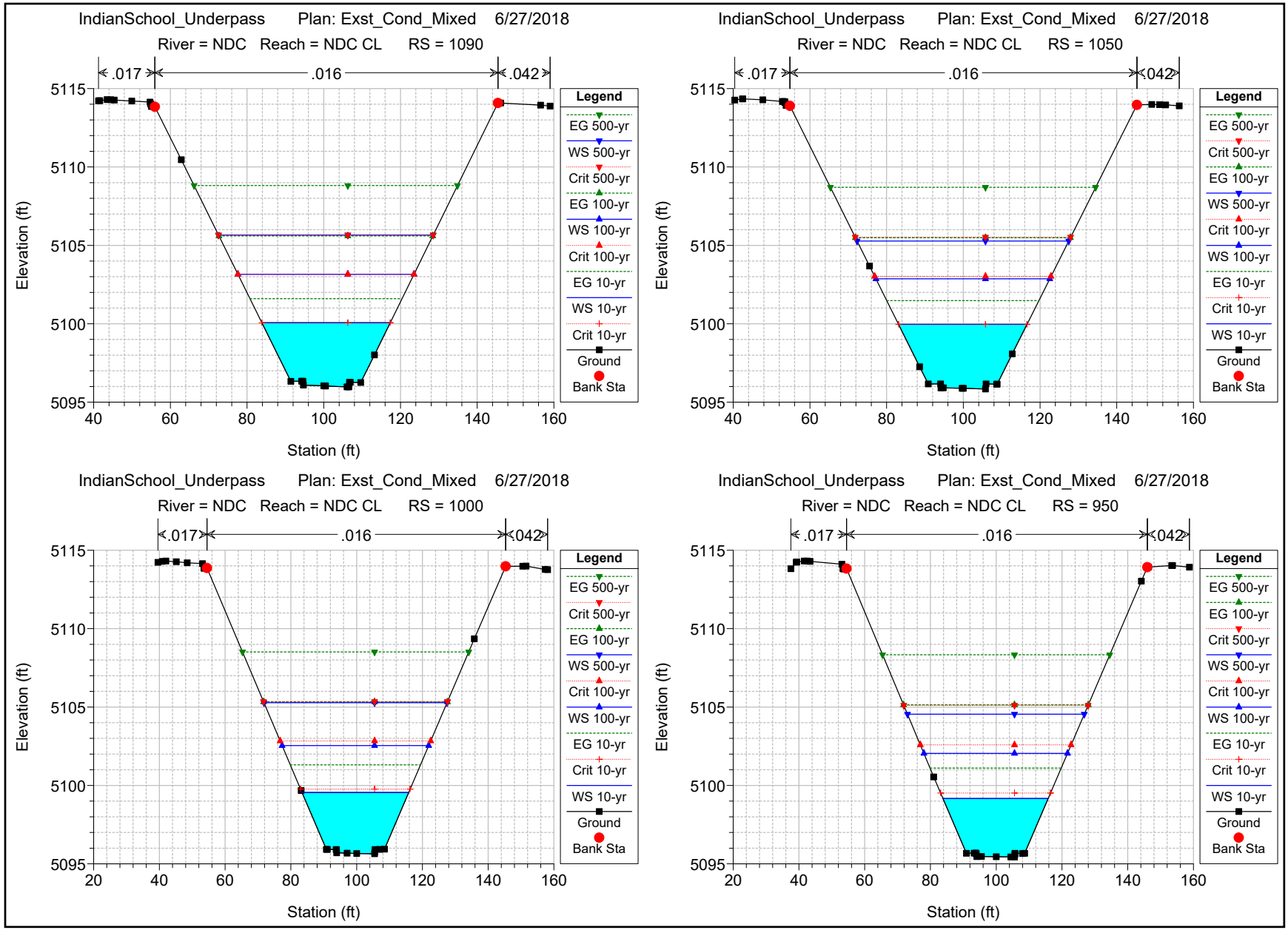
HEC-RAS Plan: Exst_Cond_Mix River: NDC Reach: NDC CL

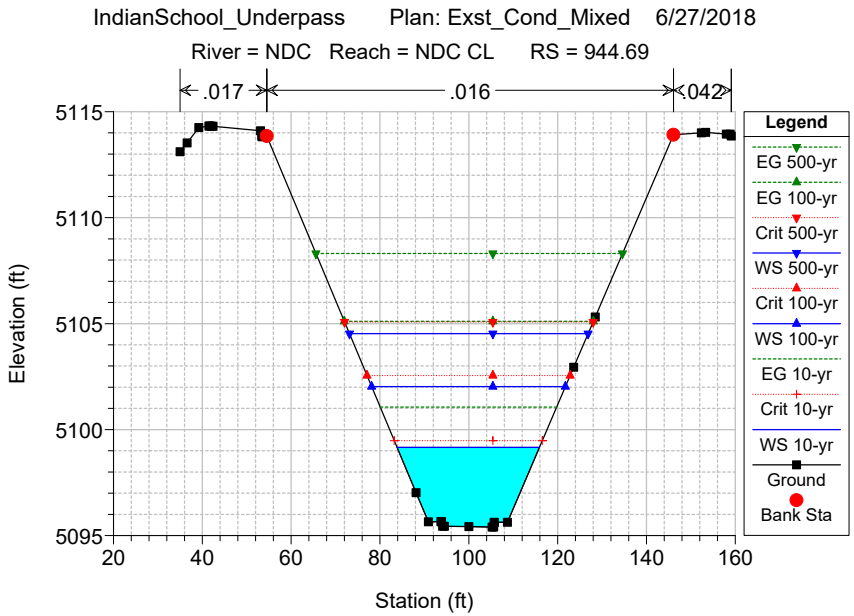
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 1090 | 10-yr | 1000.00 | 5095.97 | 5100.07 | 5100.07 | 5101.60 | 0.002841 | 9.92 | 100.81 | 33.48 | 1.01 |
| NDC CL | 1090 | 100-yr | 2800.00 | 5095.97 | 5103.16 | 5103.16 | 5105.60 | 0.002440 | 12.54 | 223.30 | 45.91 | 1.00 |
| NDC CL | 1090 | 500-yr | 5000.00 | 5095.97 | 5105.66 | 5105.66 | 5108.82 | 0.002268 | 14.25 | 350.86 | 55.99 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 1050 | 10-yr | 1000.00 | 5095.84 | 5099.96 | 5099.96 | 5101.48 | 0.002828 | 9.90 | 100.99 | 33.46 | 1.00 |
| NDC CL | 1050 | 100-yr | 2800.00 | 5095.84 | 5102.87 | 5103.02 | 5105.49 | 0.002693 | 12.98 | 215.72 | 45.35 | 1.05 |
| NDC CL | 1050 | 500-yr | 5000.00 | 5095.84 | 5105.28 | 5105.53 | 5108.70 | 0.002546 | 14.84 | 336.87 | 55.18 | 1.06 |
| | | | | | | | | | | | | |
| NDC CL | 1000 | 10-yr | 1000.00 | 5095.64 | 5099.56 | 5099.76 | 5101.31 | 0.003434 | 10.63 | 94.06 | 32.48 | 1.10 |
| NDC CL | 1000 | 100-yr | 2800.00 | 5095.64 | 5102.54 | 5102.84 | 5105.33 | 0.002916 | 13.39 | 209.16 | 44.59 | 1.09 |
| NDC CL | 1000 | 500-yr | 5000.00 | 5095.64 | 5105.27 | 5105.35 | 5108.52 | 0.002355 | 14.45 | 346.12 | 55.67 | 1.02 |
| | | | | | | | | | | | | |
| NDC CL | 950 | 10-yr | 1000.00 | 5095.43 | 5099.17 | 5099.52 | 5101.11 | 0.003954 | 11.17 | 89.55 | 32.01 | 1.18 |
| NDC CL | 950 | 100-yr | 2800.00 | 5095.43 | 5102.05 | 5102.59 | 5105.14 | 0.003371 | 14.11 | 198.46 | 43.69 | 1.17 |
| NDC CL | 950 | 500-yr | 5000.00 | 5095.43 | 5104.54 | 5105.11 | 5108.33 | 0.002910 | 15.62 | 320.09 | 53.77 | 1.13 |
| | | | | | | | | | | | | |
| NDC CL | 944.69 | 10-yr | 1000.00 | 5095.40 | 5099.16 | 5099.48 | 5101.07 | 0.003839 | 11.06 | 90.41 | 32.06 | 1.16 |
| NDC CL | 944.69 | 100-yr | 2800.00 | 5095.40 | 5102.03 | 5102.55 | 5105.11 | 0.003345 | 14.08 | 198.85 | 43.64 | 1.16 |
| NDC CL | 944.69 | 500-yr | 5000.00 | 5095.40 | 5104.53 | 5105.08 | 5108.31 | 0.002895 | 15.60 | 320.53 | 53.75 | 1.13 |
| | | | | | | | | | | | | |
| NDC CL | 900 | 10-yr | 1000.00 | 5095.12 | 5098.94 | 5099.29 | 5100.89 | 0.003984 | 11.19 | 89.37 | 31.87 | 1.18 |
| NDC CL | 900 | 100-yr | 2800.00 | 5095.12 | 5101.77 | 5102.37 | 5104.95 | 0.003499 | 14.30 | 195.87 | 43.32 | 1.19 |
| NDC CL | 900 | 500-yr | 5000.00 | 5095.12 | 5104.21 | 5104.89 | 5108.17 | 0.003087 | 15.95 | 313.39 | 53.16 | 1.16 |
| | | | | | | | | | | | | |
| NDC CL | 850 | 10-yr | 1000.00 | 5094.91 | 5098.75 | 5099.08 | 5100.67 | 0.003920 | 11.14 | 89.75 | 31.93 | 1.17 |
| NDC CL | 850 | 100-yr | 2800.00 | 5094.91 | 5101.51 | 5102.16 | 5104.76 | 0.003614 | 14.48 | 193.40 | 43.12 | 1.21 |
| NDC CL | 850 | 500-yr | 5000.00 | 5094.91 | 5103.88 | 5104.67 | 5108.00 | 0.003250 | 16.27 | 307.33 | 52.75 | 1.19 |
| | | | | | | | | | | | | |
| NDC CL | 800 | 10-yr | 1000.00 | 5094.79 | 5098.61 | 5098.90 | 5100.48 | 0.003788 | 10.98 | 91.11 | 32.27 | 1.15 |
| NDC CL | 800 | 100-yr | 2800.00 | 5094.79 | 5101.30 | 5101.98 | 5104.58 | 0.003674 | 14.53 | 192.67 | 43.22 | 1.21 |
| NDC CL | 800 | 500-yr | 5000.00 | 5094.79 | 5103.62 | 5104.48 | 5107.83 | 0.003361 | 16.44 | 304.11 | 52.68 | 1.21 |
| | | | | | | | | | | | | |
| NDC CL | 750 | 10-yr | 1000.00 | 5094.50 | 5098.30 | 5098.67 | 5100.27 | 0.004060 | 11.26 | 88.82 | 31.91 | 1.19 |
| NDC CL | 750 | 100-yr | 2800.00 | 5094.50 | 5100.99 | 5101.74 | 5104.38 | 0.003842 | 14.78 | 189.51 | 42.91 | 1.24 |
| NDC CL | 750 | 500-yr | 5000.00 | 5094.50 | 5103.30 | 5104.24 | 5107.63 | 0.003506 | 16.70 | 299.43 | 52.34 | 1.23 |
| | | | | | | | | | | | | |
| NDC CL | 700 | 10-yr | 1000.00 | 5094.38 | 5098.21 | 5098.49 | 5100.06 | 0.003737 | 10.93 | 91.51 | 32.35 | 1.15 |
| NDC CL | 700 | 100-yr | 2800.00 | 5094.38 | 5100.87 | 5101.55 | 5104.16 | 0.003698 | 14.56 | 192.31 | 43.31 | 1.22 |
| NDC CL | 700 | 500-yr | 5000.00 | 5094.38 | 5105.28 | 5104.05 | 5107.45 | 0.001377 | 11.82 | 423.09 | 61.43 | 0.79 |
| | | | | | | | | | | | | |
| NDC CL | 650 | 10-yr | 1000.00 | 5094.02 | 5097.58 | 5098.12 | 5099.81 | 0.004946 | 11.98 | 83.46 | 31.69 | 1.30 |
| NDC CL | 650 | 100-yr | 2800.00 | 5094.02 | 5102.48 | 5101.19 | 5103.95 | 0.001229 | 9.71 | 288.28 | 51.79 | 0.73 |
| NDC CL | 650 | 500-yr | 5000.00 | 5094.02 | 5105.45 | | 5107.29 | 0.001103 | 10.87 | 459.84 | 63.93 | 0.71 |
| | | | | | | | | | | | | |
| NDC CL | 600 | 10-yr | 1000.00 | 5093.73 | 5098.66 | 5097.84 | 5099.57 | 0.001374 | 7.63 | 131.14 | 37.48 | 0.72 |
| NDC CL | 600 | 100-yr | 2800.00 | 5093.73 | 5102.55 | 5100.87 | 5103.84 | 0.001026 | 9.11 | 307.52 | 53.31 | 0.67 |
| NDC CL | 600 | 500-yr | 5000.00 | 5093.73 | 5105.52 | 5103.34 | 5107.18 | 0.000956 | 10.33 | 483.90 | 65.42 | 0.67 |
| | | | | | | | | | | | | |
| NDC CL | 582 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| NDC CL | 450 | 10-yr | 1000.00 | 5093.24 | 5097.08 | 5097.39 | 5098.96 | 0.003809 | 10.97 | 91.12 | 32.40 | 1.15 |
| NDC CL | 450 | 100-yr | 2800.00 | 5093.24 | 5099.46 | 5100.45 | 5103.25 | 0.004487 | 15.62 | 179.27 | 41.97 | 1.33 |
| NDC CL | 450 | 500-yr | 5000.00 | 5093.24 | 5101.90 | 5102.96 | 5106.40 | 0.003692 | 17.02 | 293.71 | 51.81 | 1.26 |
| | | | | | | | | | | | | |
| NDC CL | 400 | 10-yr | 1000.00 | 5092.93 | 5096.65 | 5097.09 | 5098.73 | 0.004294 | 11.56 | 86.54 | 31.30 | 1.23 |
| NDC CL | 400 | 100-yr | 2800.00 | 5092.93 | 5099.17 | 5100.18 | 5103.01 | 0.004493 | 15.72 | 178.07 | 41.39 | 1.34 |
| NDC CL | 400 | 500-yr | 5000.00 | 5092.93 | 5101.60 | 5102.71 | 5106.20 | 0.003758 | 17.21 | 290.51 | 51.17 | 1.27 |
| | | | | | | | | | | | | |
| NDC CL | 350 | 10-yr | 1000.00 | 5092.55 | 5096.45 | 5096.86 | 5098.51 | 0.004202 | 11.51 | 86.87 | 30.83 | 1.21 |
| NDC CL | 350 | 100-yr | 2800.00 | 5092.55 | 5099.11 | 5100.00 | 5102.74 | 0.004140 | 15.28 | 183.26 | 41.55 | 1.28 |
| NDC CL | 350 | 500-yr | 5000.00 | 5092.55 | 5103.14 | 5102.55 | 5105.79 | 0.001777 | 13.06 | 382.98 | 57.72 | 0.89 |
| | | | | | | | | | | | | |
| NDC CL | 300 | 10-yr | 1000.00 | 5092.48 | 5097.13 | 5096.78 | 5098.37 | 0.002081 | 8.95 | 111.69 | 33.96 | 0.87 |
| NDC CL | 300 | 100-yr | 2800.00 | 5092.48 | 5099.31 | 5099.91 | 5102.50 | 0.003472 | 14.32 | 195.47 | 42.73 | 1.18 |
| NDC CL | 300 | 500-yr | 5000.00 | 5092.48 | 5102.46 | 5102.46 | 5105.64 | 0.002275 | 14.30 | 349.65 | 55.38 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 250 | 10-yr | 1000.00 | 5092.48 | 5096.68 | 5096.68 | 5098.22 | 0.002840 | 9.96 | 100.40 | 32.96 | 1.01 |
| NDC CL | 250 | 100-yr | 2800.00 | 5092.48 | 5099.21 | 5099.78 | 5102.36 | 0.003439 | 14.24 | 196.65 | 43.12 | 1.18 |
| NDC CL | 250 | 500-yr | 5000.00 | 5092.48 | 5102.12 | 5102.30 | 5105.50 | 0.002479 | 14.74 | 339.17 | 54.82 | 1.04 |
| | | | | | | | | | | | | |
| NDC CL | 200 | 10-yr | 1000.00 | 5092.33 | 5096.54 | 5096.54 | 5098.07 | 0.002839 | 9.93 | 100.73 | 33.25 | 1.01 |
| NDC CL | 200 | 100-yr | 2800.00 | 5092.33 | 5099.07 | 5099.62 | 5102.18 | 0.003407 | 14.16 | 197.72 | 43.44 | 1.17 |
| NDC CL | 200 | 500-yr | 5000.00 | 5092.33 | 5101.74 | 5102.13 | 5105.35 | 0.002724 | 15.24 | 328.07 | 54.20 | 1.09 |
| | | | | | | | | | | | | |
| NDC CL | 150 | 10-yr | 1000.00 | 5092.24 | 5096.23 | 5096.38 | 5097.90 | 0.003257 | 10.39 | 96.28 | 33.10 | 1.07 |
| NDC CL | 150 | 100-yr | 2800.00 | 5092.24 | 5098.84 | 5099.43 | 5102.00 | 0.003485 | 14.26 | 196.32 | 43.56 | 1.18 |
| NDC CL | 150 | 500-yr | 5000.00 | 5092.24 | 5101.36 | 5101.92 | 5105.18 | 0.002945 | 15.68 | 318.80 | 53.65 | 1.13 |
| | | | | | | | | | | | | |

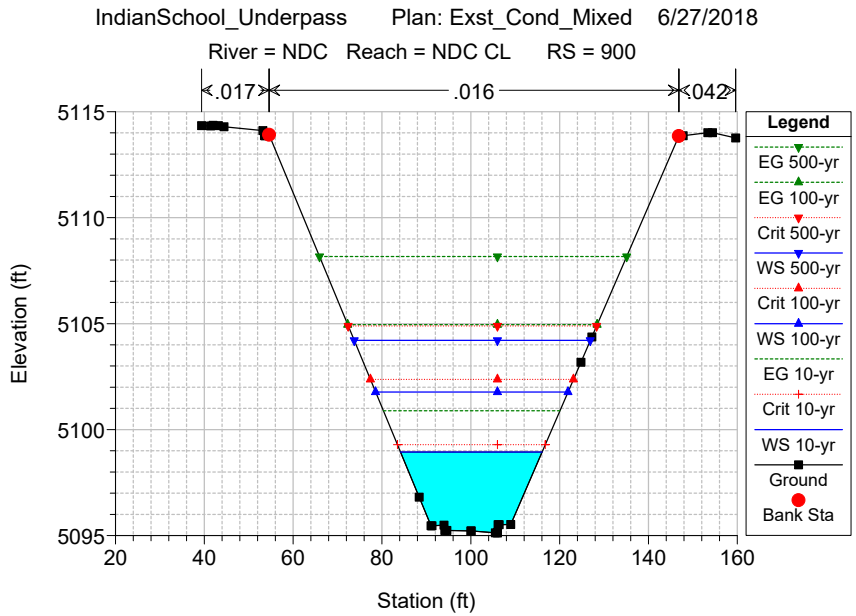
HEC-RAS Plan: Exst_Cond_Mix River: NDC Reach: NDC CL (Continued)

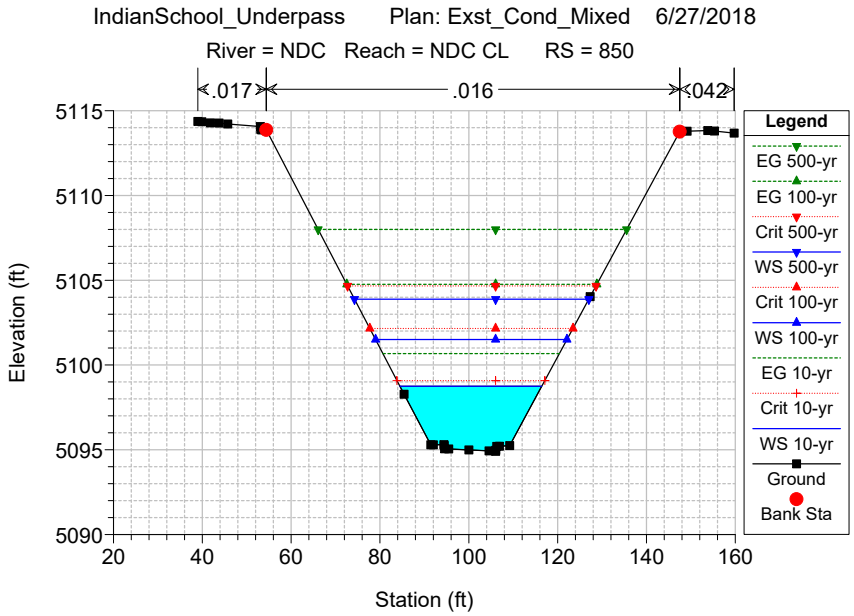
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 100 | 10-yr | 1000.00 | 5092.03 | 5095.92 | 5096.17 | 5097.72 | 0.003580 | 10.76 | 92.91 | 32.56 | 1.12 |
| NDC CL | 100 | 100-yr | 2800.00 | 5092.03 | 5098.60 | 5099.23 | 5101.82 | 0.003558 | 14.39 | 194.55 | 43.29 | 1.20 |
| NDC CL | 100 | 500-yr | 5000.00 | 5092.03 | 5101.07 | 5101.74 | 5105.02 | 0.003065 | 15.94 | 313.76 | 53.17 | 1.16 |
| | | | | | | | | | | | | |
| NDC CL | 88.79 | 10-yr | 1000.00 | 5091.98 | 5095.89 | 5096.11 | 5097.66 | 0.003502 | 10.68 | 93.61 | 32.63 | 1.11 |
| NDC CL | 88.79 | 100-yr | 2800.00 | 5091.98 | 5098.63 | 5099.17 | 5101.74 | 0.003390 | 14.15 | 197.94 | 43.57 | 1.17 |
| NDC CL | 88.79 | 500-yr | 5000.00 | 5091.98 | 5101.09 | 5101.68 | 5104.95 | 0.002970 | 15.76 | 317.33 | 53.40 | 1.14 |
| | | | | | | | | | | | | |
| NDC CL | 50 | 10-yr | 1000.00 | 5091.85 | 5095.84 | 5095.97 | 5097.49 | 0.003173 | 10.30 | 97.09 | 33.17 | 1.06 |
| NDC CL | 50 | 100-yr | 2800.00 | 5091.85 | 5098.40 | 5099.02 | 5101.60 | 0.003526 | 14.33 | 195.34 | 43.43 | 1.19 |
| NDC CL | 50 | 500-yr | 5000.00 | 5091.85 | 5100.79 | 5101.55 | 5104.82 | 0.003157 | 16.10 | 310.55 | 52.99 | 1.17 |
| | | | | | | | | | | | | |
| NDC CL | 0 | 10-yr | 1000.00 | 5091.70 | 5095.67 | 5095.83 | 5097.35 | 0.003279 | 10.42 | 95.94 | 33.02 | 1.08 |
| NDC CL | 0 | 100-yr | 2800.00 | 5091.70 | 5098.32 | 5098.88 | 5101.44 | 0.003415 | 14.17 | 197.64 | 43.67 | 1.17 |
| NDC CL | 0 | 500-yr | 5000.00 | 5091.70 | 5100.64 | 5101.40 | 5104.69 | 0.003179 | 16.14 | 309.85 | 52.99 | 1.18 |

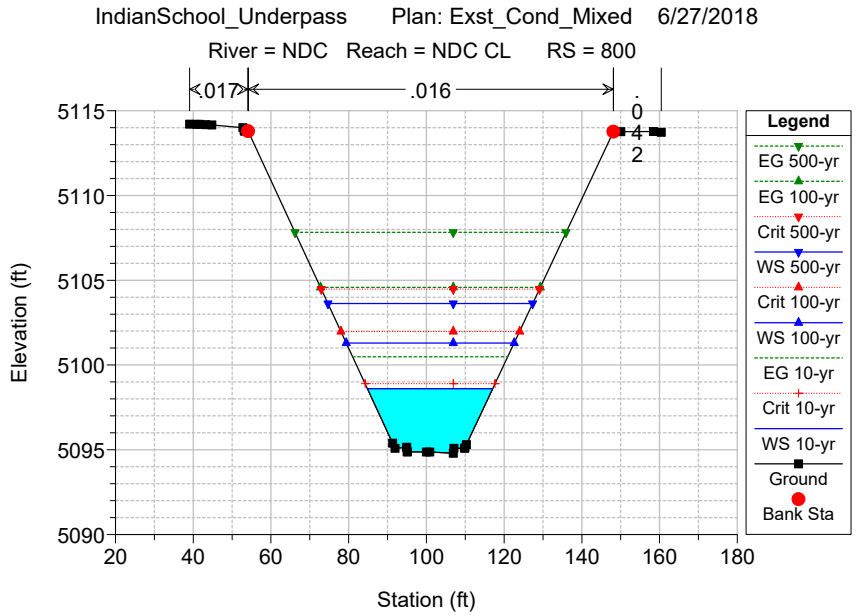

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/25/2018
NDC NDC CL
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Elevation (ft)
5120
5115
5110
5105
5100
5095
5090
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

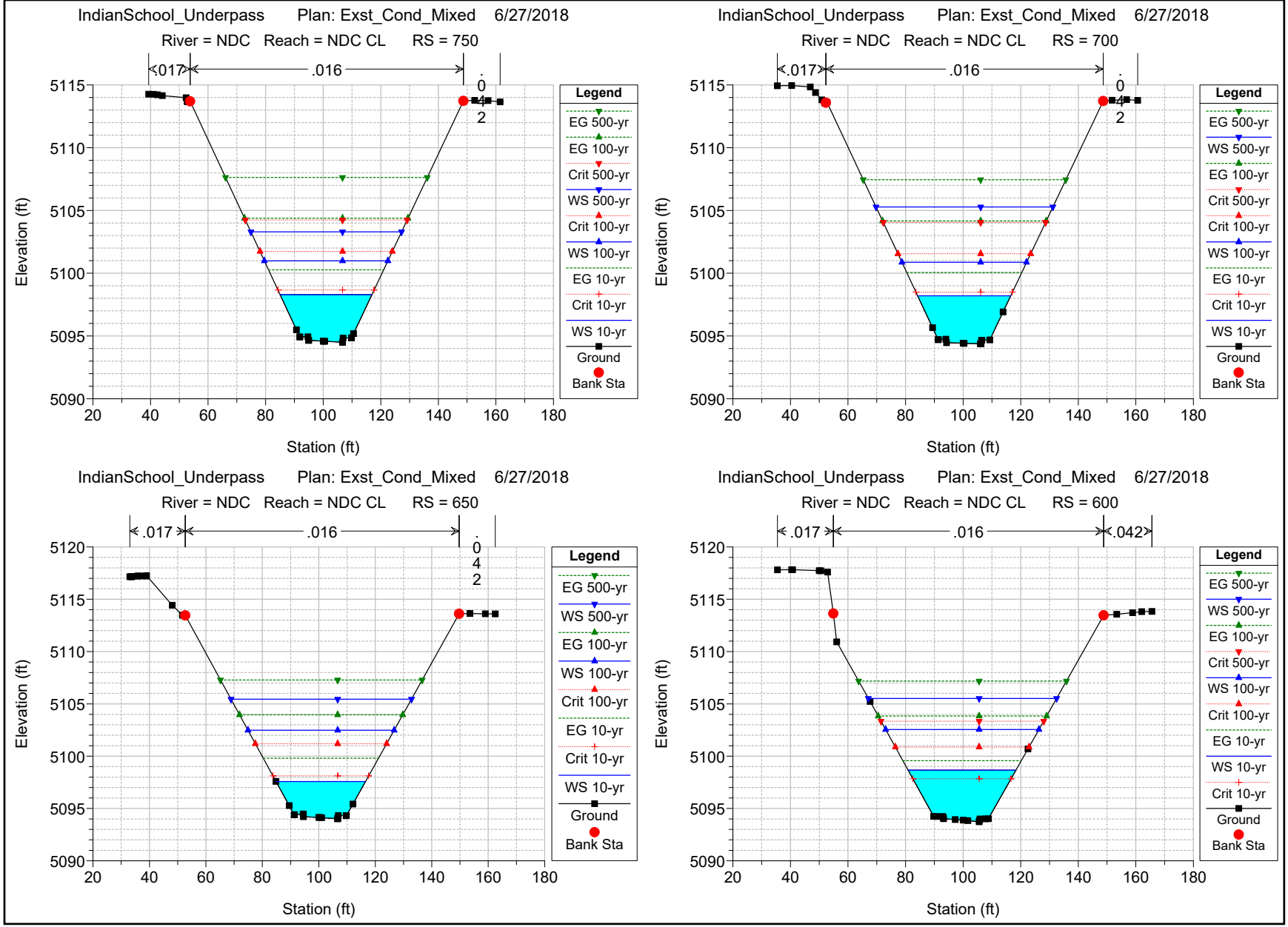

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1090
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1050
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1000
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 950
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

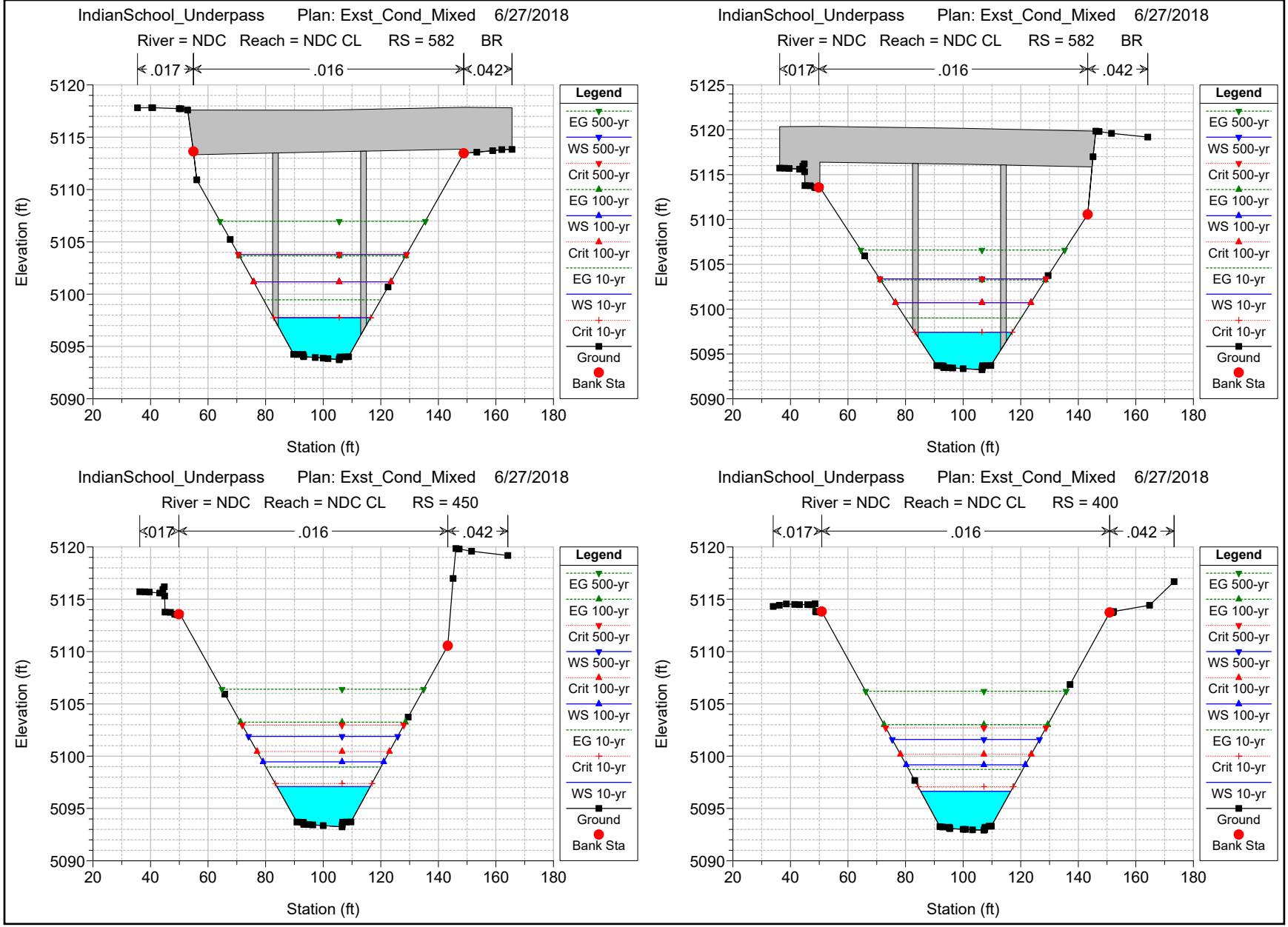

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 944.69
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

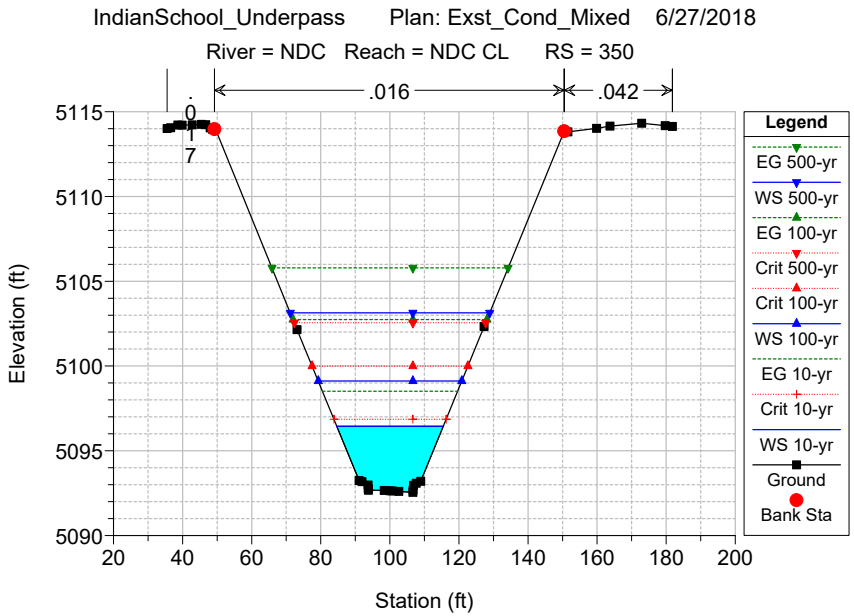

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 900
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

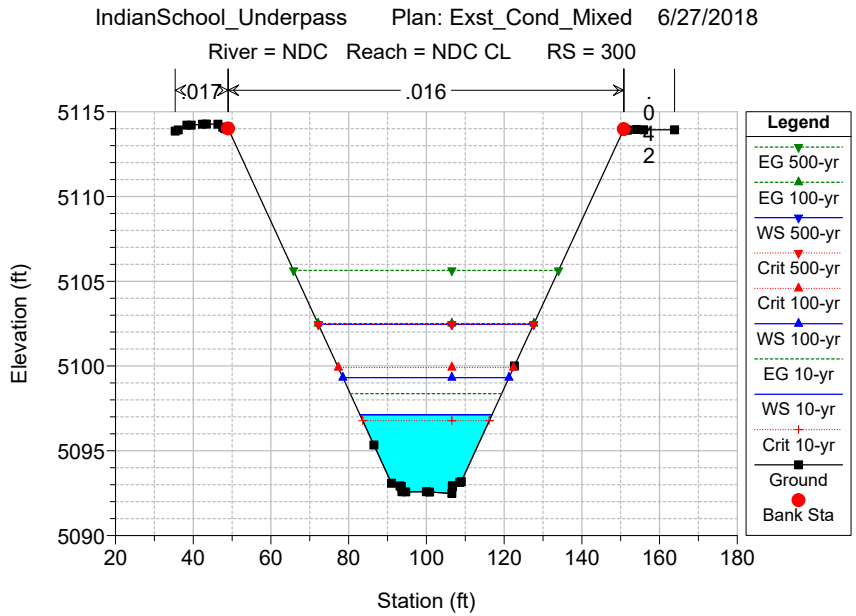

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 850
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

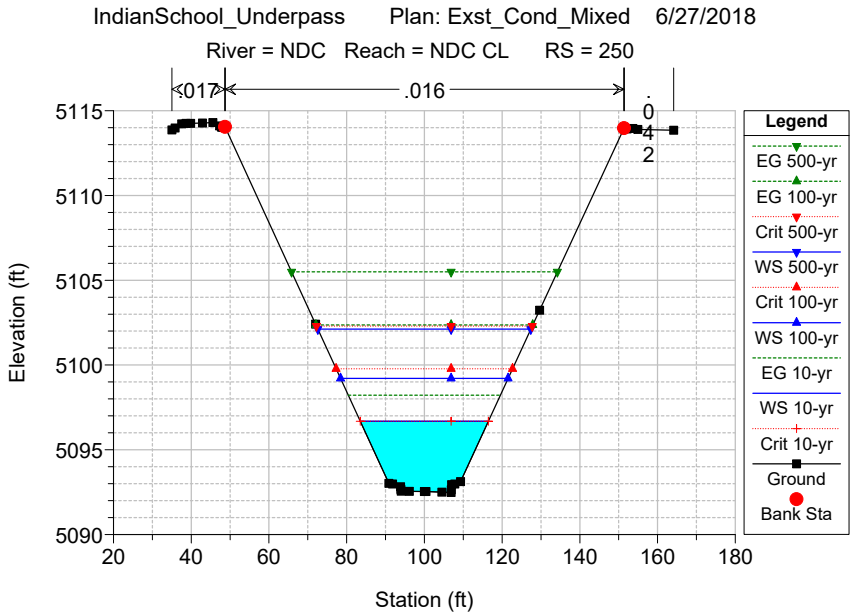

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 800
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

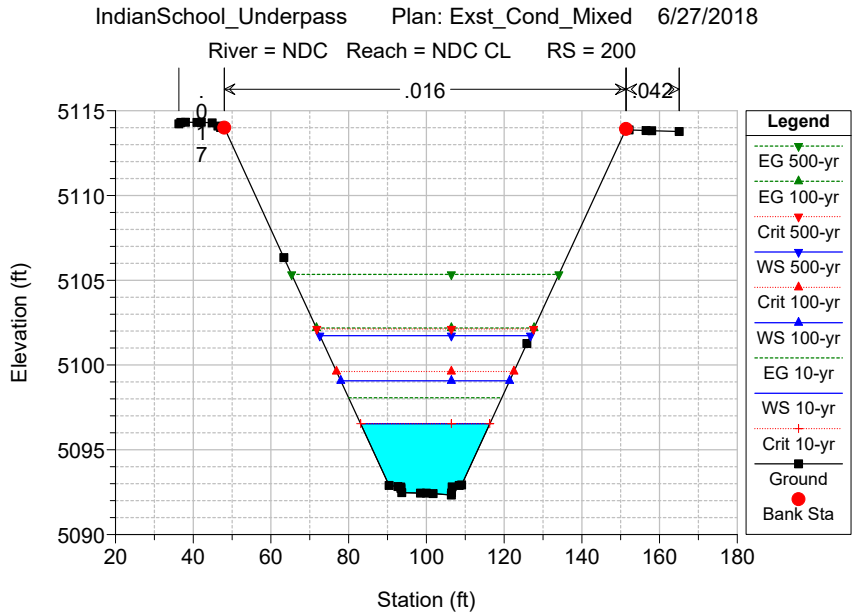

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 750
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 700
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 650
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 600
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

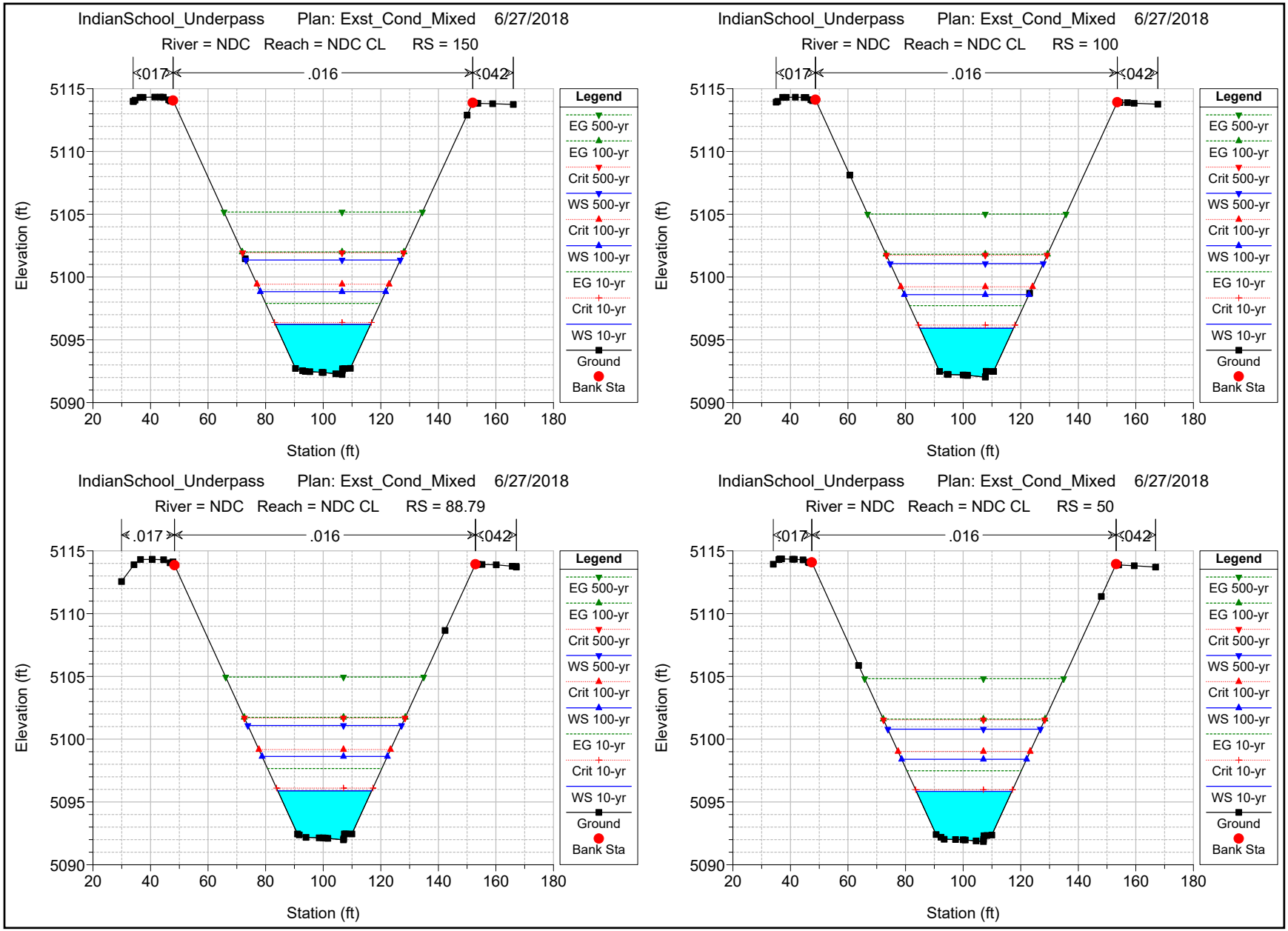

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 450
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 400
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

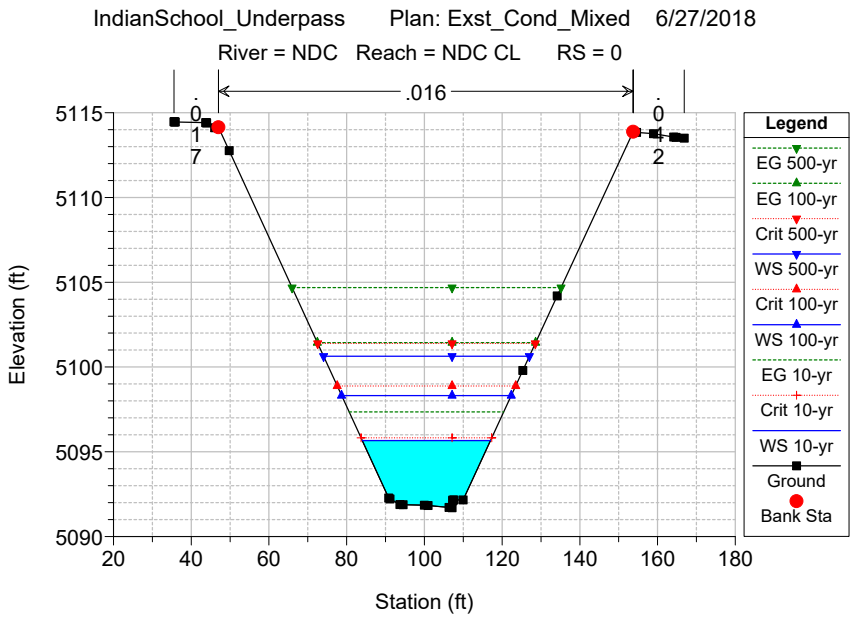

IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 350
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 300
.017
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
WS 500-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 250
.017
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 200
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 150
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 100
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 88.79
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 50
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Exst_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 0
.016
.017
.042
Elevation (ft)
5115
5110
5105
5100
5095
5090
20
40
60
80
100
120
140
160
180
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

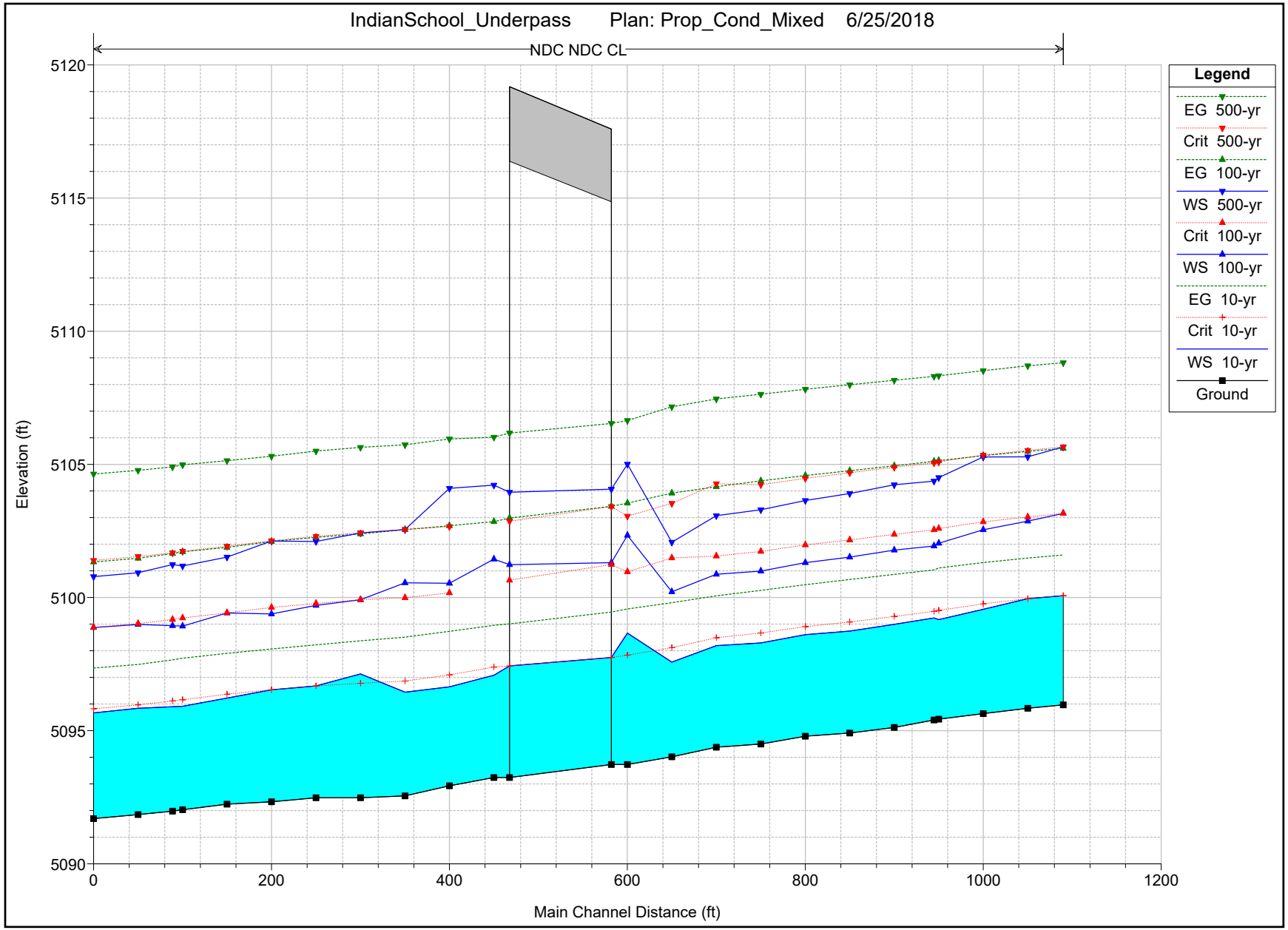
# Proposed Conditions - Subcritical Flow Regime

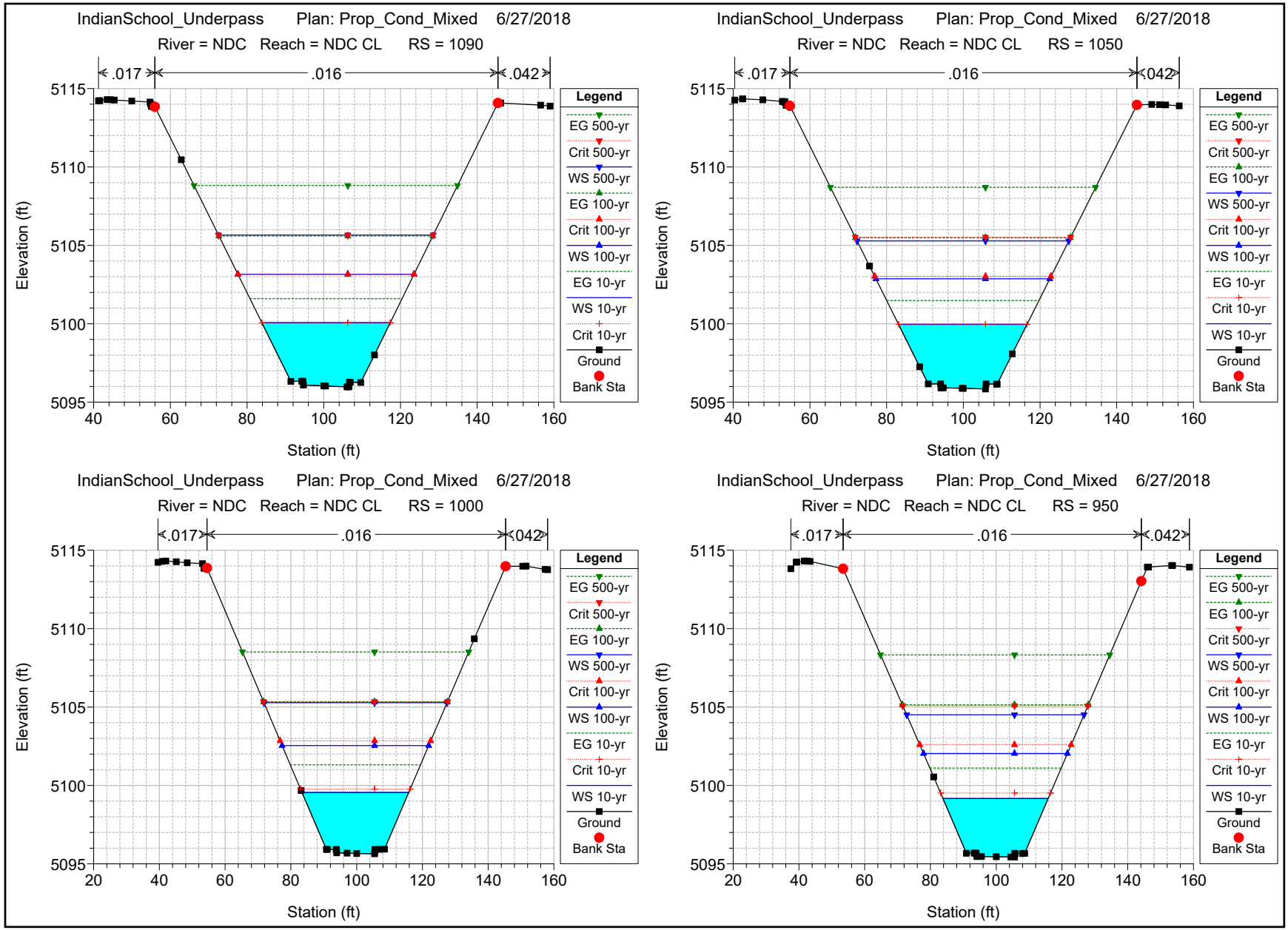
HEC-RAS Plan: Prop_Cond_Mix River: NDC Reach: NDC CL

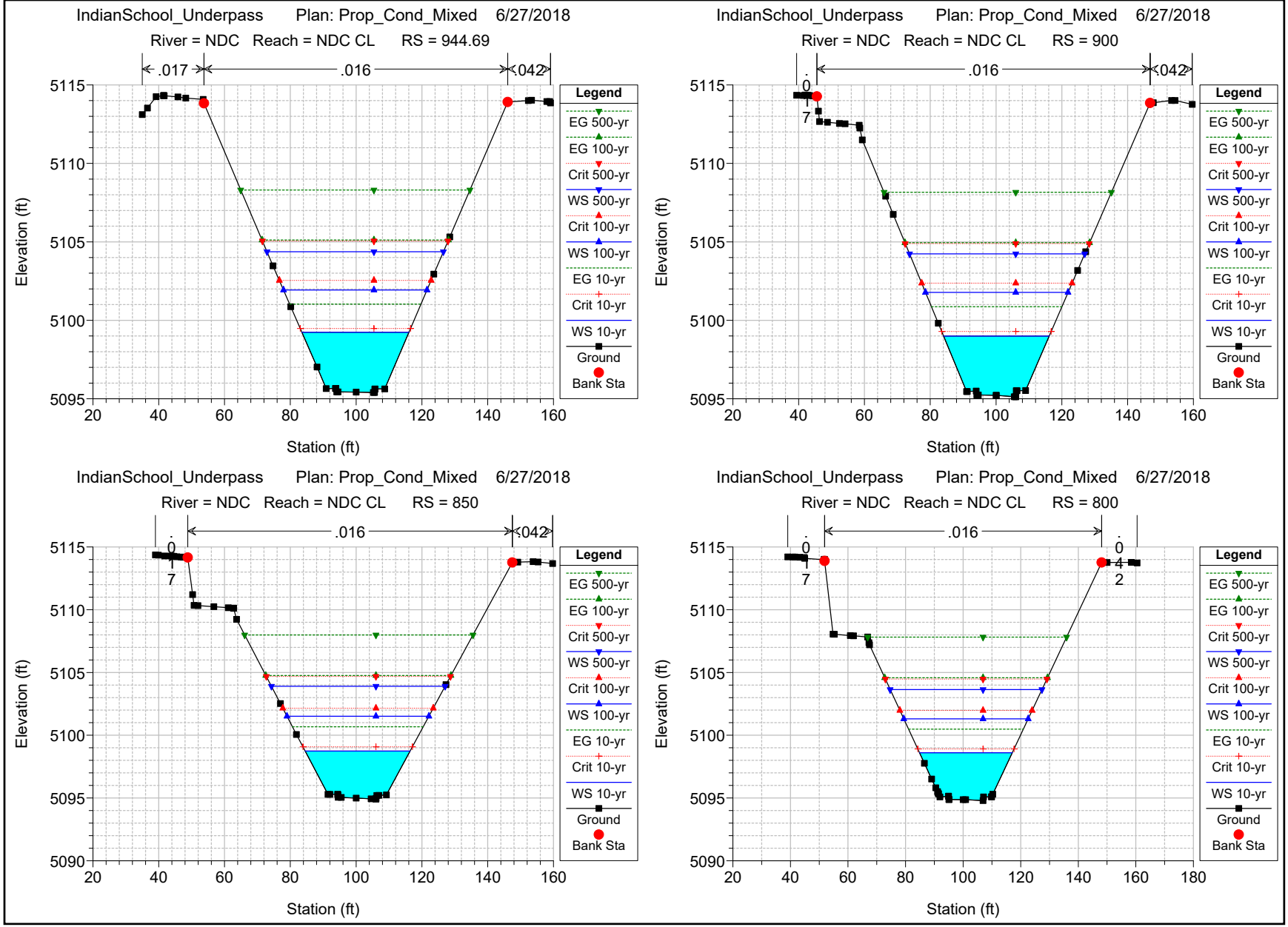
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 1090 | 10-yr | 1000.00 | 5095.97 | 5100.07 | 5100.07 | 5101.60 | 0.002841 | 9.92 | 100.81 | 33.48 | 1.01 |
| NDC CL | 1090 | 100-yr | 2800.00 | 5095.97 | 5103.16 | 5103.16 | 5105.60 | 0.002440 | 12.54 | 223.30 | 45.91 | 1.00 |
| NDC CL | 1090 | 500-yr | 5000.00 | 5095.97 | 5105.66 | 5105.66 | 5108.82 | 0.002270 | 14.26 | 350.72 | 55.98 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 1050 | 10-yr | 1000.00 | 5095.84 | 5099.96 | 5099.96 | 5101.48 | 0.002828 | 9.90 | 100.99 | 33.46 | 1.00 |
| NDC CL | 1050 | 100-yr | 2800.00 | 5095.84 | 5102.87 | 5103.03 | 5105.49 | 0.002692 | 12.98 | 215.74 | 45.35 | 1.05 |
| NDC CL | 1050 | 500-yr | 5000.00 | 5095.84 | 5105.28 | 5105.52 | 5108.70 | 0.002544 | 14.84 | 336.95 | 55.19 | 1.06 |
| | | | | | | | | | | | | |
| NDC CL | 1000 | 10-yr | 1000.00 | 5095.64 | 5099.56 | 5099.76 | 5101.31 | 0.003434 | 10.63 | 94.06 | 32.48 | 1.10 |
| NDC CL | 1000 | 100-yr | 2800.00 | 5095.64 | 5102.54 | 5102.84 | 5105.33 | 0.002917 | 13.39 | 209.14 | 44.59 | 1.09 |
| NDC CL | 1000 | 500-yr | 5000.00 | 5095.64 | 5105.28 | 5105.35 | 5108.52 | 0.002352 | 14.44 | 346.25 | 55.68 | 1.02 |
| | | | | | | | | | | | | |
| NDC CL | 950 | 10-yr | 1000.00 | 5095.43 | 5099.17 | 5099.52 | 5101.11 | 0.003954 | 11.17 | 89.55 | 32.01 | 1.18 |
| NDC CL | 950 | 100-yr | 2800.00 | 5095.43 | 5102.04 | 5102.59 | 5105.14 | 0.003389 | 14.12 | 198.27 | 43.78 | 1.17 |
| NDC CL | 950 | 500-yr | 5000.00 | 5095.43 | 5104.50 | 5105.09 | 5108.33 | 0.002959 | 15.69 | 318.75 | 53.94 | 1.14 |
| | | | | | | | | | | | | |
| NDC CL | 944.69 | 10-yr | 1000.00 | 5095.40 | 5099.23 | 5099.48 | 5101.04 | 0.003574 | 10.77 | 92.89 | 32.53 | 1.12 |
| NDC CL | 944.69 | 100-yr | 2800.00 | 5095.40 | 5101.94 | 5102.55 | 5105.12 | 0.003517 | 14.30 | 195.74 | 43.65 | 1.19 |
| NDC CL | 944.69 | 500-yr | 5000.00 | 5095.40 | 5104.37 | 5105.06 | 5108.31 | 0.003078 | 15.91 | 314.18 | 53.63 | 1.16 |
| | | | | | | | | | | | | |
| NDC CL | 900 | 10-yr | 1000.00 | 5095.12 | 5098.99 | 5099.29 | 5100.87 | 0.003780 | 10.98 | 91.04 | 32.09 | 1.15 |
| NDC CL | 900 | 100-yr | 2800.00 | 5095.12 | 5101.78 | 5102.37 | 5104.95 | 0.003484 | 14.27 | 196.17 | 43.35 | 1.18 |
| NDC CL | 900 | 500-yr | 5000.00 | 5095.12 | 5104.23 | 5104.89 | 5108.16 | 0.003051 | 15.89 | 314.72 | 53.26 | 1.15 |
| | | | | | | | | | | | | |
| NDC CL | 850 | 10-yr | 1000.00 | 5094.91 | 5098.74 | 5099.08 | 5100.68 | 0.003940 | 11.16 | 89.58 | 31.90 | 1.17 |
| NDC CL | 850 | 100-yr | 2800.00 | 5094.91 | 5101.52 | 5102.16 | 5104.76 | 0.003597 | 14.45 | 193.73 | 43.15 | 1.20 |
| NDC CL | 850 | 500-yr | 5000.00 | 5094.91 | 5103.90 | 5104.69 | 5107.99 | 0.003221 | 16.22 | 308.33 | 52.82 | 1.18 |
| | | | | | | | | | | | | |
| NDC CL | 800 | 10-yr | 1000.00 | 5094.79 | 5098.61 | 5098.91 | 5100.48 | 0.003805 | 10.99 | 90.96 | 32.24 | 1.15 |
| NDC CL | 800 | 100-yr | 2800.00 | 5094.79 | 5101.31 | 5101.97 | 5104.58 | 0.003660 | 14.51 | 192.91 | 43.23 | 1.21 |
| NDC CL | 800 | 500-yr | 5000.00 | 5094.79 | 5103.64 | 5104.47 | 5107.82 | 0.003337 | 16.40 | 304.88 | 52.73 | 1.20 |
| | | | | | | | | | | | | |
| NDC CL | 750 | 10-yr | 1000.00 | 5094.50 | 5098.29 | 5098.67 | 5100.27 | 0.004075 | 11.27 | 88.70 | 31.90 | 1.19 |
| NDC CL | 750 | 100-yr | 2800.00 | 5094.50 | 5100.99 | 5101.73 | 5104.38 | 0.003838 | 14.77 | 189.58 | 42.92 | 1.24 |
| NDC CL | 750 | 500-yr | 5000.00 | 5094.50 | 5103.29 | 5104.24 | 5107.63 | 0.003511 | 16.71 | 299.27 | 52.33 | 1.23 |
| | | | | | | | | | | | | |
| NDC CL | 700 | 10-yr | 1000.00 | 5094.38 | 5098.19 | 5098.49 | 5100.06 | 0.003778 | 10.97 | 91.16 | 32.31 | 1.15 |
| NDC CL | 700 | 100-yr | 2800.00 | 5094.38 | 5100.87 | 5101.56 | 5104.16 | 0.003693 | 14.55 | 192.41 | 43.32 | 1.22 |
| NDC CL | 700 | 500-yr | 5000.00 | 5094.38 | 5103.07 | 5104.27 | 5107.46 | 0.003544 | 16.79 | 297.78 | 52.04 | 1.24 |
| | | | | | | | | | | | | |
| NDC CL | 650 | 10-yr | 1000.00 | 5094.02 | 5097.58 | 5098.12 | 5099.81 | 0.004943 | 11.98 | 83.46 | 31.68 | 1.30 |
| NDC CL | 650 | 100-yr | 2800.00 | 5094.02 | 5100.22 | 5101.48 | 5103.92 | 0.004382 | 15.44 | 181.40 | 42.47 | 1.32 |
| NDC CL | 650 | 500-yr | 5000.00 | 5094.02 | 5102.08 | 5103.53 | 5107.16 | 0.005393 | 18.09 | 276.41 | 59.59 | 1.48 |
| | | | | | | | | | | | | |
| NDC CL | 600 | 10-yr | 1000.00 | 5093.73 | 5098.67 | 5097.84 | 5099.57 | 0.001372 | 7.62 | 131.18 | 37.48 | 0.72 |
| NDC CL | 600 | 100-yr | 2800.00 | 5093.73 | 5102.34 | 5100.97 | 5103.55 | 0.001083 | 8.82 | 317.61 | 59.88 | 0.67 |
| NDC CL | 600 | 500-yr | 5000.00 | 5093.73 | 5105.01 | 5103.06 | 5106.65 | 0.000993 | 10.28 | 486.50 | 66.71 | 0.67 |
| | | | | | | | | | | | | |
| NDC CL | 582 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| NDC CL | 450 | 10-yr | 1000.00 | 5093.24 | 5097.08 | 5097.39 | 5098.96 | 0.003824 | 10.99 | 91.00 | 32.39 | 1.16 |
| NDC CL | 450 | 100-yr | 2800.00 | 5093.24 | 5101.44 | | 5102.85 | 0.001342 | 9.52 | 294.13 | 57.93 | 0.74 |
| NDC CL | 450 | 500-yr | 5000.00 | 5093.24 | 5104.22 | | 5106.02 | 0.001120 | 10.76 | 464.70 | 64.84 | 0.71 |
| | | | | | | | | | | | | |
| NDC CL | 400 | 10-yr | 1000.00 | 5092.93 | 5096.65 | 5097.10 | 5098.73 | 0.004314 | 11.58 | 86.38 | 31.27 | 1.23 |
| NDC CL | 400 | 100-yr | 2800.00 | 5092.93 | 5100.53 | 5100.18 | 5102.70 | 0.002036 | 11.80 | 237.38 | 46.44 | 0.92 |
| NDC CL | 400 | 500-yr | 5000.00 | 5092.93 | 5104.10 | 5102.66 | 5105.96 | 0.001203 | 10.92 | 457.70 | 66.55 | 0.73 |
| | | | | | | | | | | | | |
| NDC CL | 350 | 10-yr | 1000.00 | 5092.55 | 5096.44 | 5096.86 | 5098.51 | 0.004224 | 11.53 | 86.70 | 30.81 | 1.21 |
| NDC CL | 350 | 100-yr | 2800.00 | 5092.55 | 5100.55 | 5099.99 | 5102.55 | 0.001826 | 11.32 | 247.25 | 47.34 | 0.87 |
| NDC CL | 350 | 500-yr | 5000.00 | 5092.55 | 5102.55 | 5102.55 | 5105.74 | 0.002234 | 14.31 | 349.29 | 54.21 | 0.99 |
| | | | | | | | | | | | | |
| NDC CL | 300 | 10-yr | 1000.00 | 5092.48 | 5097.13 | 5096.78 | 5098.37 | 0.002081 | 8.95 | 111.71 | 33.96 | 0.87 |
| NDC CL | 300 | 100-yr | 2800.00 | 5092.48 | 5099.92 | 5099.92 | 5102.39 | 0.002452 | 12.61 | 221.98 | 45.14 | 1.00 |
| NDC CL | 300 | 500-yr | 5000.00 | 5092.48 | 5102.42 | 5102.44 | 5105.64 | 0.002310 | 14.38 | 347.69 | 55.23 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 250 | 10-yr | 1000.00 | 5092.48 | 5096.68 | 5096.68 | 5098.22 | 0.002836 | 9.96 | 100.45 | 32.96 | 1.01 |
| NDC CL | 250 | 100-yr | 2800.00 | 5092.48 | 5099.70 | 5099.77 | 5102.26 | 0.002579 | 12.82 | 218.43 | 45.11 | 1.03 |
| NDC CL | 250 | 500-yr | 5000.00 | 5092.48 | 5102.11 | 5102.30 | 5105.50 | 0.002497 | 14.78 | 338.30 | 54.75 | 1.05 |
| | | | | | | | | | | | | |
| NDC CL | 200 | 10-yr | 1000.00 | 5092.33 | 5096.54 | 5096.54 | 5098.07 | 0.002838 | 9.93 | 100.73 | 33.25 | 1.01 |
| NDC CL | 200 | 100-yr | 2800.00 | 5092.33 | 5099.38 | 5099.63 | 5102.10 | 0.002825 | 13.23 | 211.64 | 44.71 | 1.07 |
| NDC CL | 200 | 500-yr | 5000.00 | 5092.33 | 5102.12 | 5102.13 | 5105.31 | 0.002296 | 14.31 | 349.36 | 55.75 | 1.01 |
| | | | | | | | | | | | | |
| NDC CL | 150 | 10-yr | 1000.00 | 5092.24 | 5096.22 | 5096.37 | 5097.90 | 0.003267 | 10.40 | 96.17 | 33.09 | 1.08 |
| NDC CL | 150 | 100-yr | 2800.00 | 5092.24 | 5099.42 | 5099.43 | 5101.88 | 0.002469 | 12.59 | 222.47 | 45.89 | 1.01 |
| NDC CL | 150 | 500-yr | 5000.00 | 5092.24 | 5101.52 | 5101.93 | 5105.14 | 0.002740 | 15.28 | 327.33 | 54.27 | 1.10 |
| | | | | | | | | | | | | |

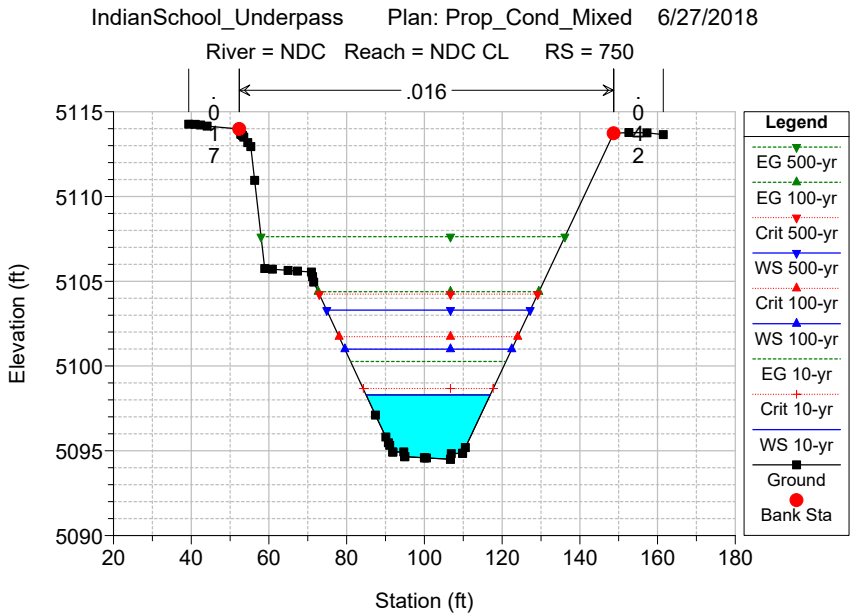
HEC-RAS Plan: Prop_Cond_Mix River: NDC Reach: NDC CL (Continued)

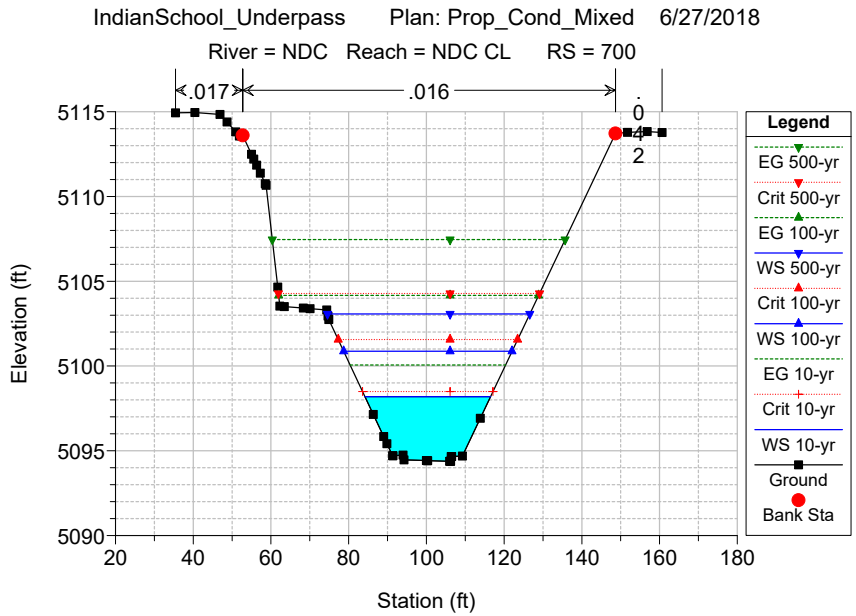
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 100 | 10-yr | 1000.00 | 5092.03 | 5095.92 | 5096.16 | 5097.72 | 0.003593 | 10.78 | 92.80 | 32.55 | 1.13 |
| NDC CL | 100 | 100-yr | 2800.00 | 5092.03 | 5098.93 | 5099.23 | 5101.72 | 0.002926 | 13.41 | 208.87 | 44.59 | 1.09 |
| NDC CL | 100 | 500-yr | 5000.00 | 5092.03 | 5101.19 | 5101.73 | 5104.98 | 0.002909 | 15.63 | 319.87 | 53.63 | 1.13 |
| | | | | | | | | | | | | |
| NDC CL | 88.79 | 10-yr | 1000.00 | 5091.98 | 5095.90 | 5096.11 | 5097.66 | 0.003461 | 10.64 | 94.03 | 32.71 | 1.11 |
| NDC CL | 88.79 | 100-yr | 2800.00 | 5091.98 | 5098.94 | 5099.17 | 5101.65 | 0.002807 | 13.21 | 212.03 | 44.88 | 1.07 |
| NDC CL | 88.79 | 500-yr | 5000.00 | 5091.98 | 5101.24 | 5101.68 | 5104.90 | 0.002774 | 15.36 | 325.51 | 54.06 | 1.10 |
| | | | | | | | | | | | | |
| NDC CL | 50 | 10-yr | 1000.00 | 5091.85 | 5095.84 | 5095.97 | 5097.49 | 0.003166 | 10.29 | 97.17 | 33.18 | 1.06 |
| NDC CL | 50 | 100-yr | 2800.00 | 5091.85 | 5098.99 | 5099.02 | 5101.47 | 0.002497 | 12.65 | 221.43 | 45.77 | 1.01 |
| NDC CL | 50 | 500-yr | 5000.00 | 5091.85 | 5100.93 | 5101.54 | 5104.78 | 0.002965 | 15.73 | 317.78 | 53.54 | 1.14 |
| | | | | | | | | | | | | |
| NDC CL | 0 | 10-yr | 1000.00 | 5091.70 | 5095.67 | 5095.83 | 5097.35 | 0.003270 | 10.41 | 96.04 | 33.03 | 1.08 |
| NDC CL | 0 | 100-yr | 2800.00 | 5091.70 | 5098.87 | 5098.88 | 5101.33 | 0.002467 | 12.59 | 222.46 | 45.89 | 1.01 |
| NDC CL | 0 | 500-yr | 5000.00 | 5091.70 | 5100.79 | 5101.39 | 5104.64 | 0.002972 | 15.74 | 317.63 | 53.58 | 1.14 |

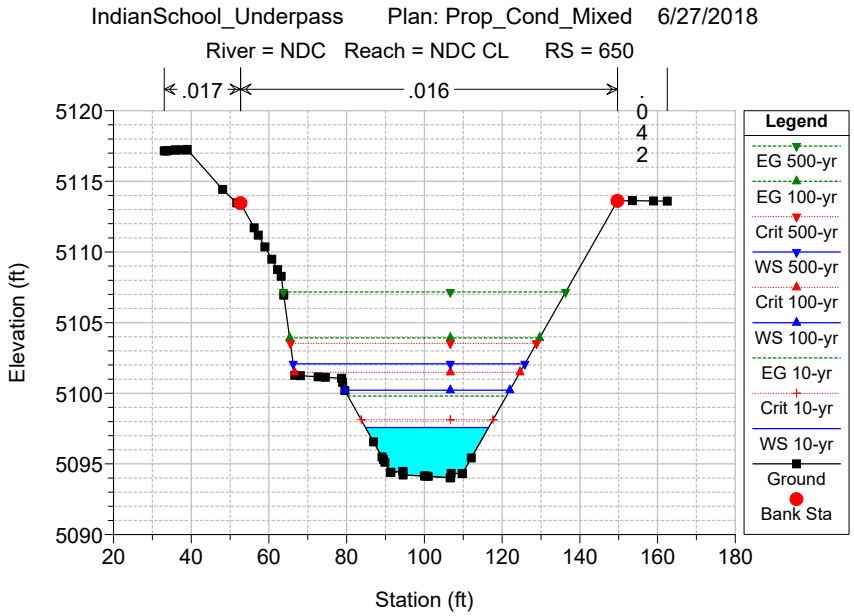

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/25/2018
NDC NDC CL
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Elevation (ft)
5120
5115
5110
5105
5100
5095
5090
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

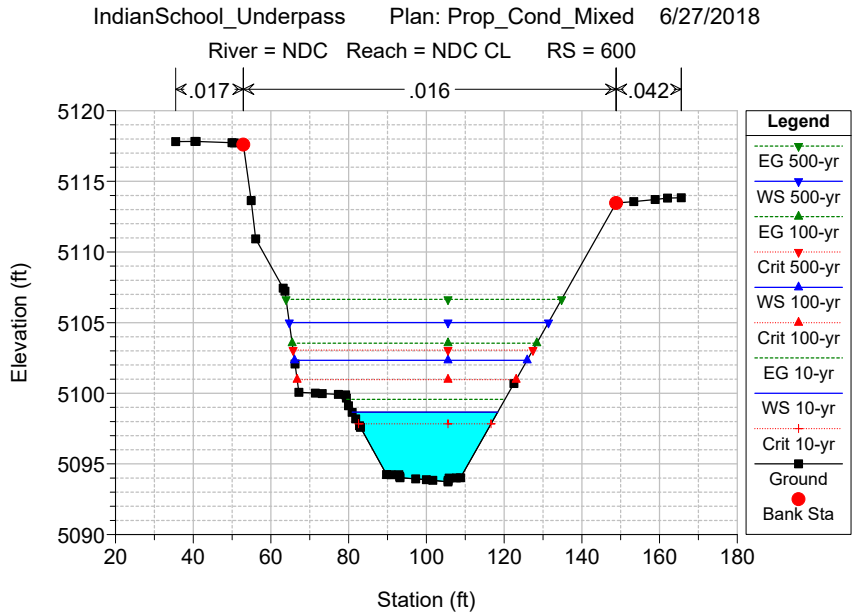

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1090
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
WS 500-yr
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1050
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1000
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 950
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

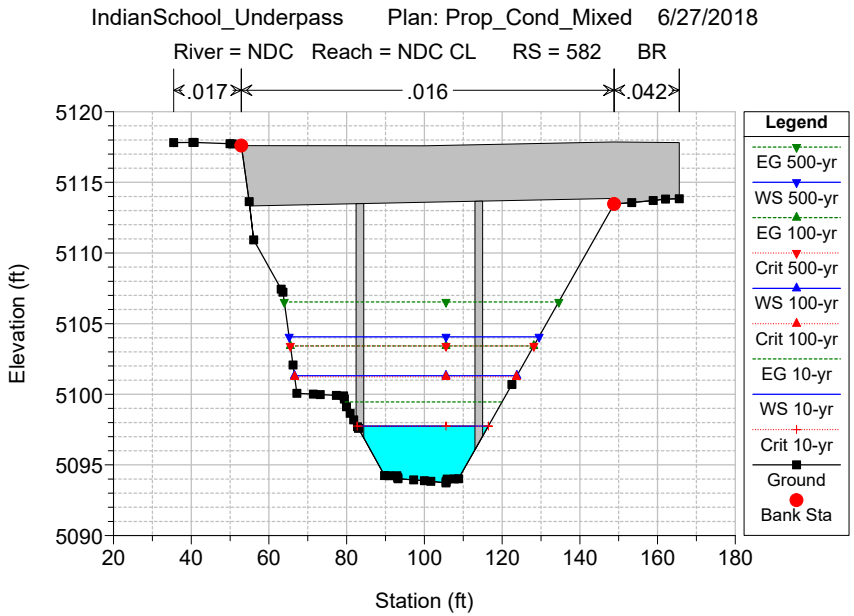

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 944.69
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 900
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 850
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 800
.016
Elevation (ft)
Station (ft)

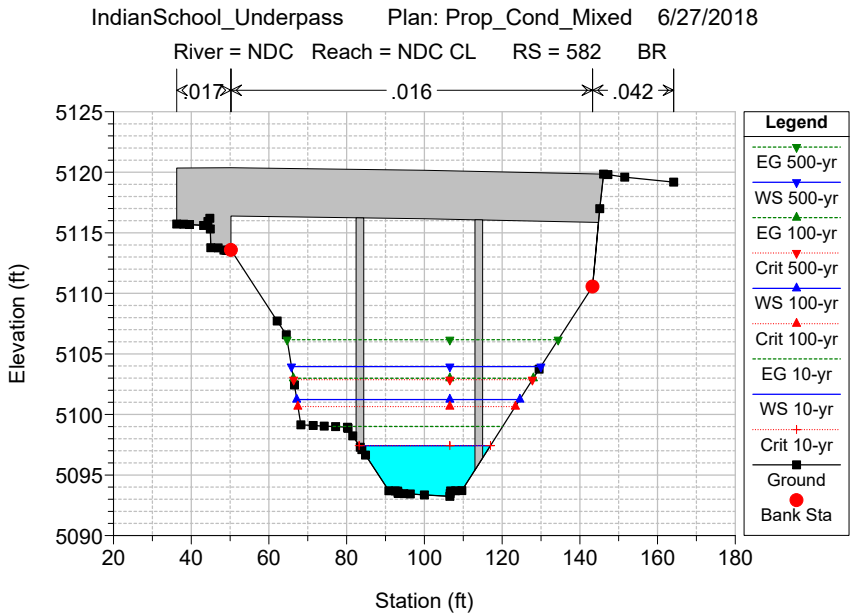

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 750
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

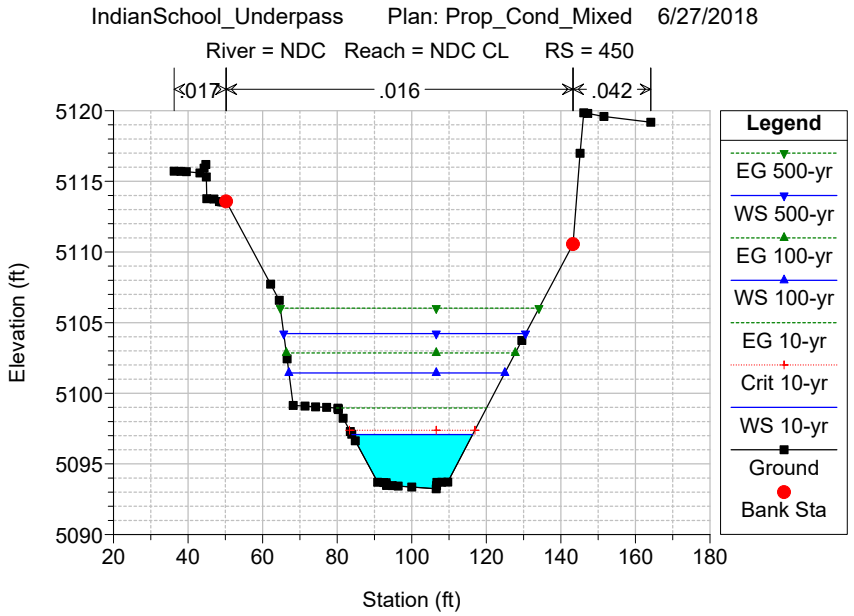

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 700
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

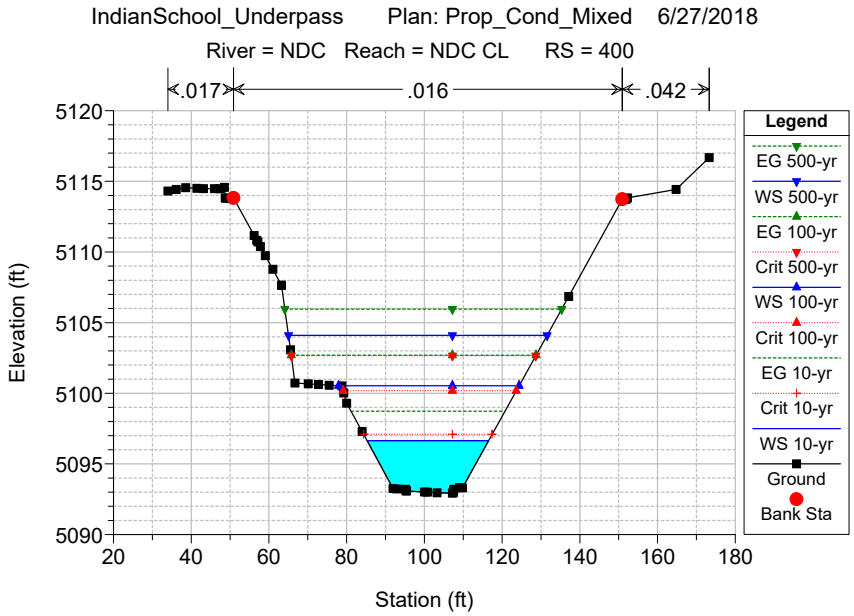

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 650
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

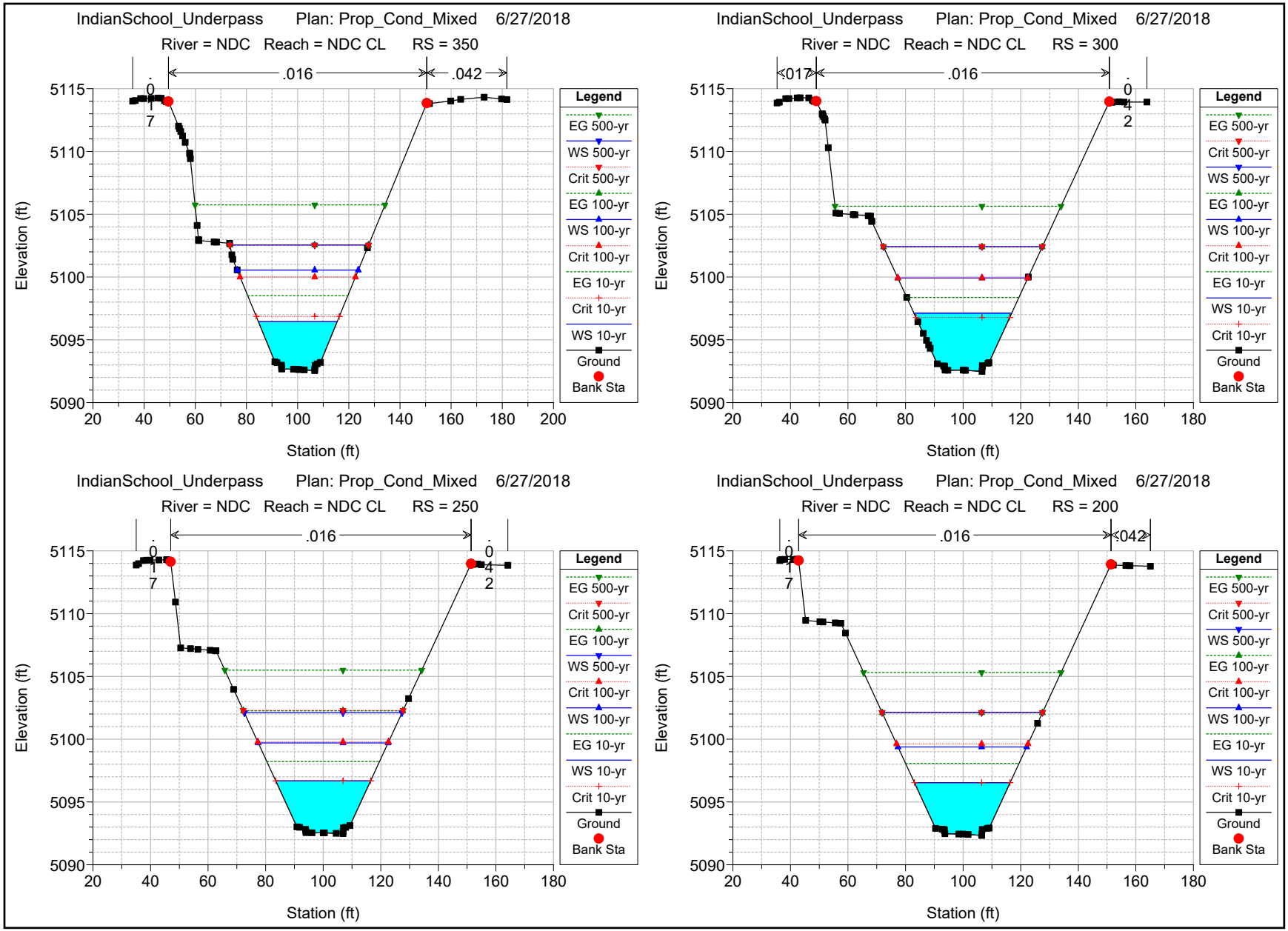

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 600
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

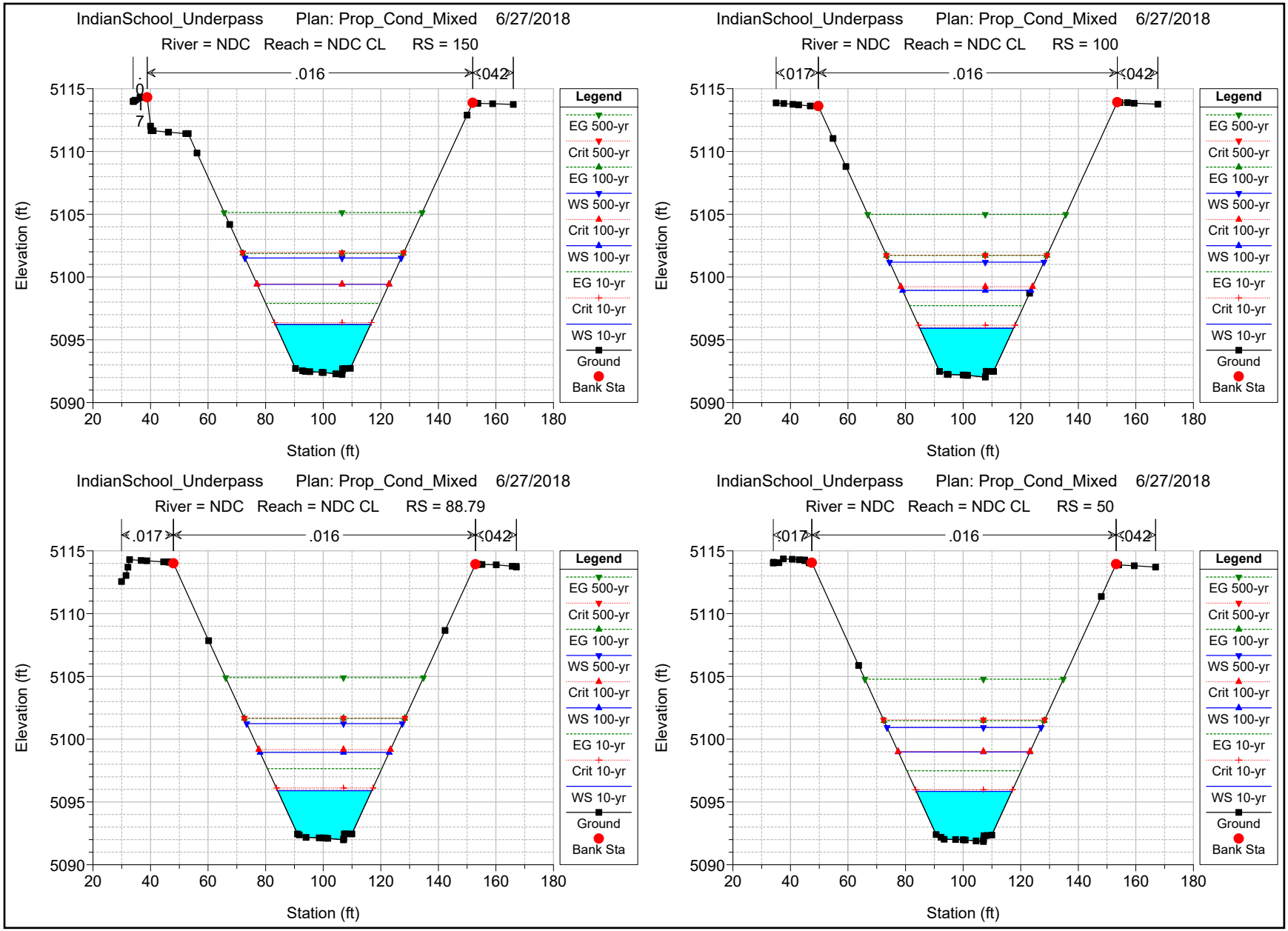

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta

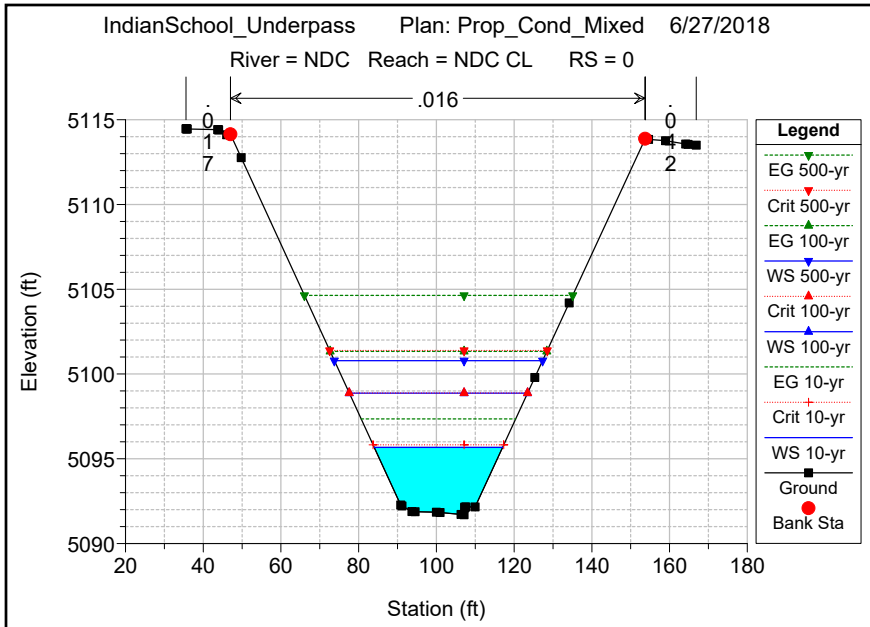

IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 450
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 400
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 350
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 300
.017
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 250
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 200
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
WS 500-yr
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 150
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 100
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 88.79
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 50
.017
.016
.042
Elevation (ft)
Station (ft)


IndianSchool_Underpass Plan: Prop_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 0
.016
.017
.042
Elevation (ft)
Station (ft)
5115
5110
5105
5100
5095
5090
20
40
60
80
100
120
140
160
180
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

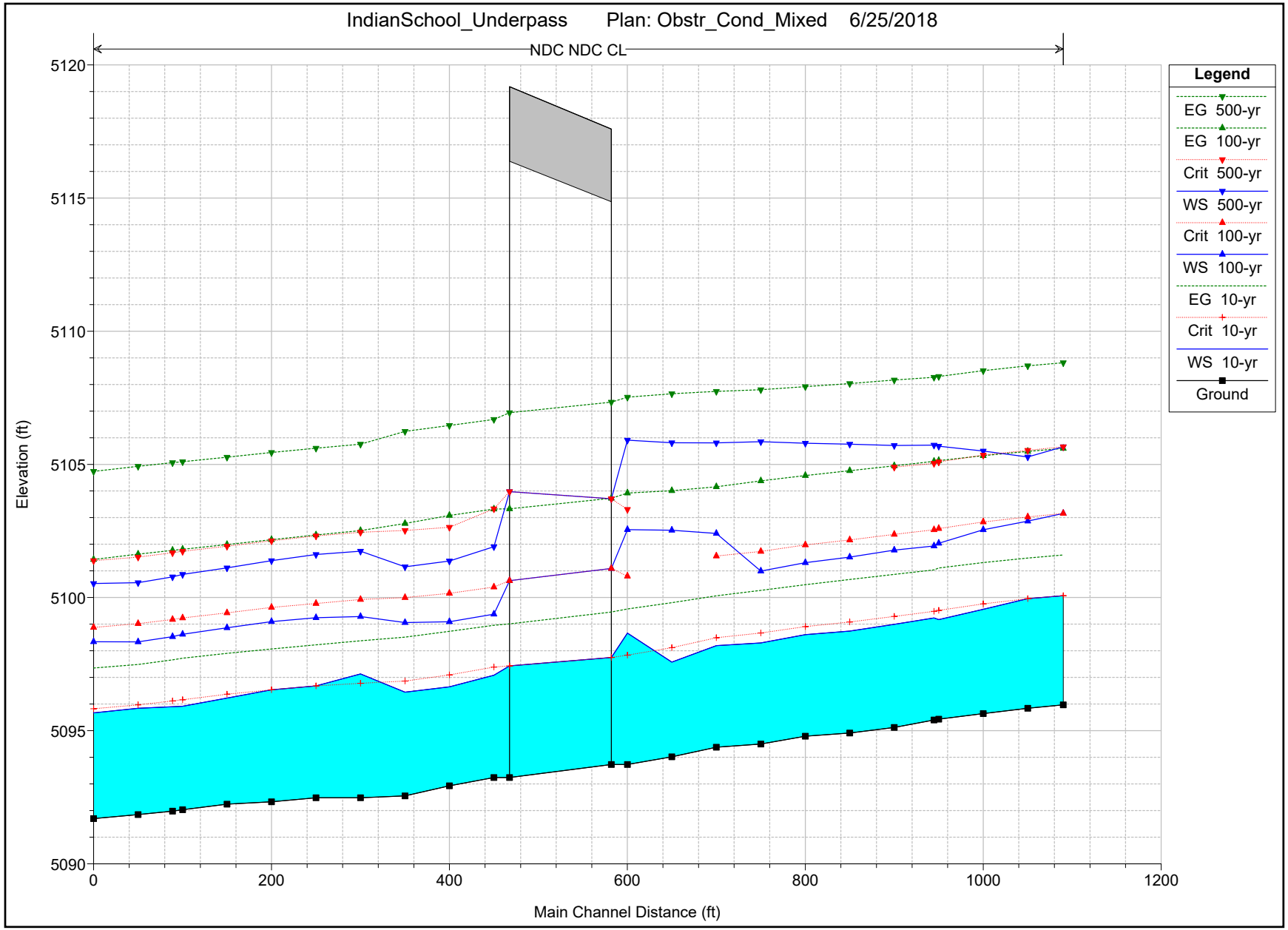
# Proposed Conditions w/ Obstructions - Mixed Flow Regime

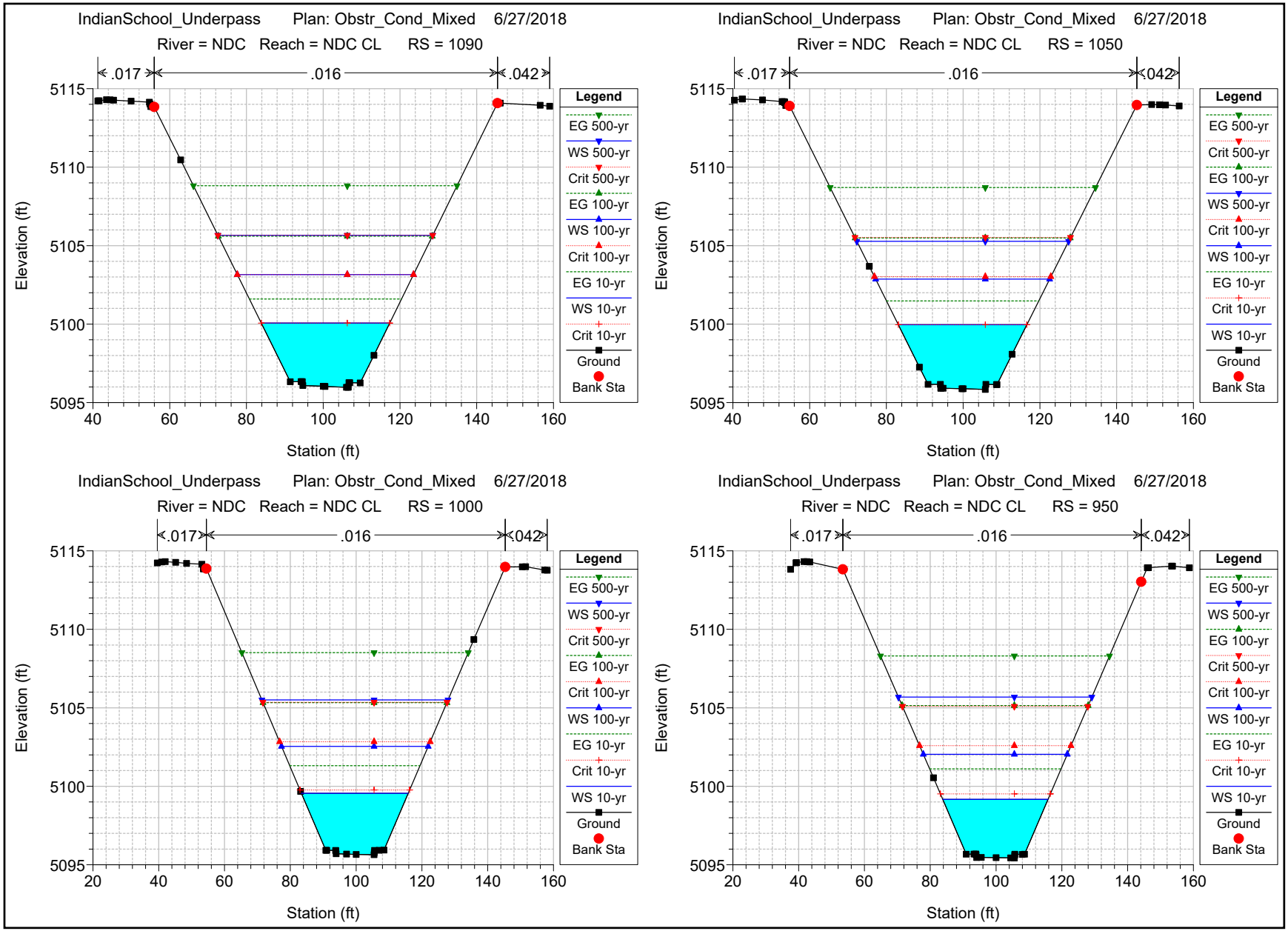
HEC-RAS Plan: Obstr_Cond_M River: NDC Reach: NDC CL

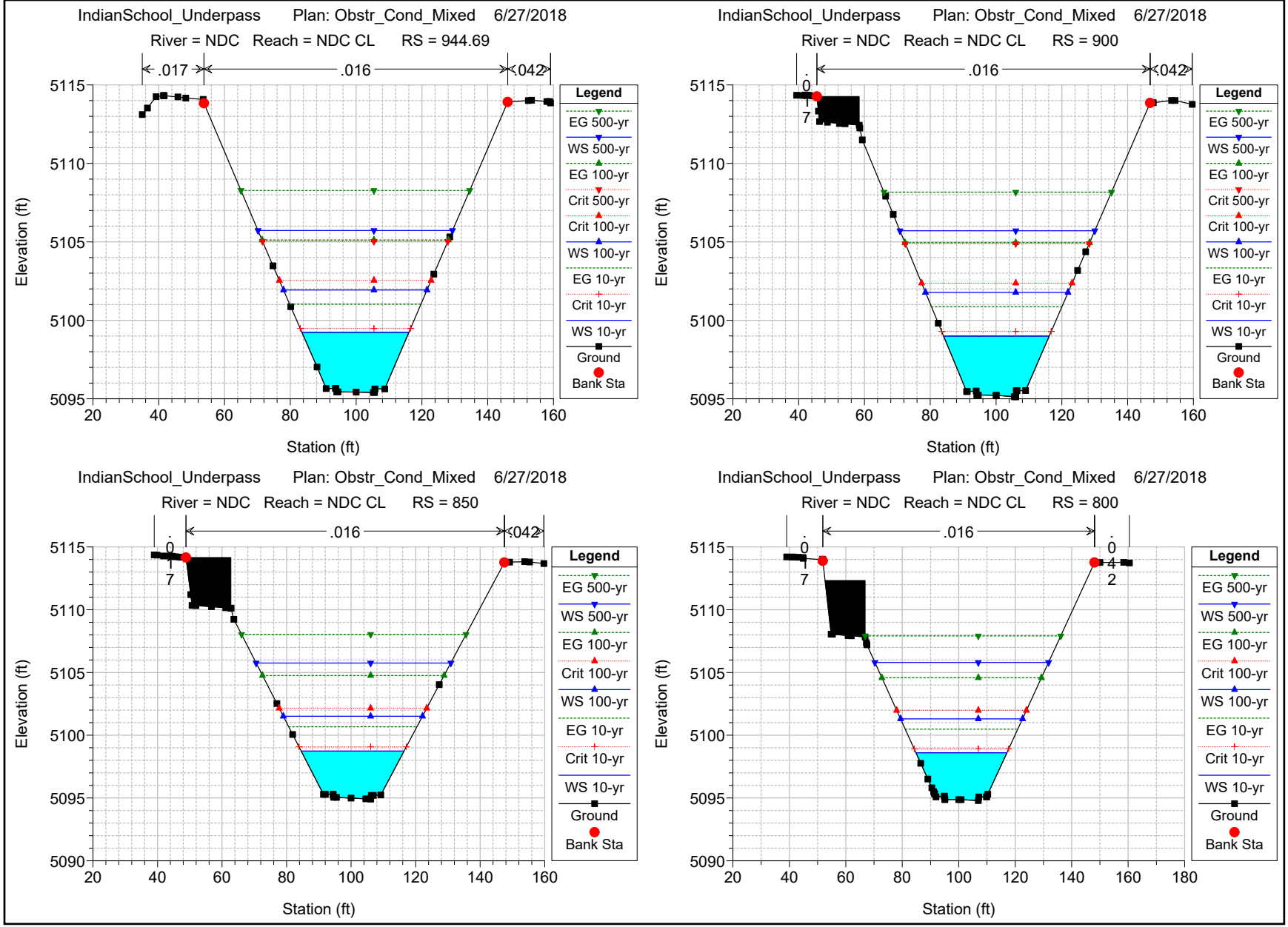
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 1090 | 10-yr | 1000.00 | 5095.97 | 5100.07 | 5100.07 | 5101.60 | 0.002841 | 9.92 | 100.81 | 33.48 | 1.01 |
| NDC CL | 1090 | 100-yr | 2800.00 | 5095.97 | 5103.16 | 5103.16 | 5105.60 | 0.002440 | 12.54 | 223.30 | 45.91 | 1.00 |
| NDC CL | 1090 | 500-yr | 5000.00 | 5095.97 | 5105.66 | 5105.66 | 5108.82 | 0.002268 | 14.25 | 350.86 | 55.99 | 1.00 |
| | | | | | | | | | | | | |
| NDC CL | 1050 | 10-yr | 1000.00 | 5095.84 | 5099.96 | 5099.96 | 5101.48 | 0.002828 | 9.90 | 100.99 | 33.46 | 1.00 |
| NDC CL | 1050 | 100-yr | 2800.00 | 5095.84 | 5102.87 | 5103.02 | 5105.49 | 0.002693 | 12.98 | 215.72 | 45.35 | 1.05 |
| NDC CL | 1050 | 500-yr | 5000.00 | 5095.84 | 5105.28 | 5105.53 | 5108.70 | 0.002546 | 14.84 | 336.87 | 55.18 | 1.06 |
| | | | | | | | | | | | | |
| NDC CL | 1000 | 10-yr | 1000.00 | 5095.64 | 5099.56 | 5099.76 | 5101.31 | 0.003434 | 10.63 | 94.06 | 32.48 | 1.10 |
| NDC CL | 1000 | 100-yr | 2800.00 | 5095.64 | 5102.54 | 5102.84 | 5105.33 | 0.002916 | 13.39 | 209.16 | 44.59 | 1.09 |
| NDC CL | 1000 | 500-yr | 5000.00 | 5095.64 | 5105.50 | 5105.35 | 5108.52 | 0.002135 | 13.93 | 358.83 | 56.59 | 0.98 |
| | | | | | | | | | | | | |
| NDC CL | 950 | 10-yr | 1000.00 | 5095.43 | 5099.17 | 5099.52 | 5101.11 | 0.003954 | 11.17 | 89.55 | 32.01 | 1.18 |
| NDC CL | 950 | 100-yr | 2800.00 | 5095.43 | 5102.04 | 5102.59 | 5105.14 | 0.003389 | 14.12 | 198.27 | 43.78 | 1.17 |
| NDC CL | 950 | 500-yr | 5000.00 | 5095.43 | 5105.68 | 5105.09 | 5108.30 | 0.001773 | 12.98 | 385.11 | 58.79 | 0.89 |
| | | | | | | | | | | | | |
| NDC CL | 944.69 | 10-yr | 1000.00 | 5095.40 | 5099.23 | 5099.48 | 5101.04 | 0.003574 | 10.77 | 92.89 | 32.53 | 1.12 |
| NDC CL | 944.69 | 100-yr | 2800.00 | 5095.40 | 5101.94 | 5102.55 | 5105.12 | 0.003517 | 14.30 | 195.74 | 43.65 | 1.19 |
| NDC CL | 944.69 | 500-yr | 5000.00 | 5095.40 | 5105.72 | 5105.04 | 5108.27 | 0.001706 | 12.81 | 390.47 | 59.14 | 0.88 |
| | | | | | | | | | | | | |
| NDC CL | 900 | 10-yr | 1000.00 | 5095.12 | 5098.99 | 5099.29 | 5100.87 | 0.003780 | 10.98 | 91.04 | 32.09 | 1.15 |
| NDC CL | 900 | 100-yr | 2800.00 | 5095.12 | 5101.78 | 5102.37 | 5104.95 | 0.003484 | 14.27 | 196.17 | 43.35 | 1.18 |
| NDC CL | 900 | 500-yr | 5000.00 | 5095.12 | 5105.71 | 5104.89 | 5108.17 | 0.001619 | 12.58 | 397.60 | 59.22 | 0.86 |
| | | | | | | | | | | | | |
| NDC CL | 850 | 10-yr | 1000.00 | 5094.91 | 5098.74 | 5099.08 | 5100.68 | 0.003940 | 11.16 | 89.58 | 31.90 | 1.17 |
| NDC CL | 850 | 100-yr | 2800.00 | 5094.91 | 5101.52 | 5102.16 | 5104.76 | 0.003597 | 14.45 | 193.73 | 43.15 | 1.20 |
| NDC CL | 850 | 500-yr | 5000.00 | 5094.91 | 5105.76 | | 5108.03 | 0.001458 | 12.10 | 413.09 | 60.34 | 0.82 |
| | | | | | | | | | | | | |
| NDC CL | 800 | 10-yr | 1000.00 | 5094.79 | 5098.61 | 5098.91 | 5100.48 | 0.003805 | 10.99 | 90.96 | 32.24 | 1.15 |
| NDC CL | 800 | 100-yr | 2800.00 | 5094.79 | 5101.31 | 5101.97 | 5104.58 | 0.003660 | 14.51 | 192.91 | 43.23 | 1.21 |
| NDC CL | 800 | 500-yr | 5000.00 | 5094.79 | 5105.80 | | 5107.92 | 0.001331 | 11.68 | 427.95 | 61.50 | 0.78 |
| | | | | | | | | | | | | |
| NDC CL | 750 | 10-yr | 1000.00 | 5094.50 | 5098.29 | 5098.67 | 5100.27 | 0.004075 | 11.27 | 88.70 | 31.90 | 1.19 |
| NDC CL | 750 | 100-yr | 2800.00 | 5094.50 | 5100.99 | 5101.73 | 5104.38 | 0.003838 | 14.77 | 189.58 | 42.92 | 1.24 |
| NDC CL | 750 | 500-yr | 5000.00 | 5094.50 | 5105.85 | | 5107.80 | 0.001172 | 11.21 | 445.89 | 61.53 | 0.73 |
| | | | | | | | | | | | | |
| NDC CL | 700 | 10-yr | 1000.00 | 5094.38 | 5098.19 | 5098.49 | 5100.06 | 0.003778 | 10.97 | 91.16 | 32.31 | 1.15 |
| NDC CL | 700 | 100-yr | 2800.00 | 5094.38 | 5102.41 | 5101.56 | 5104.16 | 0.001555 | 10.61 | 263.88 | 49.65 | 0.81 |
| NDC CL | 700 | 500-yr | 5000.00 | 5094.38 | 5105.81 | | 5107.74 | 0.001106 | 11.15 | 448.39 | 57.93 | 0.71 |
| | | | | | | | | | | | | |
| NDC CL | 650 | 10-yr | 1000.00 | 5094.02 | 5097.58 | 5098.12 | 5099.81 | 0.004943 | 11.98 | 83.46 | 31.68 | 1.30 |
| NDC CL | 650 | 100-yr | 2800.00 | 5094.02 | 5102.53 | | 5104.01 | 0.001183 | 9.77 | 286.57 | 48.09 | 0.71 |
| NDC CL | 650 | 500-yr | 5000.00 | 5094.02 | 5105.81 | | 5107.65 | 0.001305 | 10.89 | 459.31 | 69.18 | 0.74 |
| | | | | | | | | | | | | |
| NDC CL | 600 | 10-yr | 1000.00 | 5093.73 | 5098.67 | 5097.84 | 5099.57 | 0.001372 | 7.62 | 131.18 | 37.48 | 0.72 |
| NDC CL | 600 | 100-yr | 2800.00 | 5093.73 | 5102.55 | 5100.80 | 5103.92 | 0.001036 | 9.40 | 297.96 | 47.18 | 0.66 |
| NDC CL | 600 | 500-yr | 5000.00 | 5093.73 | 5105.91 | 5103.31 | 5107.52 | 0.001056 | 10.20 | 490.13 | 69.02 | 0.67 |
| | | | | | | | | | | | | |
| NDC CL | 582 | | Bridge | | | | | | | | | |
| | | | | | | | | | | | | |
| NDC CL | 450 | 10-yr | 1000.00 | 5093.24 | 5097.08 | 5097.39 | 5098.96 | 0.003824 | 10.99 | 91.00 | 32.39 | 1.16 |
| NDC CL | 450 | 100-yr | 2800.00 | 5093.24 | 5099.37 | 5100.39 | 5103.32 | 0.004660 | 15.94 | 175.68 | 40.67 | 1.35 |
| NDC CL | 450 | 500-yr | 5000.00 | 5093.24 | 5101.91 | 5103.33 | 5106.69 | 0.003713 | 17.54 | 285.04 | 45.69 | 1.24 |
| | | | | | | | | | | | | |
| NDC CL | 400 | 10-yr | 1000.00 | 5092.93 | 5096.65 | 5097.10 | 5098.73 | 0.004314 | 11.58 | 86.38 | 31.27 | 1.23 |
| NDC CL | 400 | 100-yr | 2800.00 | 5092.93 | 5099.09 | 5100.16 | 5103.08 | 0.004736 | 16.03 | 174.70 | 41.06 | 1.37 |
| NDC CL | 400 | 500-yr | 5000.00 | 5092.93 | 5101.37 | 5102.64 | 5106.46 | 0.004116 | 18.10 | 276.23 | 47.31 | 1.32 |
| | | | | | | | | | | | | |
| NDC CL | 350 | 10-yr | 1000.00 | 5092.55 | 5096.44 | 5096.86 | 5098.51 | 0.004224 | 11.53 | 86.70 | 30.81 | 1.21 |
| NDC CL | 350 | 100-yr | 2800.00 | 5092.55 | 5099.06 | 5100.00 | 5102.78 | 0.004286 | 15.47 | 180.95 | 41.32 | 1.30 |
| NDC CL | 350 | 500-yr | 5000.00 | 5092.55 | 5101.15 | 5102.52 | 5106.24 | 0.004300 | 18.09 | 276.38 | 49.74 | 1.35 |
| | | | | | | | | | | | | |
| NDC CL | 300 | 10-yr | 1000.00 | 5092.48 | 5097.13 | 5096.78 | 5098.37 | 0.002081 | 8.95 | 111.71 | 33.96 | 0.87 |
| NDC CL | 300 | 100-yr | 2800.00 | 5092.48 | 5099.29 | 5099.92 | 5102.51 | 0.003531 | 14.41 | 194.25 | 42.61 | 1.19 |
| NDC CL | 300 | 500-yr | 5000.00 | 5092.48 | 5101.74 | 5102.45 | 5105.76 | 0.003125 | 16.08 | 310.95 | 52.48 | 1.16 |
| | | | | | | | | | | | | |
| NDC CL | 250 | 10-yr | 1000.00 | 5092.48 | 5096.68 | 5096.68 | 5098.22 | 0.002836 | 9.96 | 100.45 | 32.96 | 1.01 |
| NDC CL | 250 | 100-yr | 2800.00 | 5092.48 | 5099.24 | 5099.77 | 5102.35 | 0.003377 | 14.14 | 197.96 | 43.24 | 1.17 |
| NDC CL | 250 | 500-yr | 5000.00 | 5092.48 | 5101.62 | 5102.31 | 5105.61 | 0.003109 | 16.02 | 312.05 | 52.79 | 1.16 |
| | | | | | | | | | | | | |
| NDC CL | 200 | 10-yr | 1000.00 | 5092.33 | 5096.54 | 5096.54 | 5098.07 | 0.002838 | 9.93 | 100.73 | 33.25 | 1.01 |
| NDC CL | 200 | 100-yr | 2800.00 | 5092.33 | 5099.09 | 5099.63 | 5102.17 | 0.003349 | 14.08 | 198.93 | 43.55 | 1.16 |
| NDC CL | 200 | 500-yr | 5000.00 | 5092.33 | 5101.38 | 5102.13 | 5105.45 | 0.003198 | 16.17 | 309.22 | 52.77 | 1.18 |
| | | | | | | | | | | | | |
| NDC CL | 150 | 10-yr | 1000.00 | 5092.24 | 5096.22 | 5096.37 | 5097.90 | 0.003267 | 10.40 | 96.17 | 33.09 | 1.08 |
| NDC CL | 150 | 100-yr | 2800.00 | 5092.24 | 5098.86 | 5099.43 | 5101.99 | 0.003432 | 14.18 | 197.39 | 43.65 | 1.18 |
| NDC CL | 150 | 500-yr | 5000.00 | 5092.24 | 5101.11 | 5101.93 | 5105.27 | 0.003299 | 16.35 | 305.74 | 52.66 | 1.20 |
| | | | | | | | | | | | | |

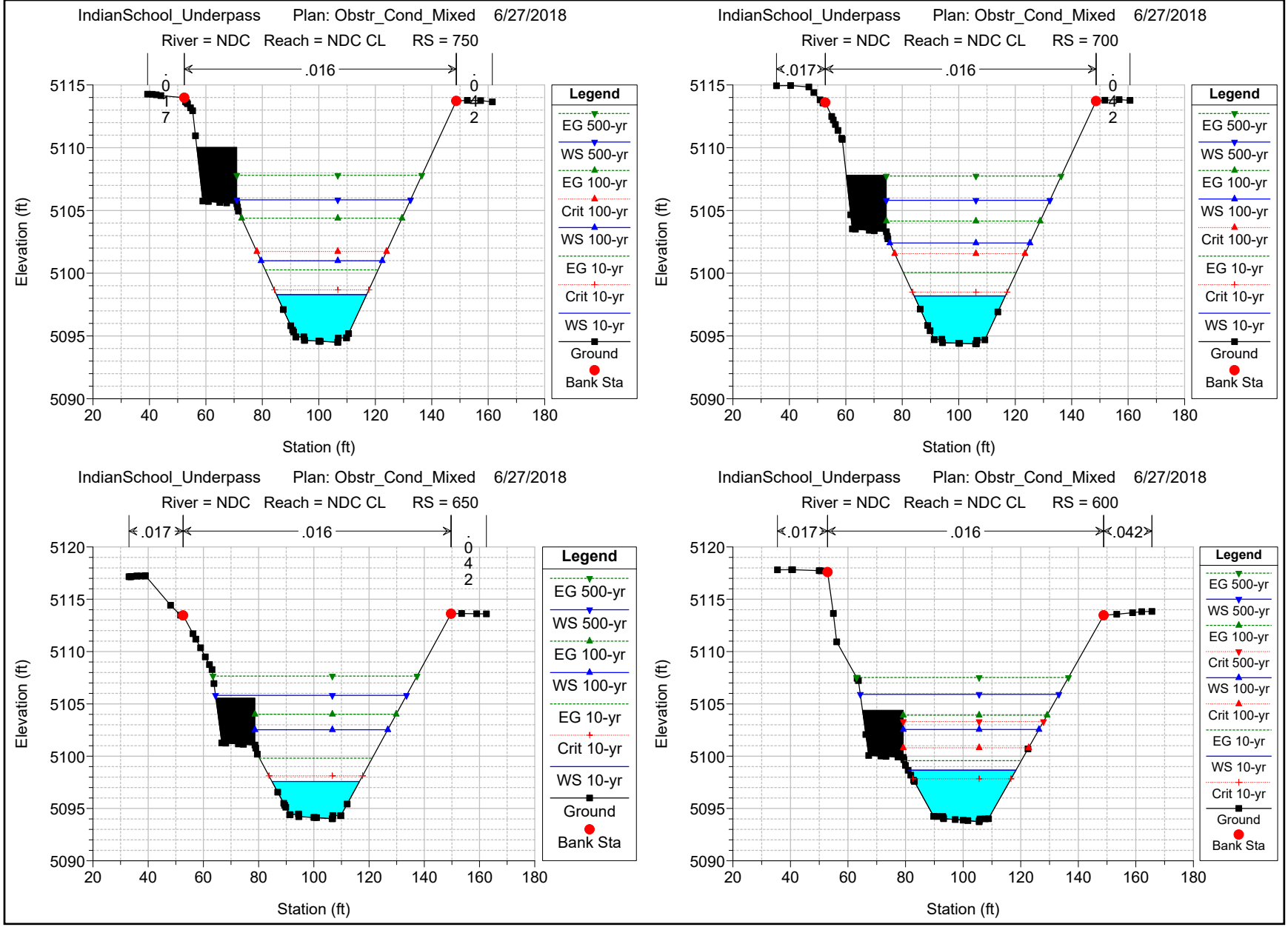
HEC-RAS Plan: Obstr_Cond_M River: NDC Reach: NDC CL (Continued)

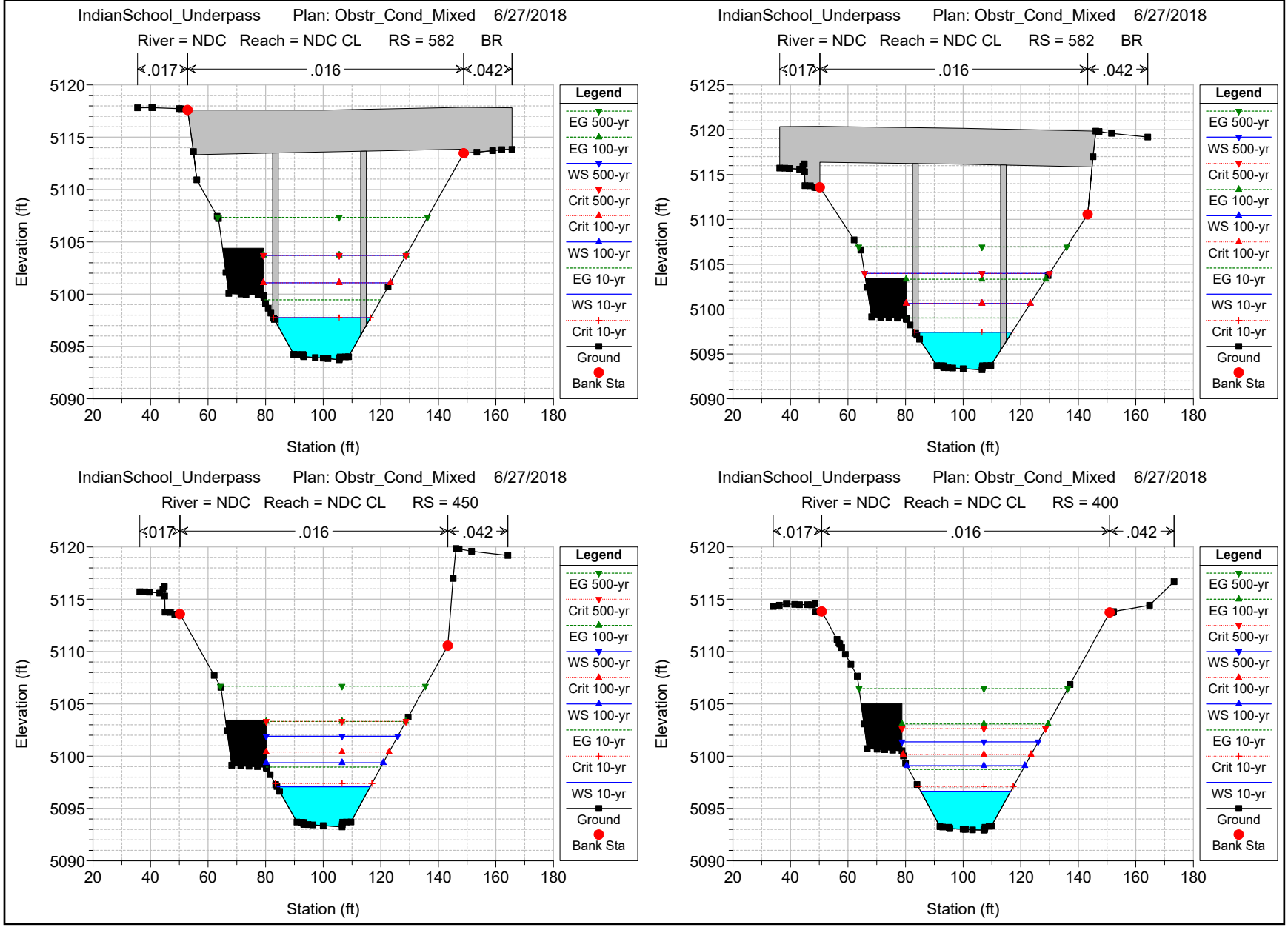
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| NDC CL | 100 | 10-yr | 1000.00 | 5092.03 | 5095.92 | 5096.16 | 5097.72 | 0.003593 | 10.78 | 92.80 | 32.55 | 1.13 |
| NDC CL | 100 | 100-yr | 2800.00 | 5092.03 | 5098.62 | 5099.23 | 5101.81 | 0.003519 | 14.34 | 195.32 | 43.36 | 1.19 |
| NDC CL | 100 | 500-yr | 5000.00 | 5092.03 | 5100.87 | 5101.74 | 5105.10 | 0.003371 | 16.50 | 303.00 | 52.35 | 1.21 |
| | | | | | | | | | | | | |
| NDC CL | 88.79 | 10-yr | 1000.00 | 5091.98 | 5095.90 | 5096.11 | 5097.66 | 0.003461 | 10.64 | 94.03 | 32.71 | 1.11 |
| NDC CL | 88.79 | 100-yr | 2800.00 | 5091.98 | 5098.53 | 5099.17 | 5101.77 | 0.003591 | 14.44 | 193.90 | 43.23 | 1.20 |
| NDC CL | 88.79 | 500-yr | 5000.00 | 5091.98 | 5100.77 | 5101.68 | 5105.06 | 0.003434 | 16.61 | 300.94 | 52.21 | 1.22 |
| | | | | | | | | | | | | |
| NDC CL | 50 | 10-yr | 1000.00 | 5091.85 | 5095.84 | 5095.97 | 5097.49 | 0.003166 | 10.29 | 97.17 | 33.18 | 1.06 |
| NDC CL | 50 | 100-yr | 2800.00 | 5091.85 | 5098.33 | 5099.02 | 5101.63 | 0.003682 | 14.56 | 192.30 | 43.15 | 1.22 |
| NDC CL | 50 | 500-yr | 5000.00 | 5091.85 | 5100.56 | 5101.52 | 5104.93 | 0.003524 | 16.76 | 298.27 | 52.06 | 1.23 |
| | | | | | | | | | | | | |
| NDC CL | 0 | 10-yr | 1000.00 | 5091.70 | 5095.67 | 5095.83 | 5097.35 | 0.003270 | 10.41 | 96.04 | 33.03 | 1.08 |
| NDC CL | 0 | 100-yr | 2800.00 | 5091.70 | 5098.34 | 5098.88 | 5101.43 | 0.003373 | 14.10 | 198.54 | 43.75 | 1.17 |
| NDC CL | 0 | 500-yr | 5000.00 | 5091.70 | 5100.53 | 5101.38 | 5104.73 | 0.003353 | 16.45 | 303.87 | 52.53 | 1.21 |

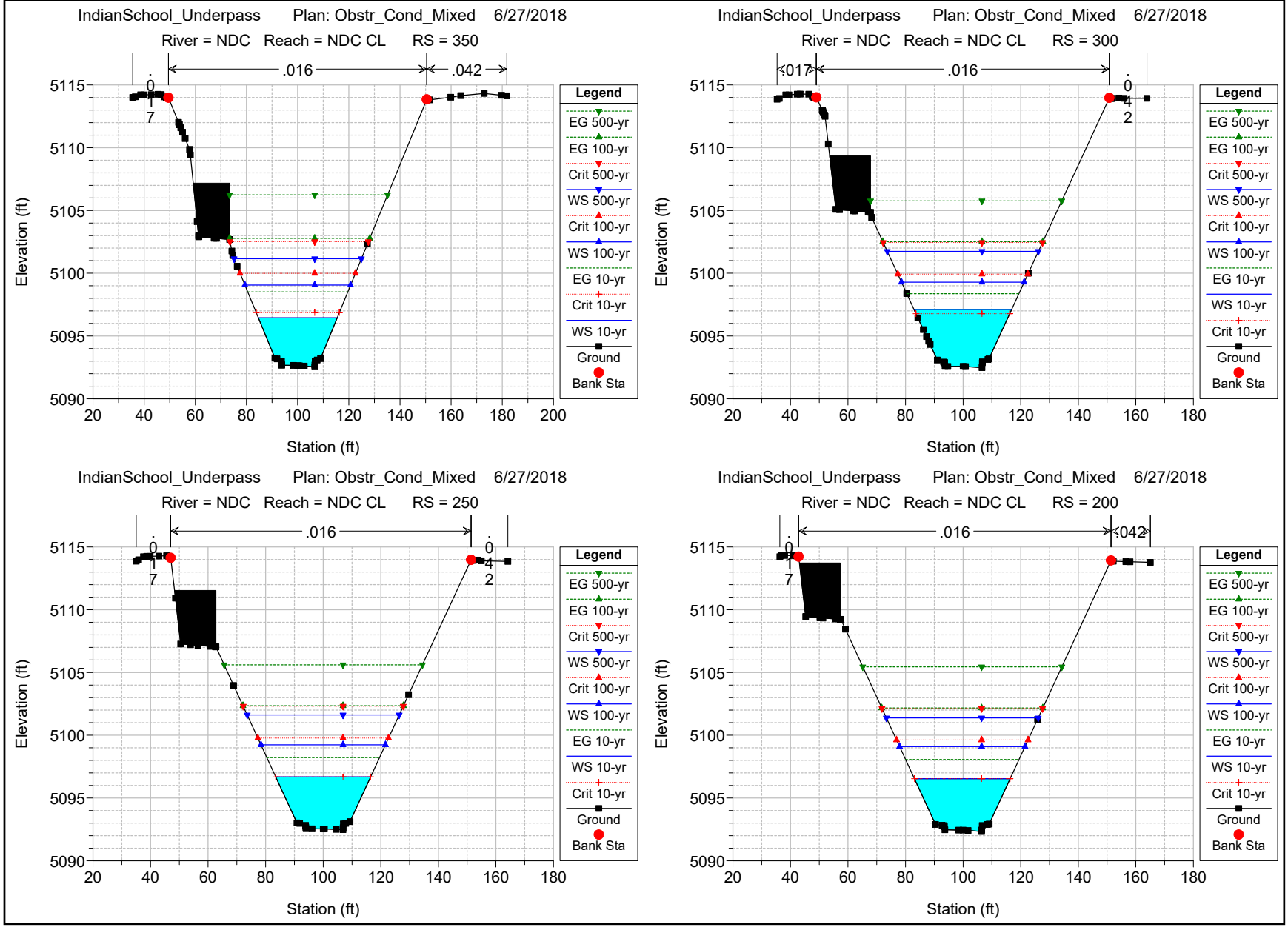

IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/25/2018
NDC NDC CL
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Elevation (ft)
5120
5115
5110
5105
5100
5095
5090
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

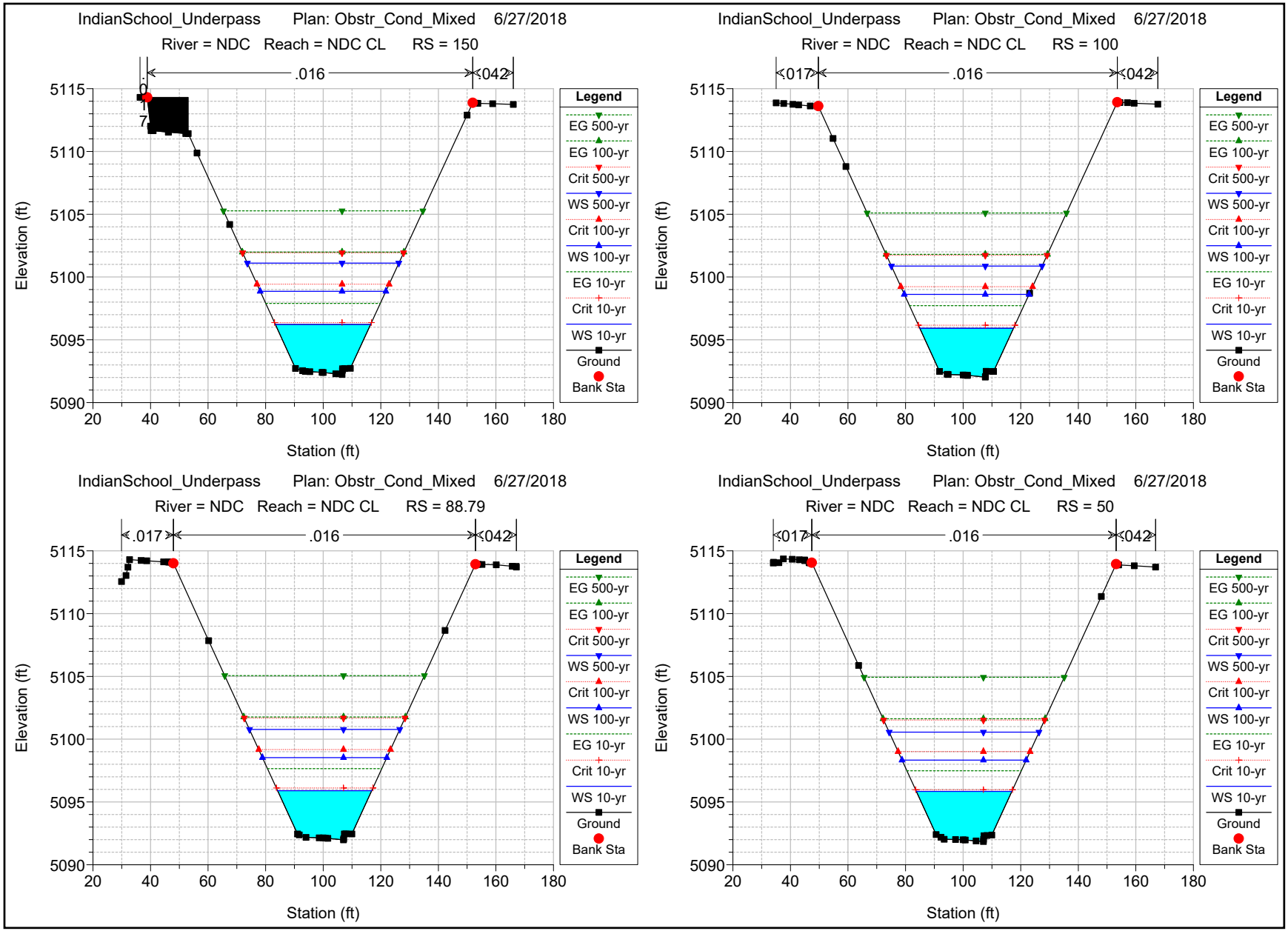

IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1090
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1050
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 1000
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 950
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

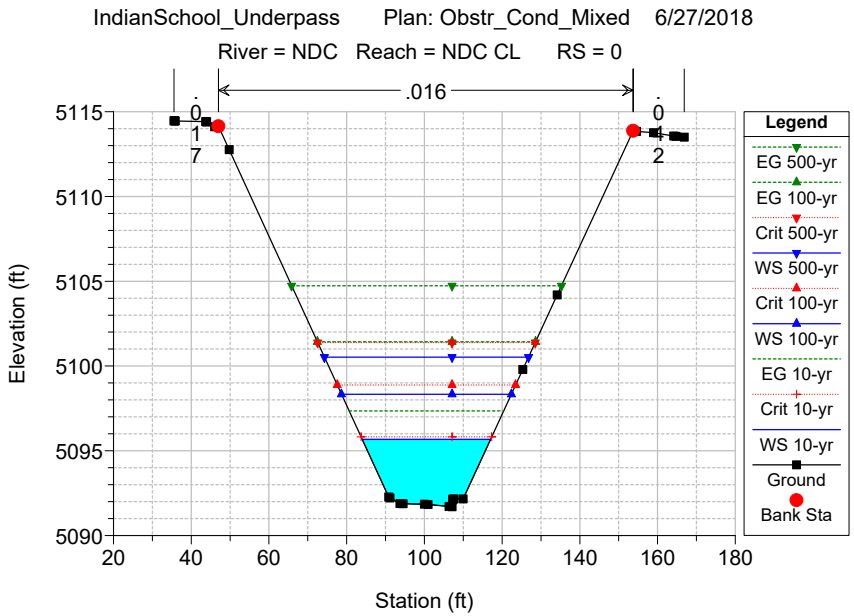

IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 944.69
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 900
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 850
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 800
.016
Elevation (ft)
Station (ft)


IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 750
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 700
.017
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 650
.017
.016
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 600
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
EG 100-yr
Crit 500-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
WS 500-yr
Crit 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 582 BR
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
WS 500-yr
Crit 500-yr
EG 100-yr
WS 100-yr
Crit 100-yr
EG 10-yr
WS 10-yr
Crit 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 450
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
Crit 500-yr
EG 100-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 400
.017
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta


IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 350
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 300
.017
.016
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 250
.016
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 200
.016
.042
Elevation (ft)
Station (ft)

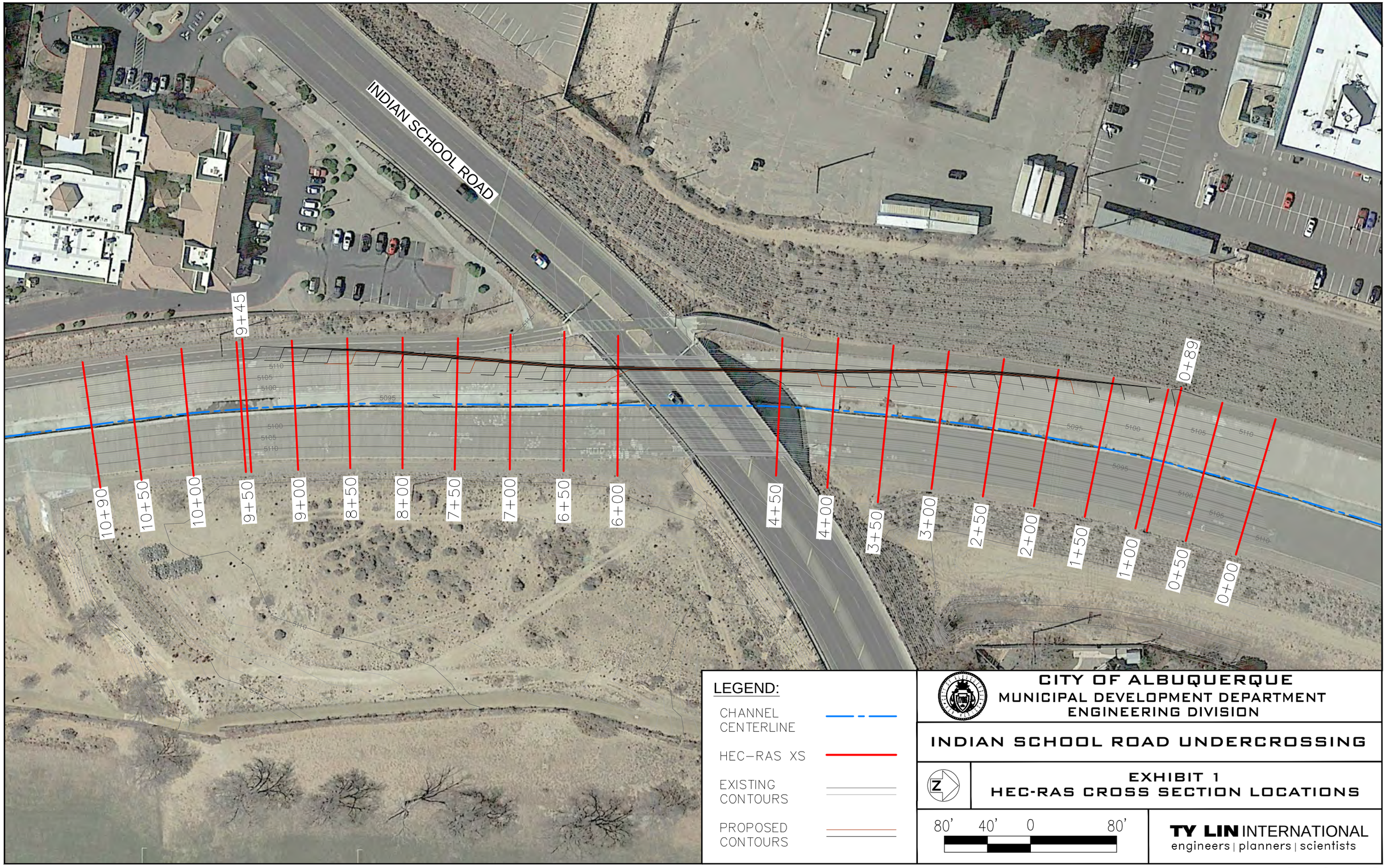

IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 150
.016
.042
Elevation (ft)
Station (ft)
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 100
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 88.79
.017
.016
.042
Elevation (ft)
Station (ft)
IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 50
.017
.016
.042
Elevation (ft)
Station (ft)


IndianSchool_Underpass Plan: Obstr_Cond_Mixed 6/27/2018
River = NDC Reach = NDC CL RS = 0
.016
.017
.042
Elevation (ft)
Station (ft)
5115
5110
5105
5100
5095
5090
20
40
60
80
100
120
140
160
180
Legend
EG 500-yr
EG 100-yr
Crit 500-yr
WS 500-yr
Crit 100-yr
WS 100-yr
EG 10-yr
Crit 10-yr
WS 10-yr
Ground
Bank Sta

TY·LIN INTERNATIONAL
engineers | planners | scientists

# APPENDIX C

**Drainage Exhibits**




LEGEND:

- CHANNEL CENTERLINE
- HEC–RAS XS
- EXISTING CONTOURS
- PROPOSED CONTOURS

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

# INDIAN SCHOOL ROAD UNDERCROSSING

## EXHIBIT 1
## HEC-RAS CROSS SECTION LOCATIONS

80' 40' 0 80'

TY LIN INTERNATIONAL
engineers | planners | scientists

Exhibit Size: 11x17