FUSCOE ENGINEERING

# HYDRAULIC STUDY FOR
# SOUTHWEST PARK

FUSCOE ENGINEERING, INC
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DATE PREPARED: JUNE 25, 2020
FEI# 1440-009

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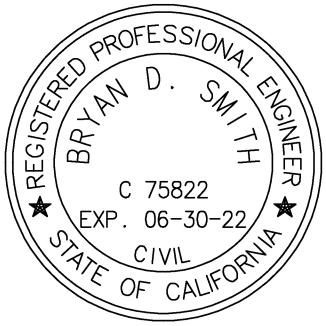
# HYDRAULIC ANALYSIS

# SOUTHWEST PARK

SAN DIEGO, CA 92154
APN: 634-120-12,15,17
May 4, 2020

Prepared Under the Responsible Charge of:

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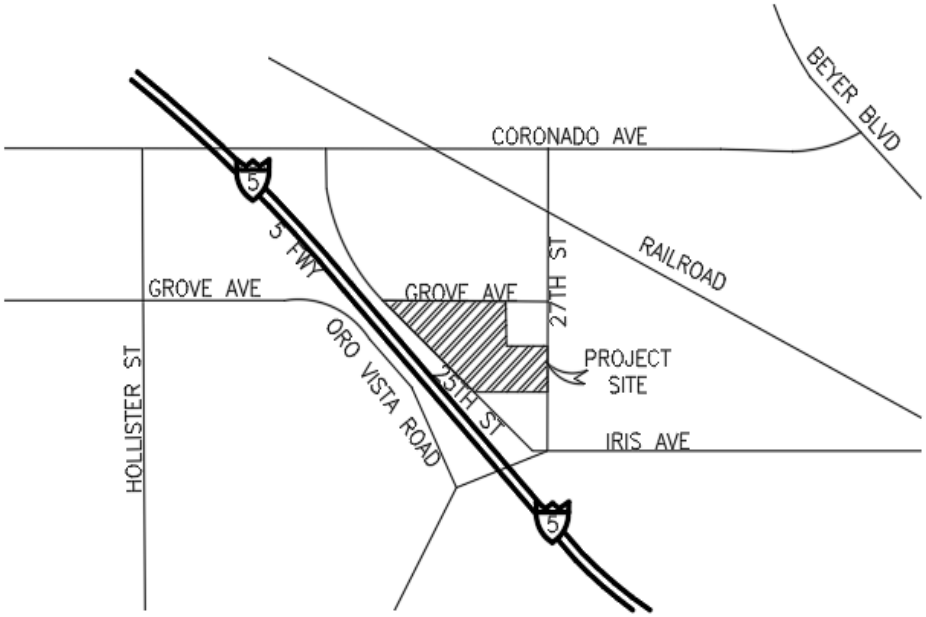
## INTRODUCTION

The proposed Southwest Neighborhood Park is located between 25th and 27th Streets and South of Grove Avenue in the City of San Diego, CA. The project site encompasses approximately 11.5 acres, and the proposed park includes features such as multi-sport fields, multi-purpose courts, children's play areas, picnic shelters, parking lots, comfort station, security lighting, storm water facilities, and right-of-way improvements. The project also proposes street widening on Grove and 27th as well as the construction of new curb, gutter, and pedestrian sidewalk on all frontage streets.




VICINITY MAP
NO SCALE

The existing project site is a vacant rural lot covered by light vegetation with moderate slopes averaging from 5%-10%. Nestor Creek runs east to west, north of the property boundary. The site is within the 100-year floodplain of Nestor Creek. Fill will be placed over the project site within the floodplain to raise most of the site above the Base Flood Elevation. This Hydraulic Study will show that the project will meet the City of San Diego and FEMA requirements for development within the floodplain and will not cause significant changes to the Base Flood Elevations (BFE) or expand the flood zone. It is anticipated that a CLOMR will be required through FEMA.

## REGULATORY GUIDANCE DOCUMENTS

The site is located within a 100-year FEMA floodplain Zone AH (FIRM Number 06073C2154H), and thus must comply with floodplain development regulations from both the City of San Diego *Municipal Code* and FEMA's *Code of Federal Regulations*. In the City's *Municipal Code* Chapter 14, Article 3, Division 1 (See Appendix A), the following development regulations are to be met and reflected upon plan submittal:

- *Municipal Code* Section 143.0146(a)(1)(2) "Proposed development in a Special Flood Hazard Area shall not adversely affect the flood carrying capacity of areas where base flood elevations have been determined but the floodway has not been designated. "Adversely affect" as used in this section means that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point"
- *Municipal Code* Section 143.0146(a)(6) "Development in a Special Flood Hazard Area shall not increase or expand a FIRM Zone A"
- *Municipal Code* Section 143.0146(c)(6) "New construction or substantial improvement of any structure shall have the lowest floor, including basement, elevated at least 2 feet above the base flood elevation".
- *Municipal Code* Section 143.0146(c)(*10) Within FIRM Zones AH or AO, new construction and substantial improvements of any structure shall be constructed so that there are adequate drainage paths around structures on slopes to guide flood waters around and away from proposed structures.*
- *Municipal Code* Section 143.0146(e)(6) "Development shall not significantly adversely affect existing sensitive biological resources on-site or off-site".

Any deviations from the *Municipal Code* are to be acknowledged in the Environmental Document. Per the municipal code, a CLOMR will need to be processed with FEMA due to changes in the site's topography.

## HYDRAULIC ANALYSIS

Utilizing the HEC-RAS software, we performed a hydraulic analysis on the portion of Nestor Creek that is adjacent to the project site. The results were compared to the FEMA effective model dated April 2016 (See Appendix B), and to the City of San Diego Working Maps effective 1977 and 1987. The HEC-RAS models were based on the hardcopy HEC-2 output data (Effective Model) we received from FEMA (December 1977) that correlates with the Working Maps. HEC-2 is a legacy program no longer provided by the Hydrologic Engineering Center.

Cross-sections 'Y', 'Z', 'AA', 'BB', 'CC', 'DD', and 'EE' were found to correspond with the Effective Model's cross-sections 150 through 157 (See Appendix C for reference). The analysis was bounded to the downstream end of our project just East of I-5 at 25$^{th}$ Street (Section 'Y') and upstream at the Western edge of 27$^{th}$ street (Section 'EE'). The FEMA 100-year Water Surface Elevations were held at the downstream end (32.4' NGVD).

## EXISTING HYDRAULIC CONDITION

The Effective Model data specifies a 100-year flowrate of 1,015cfs, however, according to Chapter 1 of the Flood Insurance Study effective April 2016, the flowrate through the project

frontage section of Nestor Creek was reduced from 1,015cfs to 456cfs due to the construction of the "Lot 6 Detention Basin" upstream of the railroad. This reduced flow was also reported on an updated Working Map (effective 1987), as well as in LOMR Case No. 03-09-0633P effective 2003 (see Appendix G for reference) which uses the revised flowrates in its HEC-RAS model we received from FEMA.

The Effective Model was re-run in HEC-RAS with 1,015cfs as quantified in the FIS, which yielded water surface elevations that match those in the FIS as well as the FIRM (Appendix D). A Corrected Model was run using the corrected flowrate of 456cfs and the resulting water surface elevations dropped in the upstream portion of the channel. The results indicate that although the change in flowrate was reported in Chapter 1 of the FIS (Appendix B), the effective hydraulic model was never re-run, and the current reported water surface elevations in the FIS are inaccurate. Water surface elevation comparisons are tabulated below.

There is a bridge modelled between sections 'BB' and 'CC' as Nestor Creek flows under Camino Avella and the data is shown in Appendix F for reference. Bridge data is shown in HEC-2 output as a data line beginning with 'BT' followed by a stationing and elevations.

## PROPOSED HYDRAULIC CONDITION

The project will fill portions of the site within the floodplain. However, as shown below, these areas were not essential for conveyance of floodwaters since filling did not create a significant increase in base flood elevations.

The channel elevations and Manning's coefficients were not modified from the effective model. The ground elevations in the 'Z' – 'DD' cross-sections were edited to reflect the most conservative grading scenario of the site. This resulted in a very minimal change in elevation from existing to proposed water surface elevations (below thresholds of significance). See Appendix E for all existing and proposed cross sections.

Table 1 shows the water surface elevation comparison between the Effective Model, the Effective Model Re-run, the Corrected Model, and the Proposed Conditions model. The Proposed Conditions Model increased by a maximum of 0.23' from the Corrected Model, which is well under the allowable 1'.

Table 1 – Summary of Findings

| Cross-Sections | | 100-Year Water Surface Elevations, feet (Datum NGVD29) | | | |
|---|---|---|---|---|---|
| City of San Diego Working Maps | FEMA HEC-2 | Effective Model (HEC-2 hardcopy data) | Effective Model Re-run (HEC-RAS, 1,015cfs) | Corrected Model (HEC-RAS, 456cfs) | Proposed Conditions Model (HEC-RAS, 456cfs) |
| Downstream of Analysis | | | | | |
| Y | 150 | 32.36 | 32.40 | 32.40 | 32.40 |
| Z | 151 | 32.35 | 32.40 | 32.40 | 32.39 |
| AA | 152 | 32.36 | 32.40 | 32.40 | 32.41 |
| BB | 153 | 31.5* | 31.49* | 32.3 | 32.47 |
| Bridge (HEC-2 XS 154.5) | | | | | |
| CC | 154 | 32.80 | 32.91 | 32.41 | 32.55 |
| DDA | 155 | 32.72 | 32.9 | 32.43 | 32.66 |
| DD | 156 | 34.22 | 34.22 | 32.69 | 32.70 |
| EE | 157 | 37.39 | 37.37 | 35.43 | 35.43 |
| Upstream of Analysis | | | | | |

*WSE drop is not reflected in FIS profile or FIRM

The HEC-RAS analysis results confirm that the effective model is incorrect, but no significant change in water surface elevation will occur as a result of the project as compared to the corrected model using 456 cfs. Table 1 shows the water surface elevation comparison between the FEMA hardcopy HEC-2 data, the Effective Existing Conditions model, and the Proposed Conditions model.

## CONCLUSION

The site is located within a 100-year FEMA floodplain zone AH (FIRM Number 06073C2154H) and will comply with sensitive lands development requirements from both the City of San Diego *Municipal Code* and FEMA's *Code of Federal Regulations*. Based on the HEC-RAS analyses in Appendix E, and as illustrated in Table 1, there will be no significant change in velocities or water surface elevation from existing corrected model to proposed conditions. Per the municipal code, a CLOMR or CLOMR-F will need to be processed with FEMA in order to place fill within the Floodplain.

# APPENDIX A

EXCERPTS FROM SAN DIEGO MUNICIPAL CODE

(D) All artificial channels shall consist of natural bottoms and sides and shall be designed and sized to accommodate existing and proposed riparian vegetation and other natural or proposed constraints. Where maintenance is proposed or required to keep vegetation at existing levels compatible with the design capacity of the channel, a responsible party shall be identified and a maintenance and monitoring process shall be established to the satisfaction of the City Engineer.

(6) *Development* shall not significantly adversely affect existing *sensitive biological resources* on-site or off-site.

(7) Within the Coastal Overlay Zone, no *structure* or portion thereof shall be erected, constructed, converted, established, altered or enlarged, or no landform alteration *grading*, placement or removal of vegetation, except that related to a historic and ongoing agricultural operation, or land division shall be permitted, provided:

(A) Parking lots, new roadways and roadway expansions shall be allowed only where indicated on an adopted *Local Coastal Program land use plan.*

(B) *Floodway* encroachments for utility and transportation crossings shall be offset by improvements or modifications to enable the passage of the *base flood*, in accordance with the FEMA standards and regulations provided in Section 143.0146.

(f) *Flood Fringe*. The applicable development regulations are those in the underlying zone, subject to the following supplemental regulations:

(1) Within the *flood fringe* of a *Special Flood Hazard Area*, permanent *structures* and *fill* for permanent *structures*, roads, and other *development* are allowed only if the following conditions are met:

(A) The *development* or *fill* will not significantly adversely affect existing *sensitive biological resources* on-site or off-site;

(B) The *development* is capable of withstanding *flooding* and does not require or cause the construction of off-site *flood* protective works including artificial *flood* channels, revetments, and levees nor will it cause adverse impacts related to *flooding* of properties located upstream or downstream, nor will it increase or expand a *(FIRM)* Zone A;

(b) Standards for *Subdivisions*

(1) All preliminary *subdivision* proposals shall identify the *Special Flood Hazard Area* and the elevation of the *base flood*.

(2) All final *subdivision maps* shall provide the elevation of proposed *structures* and pads. If the site is *filled* above the *base flood elevation*, the *lowest floor*, including *basement*, shall be certified to be 2 feet above the *base flood elevation* by a registered professional engineer or surveyor, and the *certification* shall be provided to the City Engineer.

(3) All *subdivisions* shall be designed to minimize *flood* damage.

(4) All *subdivisions* shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize *flood* damage.

(5) All *subdivisions* shall provide adequate drainage to reduce exposure to *flood* hazards.

(6) The final map shall bear the notation "Subject to Inundation" for those portions of the property with a *grade* lower than 2 feet above the *base flood elevation*.

(c) Standards of Construction

In all *Special Flood Hazard Areas*, the following standards apply for all *development*.

(1) All permitted, permanent *structures* and other significant improvements shall be anchored to prevent flotation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

(2) All permitted permanent *structures* and other significant improvements shall be constructed with materials and utility equipment resistant to *flood* damage.

(3) Construction methods and practices that minimize *flood* damage shall be used.

(4) All electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities shall be designed and located to prevent water from entering or accumulating within the equipment components during conditions of *flooding*.

(5) *Breakaway walls* shall be certified by a registered engineer or architect to meet all applicable FEMA requirements. The *certification* shall be provided to the City Engineer before final inspection approval.

(6) New construction or *substantial improvement* of any *structure* shall have the *lowest floor*, including *basement*, elevated at least 2 feet above the *base flood elevation*. Upon completion of the *development*, the elevation of the *lowest floor*, including *basement*, shall be certified by a registered professional engineer or surveyor to be properly elevated. The *certification* shall be provided to the City Engineer before final inspection approval. The City Engineer reserves the right to require a preliminary *certification* before foundation inspection approval.

(7) New construction or *substantial improvement* of any *structure* in *FIRM* Zone AH or AO shall have the *lowest floor*, including *basement*, elevated above the highest adjacent *grade* at least 2 feet higher than the depth number specified on the *FIRM*, or at least 4 feet if no depth number is specified. Upon the completion of the *structure* the elevation of the *lowest floor*, including *basement*, shall be certified by a registered professional engineer or surveyor, to be properly elevated. The *certification* shall be provided to the City Engineer before final inspection approval. The City Engineer may require a preliminary *certification* before foundation inspection approval.

(8) Permitted nonresidential construction shall either be elevated as required by Section 143.0146(c)(6) or (7) or, together with attendant utility and sanitary facilities, meet the flood proofing requirements of FEMA. *Certification* by a registered professional engineer or architect that such requirements are met shall be provided to the City Engineer before final inspection approval. The City Engineer may require a preliminary *certification* before foundation inspection approval.

(9) Fully enclosed areas below the *lowest floor* that are subject to *flooding* shall be certified by a registered professional engineer or architect that they comply with the flood proofing requirements of FEMA. The *certification* shall be provided to the City Engineer before final inspection approval.

# APPENDIX B

EXCERPTS FROM FEMA FLOOD INSURANCE STUDY

## TABLE 8: SUMMARY OF PEAK DISCHARGES

| Flooding Source and Location | Drainage Area (sq. miles) | Peak Discharges (cubic feet per second) 10% Annual-Chance | 2% Annual-Chance | 1% Annual-Chance | 0.2% Annual-Chance |
|---|---|---|---|---|---|
| Downstream of Balboa Boulevard | 5.9 | 550 | 1,400 | 1,700 | 3,300 |
| Upstream of Balboa Boulevard | 5.9 | 550 | 1,400 | 1,700 | 3,300 |
| Downstream of Confluence with Unnamed Tributary | 5.8 | 550 | 1,400 | 1,700 | 3,300 |
| Downstream of Clairmont Mesa Boulevard | 3.4 | 350 | 800[2] | 1,000[2] | 1,850[2] |
| Upstream of Clairmont Mesa Boulevard | 3.4 | 350 | 950 | 1,400 | 2,800 |
| Murray Canyon Creek | | | | | |
| At Mouth | 3.93 | 1,200 | 2,400 | 3,100 | 4,800 |
| Upstream of Unnamed Tributary | 2.74 | 1,000 | 1,700 | 2,100 | 3,300 |
| Downstream of Interstate Highway 805 | 1.76 | 800 | 1,200[3] | 1,400[3] | 1,800[3] |
| Upstream of Interstate Highway 805 | 1.76 | 800 | 1,600 | 2,100 | 3,400 |
| Nestor Creek | | | | | |
| At Palm Avenue | 2.75 | -- | -- | 1,093 | -- |

-- Data Not Available

[2] Decreases Due to Ponding Upstream

[3] Decrease Due to Overbank Losses Upstream

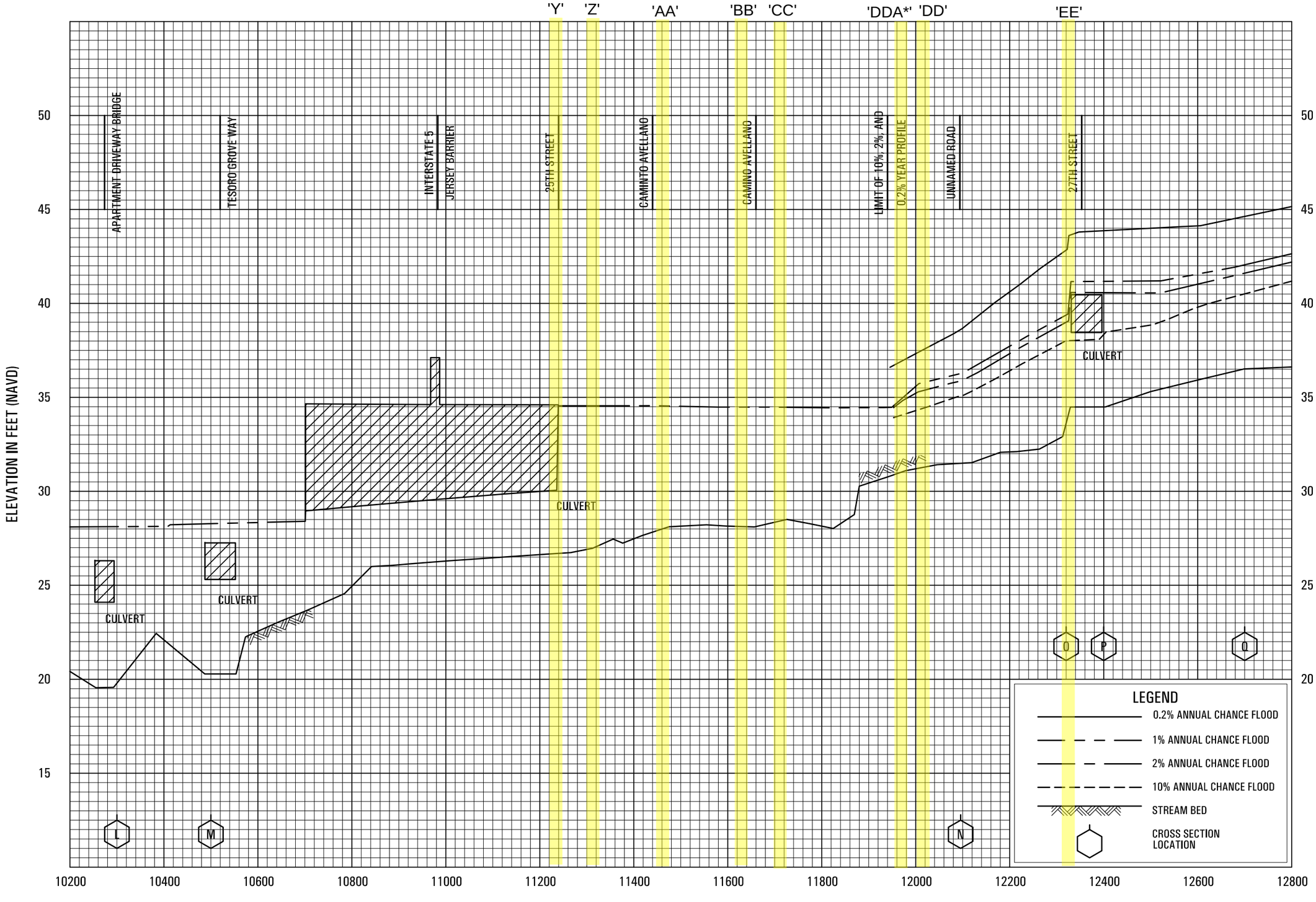
[4] Decrease Due to Construction of "Lot 6 Detention Basin" Upstream of Railroad

## TABLE 8: SUMMARY OF PEAK DISCHARGES

| Flooding Source and Location | Drainage Area (sq. miles) | Peak Discharges (cubic feet per second) 10% Annual-Chance | 2% Annual-Chance | 1% Annual-Chance | 0.2% Annual-Chance |
|---|---|---|---|---|---|
| At 19th Street | -- | -- | -- | 864[4] | -- |
| At Elm Avenue | 2.45 | -- | -- | 796[4] | -- |
| At Coronado Avenue | 2.33 | -- | -- | 698[4] | -- |
| At Hollister Street | 1.99 | -- | -- | 496[4] | -- |
| At 25th Street/Interstate 5 | 1.71 | -- | -- | 456[4] | -- |
| At San Diego and Arizona Eastern Railroad | 1.40 | 555 | 860 | 1,015 | 2,295 |
| North Avenue Tributary | | | | | |
| Approximately 1,730 feet upstream of North Broadway | 0.5 | -- | -- | 440 | -- |
| North Branch Poway Creek | | | | | |
| At Sycamore Canyon Road | 4.5 | 650 | 2,000 | 3,000 | 7,200 |
| North Tributary to Santa Maria | | | | | |
| At Mouth | 1.6 | 100 | 600 | 1,100 | 2,900 |
| Olive Creek | | | | | |
| At Mouth | 1.0 | -- | -- | 1,370 | -- |

-- Data Not Available

[4] Decrease Due to Construction of "Lot 6 Detention Basin" Upstream of Railroad




*SECTION 'DDA' IS NOT PRESENT ON THE WORKING MAPS, BUT IS PRESENT IN THE HARDCOPY HEC-2 DATA WE RECEIVED

# FLOOD PROFILES

## NESTOR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

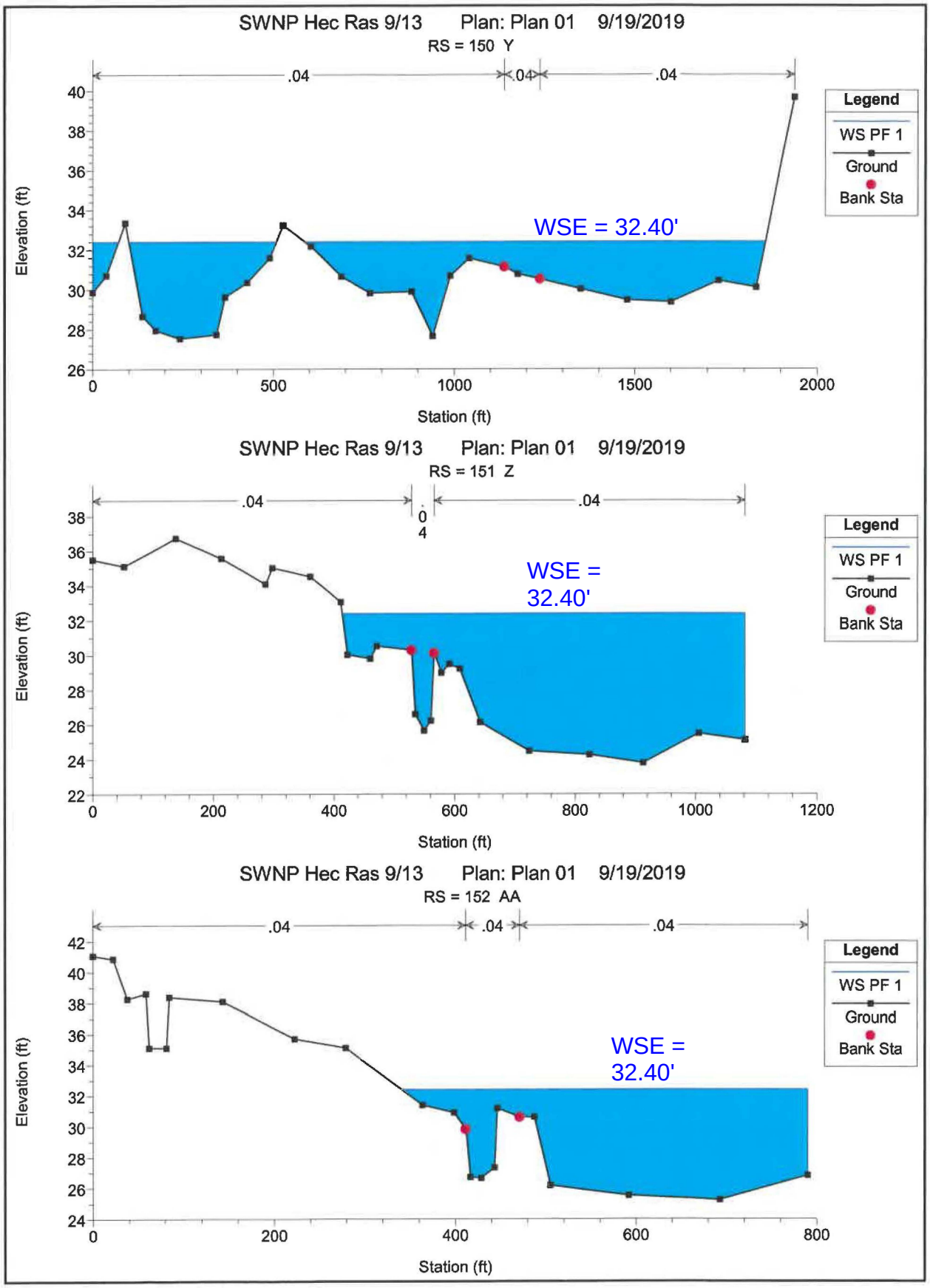
SAN DIEGO COUNTY, CA

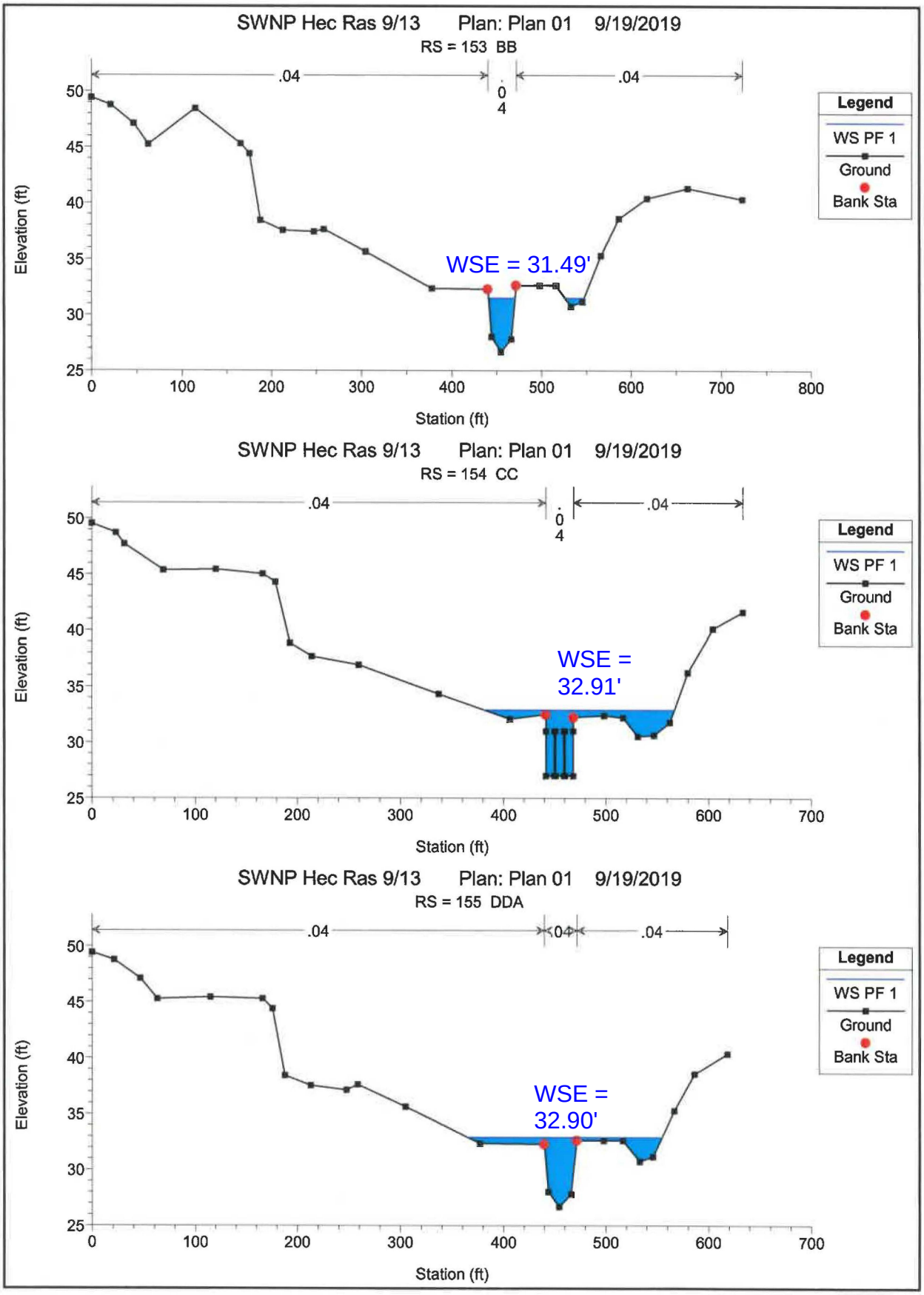
(AND INCORPORATED AREAS)

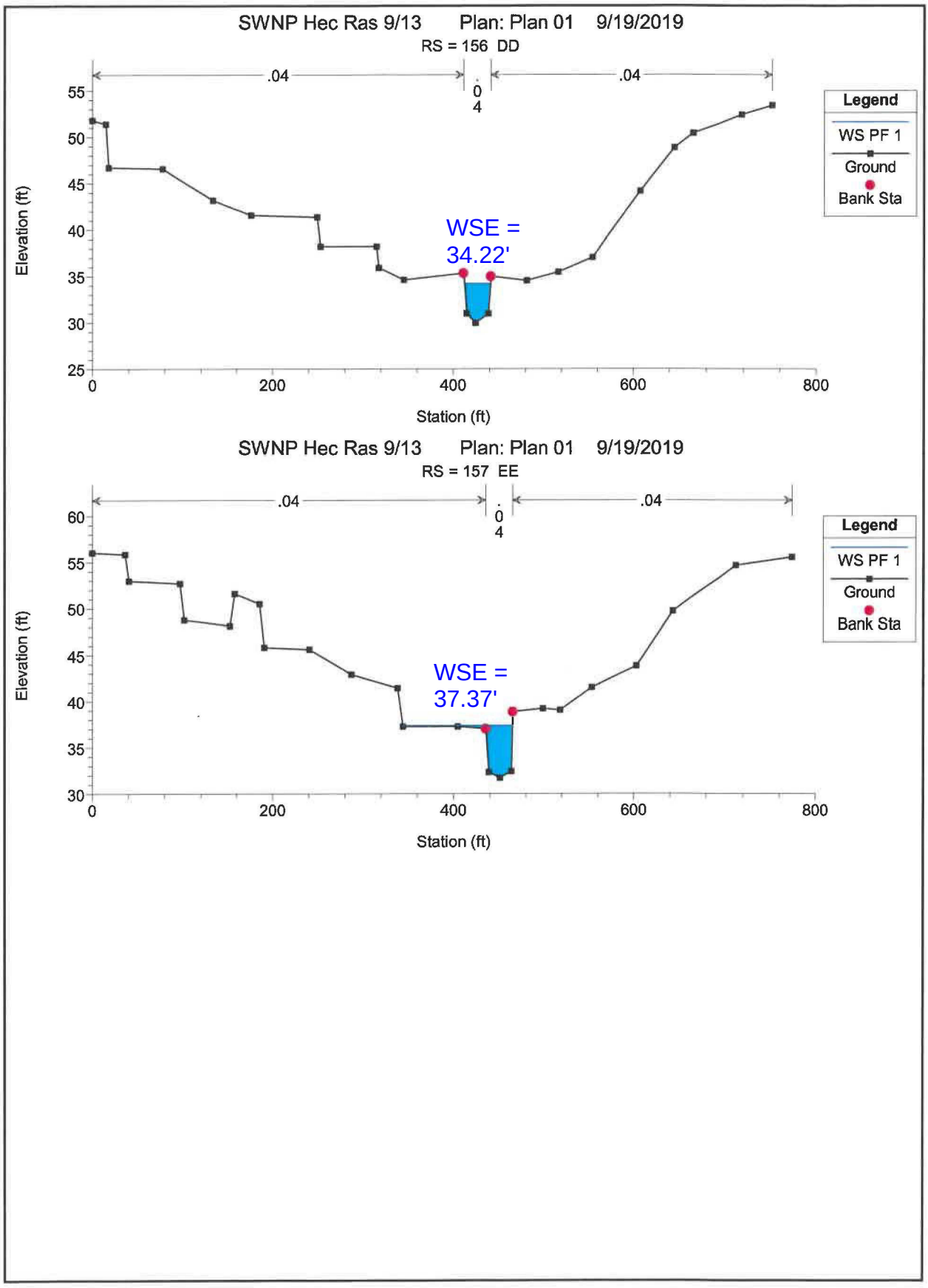
# APPENDIX C

HEC-RAS ANAYLSES AND CROSS-SECTIONS

Effective Model Rerun
1,015 cfs




SWNP Hec Ras 9/13 Plan: Plan 01 9/19/2019
RS = 153 BB
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 31.49'
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13 Plan: Plan 01 9/19/2019
RS = 154 CC
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.91'
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13 Plan: Plan 01 9/19/2019
RS = 155 DDA
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.90'
Elevation (ft)
Station (ft)


SWNP Hec Ras 9/13 Plan: Plan 01 9/19/2019
RS = 156 DD
.04
.04
0
4
Legend
WS PF 1
Ground
Bank Sta
WSE = 34.22'
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13 Plan: Plan 01 9/19/2019
RS = 157 EE
.04
.04
0
4
Legend
WS PF 1
Ground
Bank Sta
WSE = 37.37'
Elevation (ft)
Station (ft)

'EE'

Plan: Plan 01 Nestor Creek 1 RS: 157 Profile: PF 1

| E.G. Elev (ft) | 38.10 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.73 | Wt. n-Val. | 0.040 | 0.040 | |
| W.S. Elev (ft) | 37.37 | Reach Len. (ft) | 235.00 | 235.00 | 235.00 |
| Crit W.S. (ft) | 35.67 | Flow Area (sq ft) | 12.33 | 146.32 | |
| E.G. Slope (ft/ft) | 0.005297 | Area (sq ft) | 12.33 | 146.32 | |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 8.77 | 1006.23 | |
| Top Width (ft) | 121.02 | Top Width (ft) | 91.37 | 29.66 | |
| Vel Total (ft/s) | 6.40 | Avg. Vel. (ft/s) | 0.71 | 6.88 | |
| Max Chl Dpth (ft) | 5.67 | Hydr. Depth (ft) | 0.13 | 4.93 | |
| Conv. Total (cfs) | 13945.5 | Conv. (cfs) | 120.5 | 13825.0 | |
| Length Wtd. (ft) | 235.00 | Wetted Per. (ft) | 91.40 | 36.07 | |
| Min Ch El (ft) | 31.70 | Shear (lb/sq ft) | 0.04 | 1.34 | |
| Alpha | 1.15 | Stream Power (lb/ft s) | 0.03 | 9.23 | |
| Frctn Loss (ft) | 2.09 | Cum Volume (acre-ft) | 10.24 | 3.96 | 21.60 |
| C & E Loss (ft) | 0.10 | Cum SA (acres) | 4.88 | 1.05 | 3.97 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross |
| | sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |
| Warning: | The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate |
| | the need for additional cross sections. |

'DDA'

Plan: Plan 01 Nestor Creek 1 RS: 156 Profile: PF 1

| E.G. Elev (ft) | 35.91 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.69 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 34.22 | Reach Len. (ft) | 230.00 | 230.00 | 230.00 |
| Crit W.S. (ft) | 34.22 | Flow Area (sq ft) | | 97.28 | |
| E.G. Slope (ft/ft) | 0.017930 | Area (sq ft) | | 97.28 | |
| Q Total (cfs) | 1015.00 | Flow (cfs) | | 1015.00 | |
| Top Width (ft) | 28.74 | Top Width (ft) | | 28.74 | |
| Vel Total (ft/s) | 10.43 | Avg. Vel. (ft/s) | | 10.43 | |
| Max Chl Dpth (ft) | 4.26 | Hydr. Depth (ft) | | 3.38 | |
| Conv. Total (cfs) | 7580.1 | Conv. (cfs) | | 7580.1 | |
| Length Wtd. (ft) | 230.00 | Wetted Per. (ft) | | 32.02 | |
| Min Ch El (ft) | 29.96 | Shear (lb/sq ft) | | 3.40 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 35.48 | |
| Frctn Loss (ft) | 1.50 | Cum Volume (acre-ft) | 10.21 | 3.30 | 21.60 |
| C & E Loss (ft) | 0.38 | Cum SA (acres) | 4.63 | 0.89 | 3.97 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The energy equation could not be balanced within the specified number of iterations. The program used critical |
| | depth for the water surface and continued on with the calculations. |
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross |
| | sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |
| Warning: | The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate |
| | the need for additional cross sections. |
| Warning: | During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated |
| | water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The |
| | program defaulted to critical depth. |

'DD'

Plan: Plan 01 Nestor Creek 1 RS: 155 Profile: PF 1

| E.G. Elev (ft) | 33.31 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.41 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.90 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | 31.48 | Flow Area (sq ft) | 40.22 | 149.59 | 65.75 |
| E.G. Slope (ft/ft) | 0.003327 | Area (sq ft) | 40.22 | 149.59 | 65.75 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 56.80 | 837.71 | 120.49 |
| Top Width (ft) | 189.66 | Top Width (ft) | 75.16 | 31.63 | 82.87 |
| Vel Total (ft/s) | 3.97 | Avg. Vel. (ft/s) | 1.41 | 5.60 | 1.83 |
| Max Chl Dpth (ft) | 6.22 | Hydr. Depth (ft) | 0.54 | 4.73 | 0.79 |
| Conv. Total (cfs) | 17596.2 | Conv. (cfs) | 984.7 | 14522.6 | 2088.8 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 75.17 | 35.41 | 83.15 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.11 | 0.88 | 0.16 |
| Alpha | 1.67 | Stream Power (lb/ft s) | 0.16 | 4.91 | 0.30 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 10.10 | 2.65 | 21.43 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 4.43 | 0.73 | 3.75 |

Errors Warnings and Notes

| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
|---|---|
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 154.5 BR U Profile: PF 1

| E.G. Elev (ft) | 33.30 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.54 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.76 | Reach Len. (ft) | 3.00 | 3.00 | 3.00 |
| Crit W.S. (ft) | 31.01 | Flow Area (sq ft) | 29.55 | 104.26 | 53.79 |
| E.G. Slope (ft/ft) | 0.029118 | Area (sq ft) | 29.55 | 104.26 | 53.79 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 78.34 | 680.09 | 256.56 |
| Top Width (ft) | 185.77 | Top Width (ft) | 72.00 | 31.63 | 82.14 |
| Vel Total (ft/s) | 5.41 | Avg. Vel. (ft/s) | 2.65 | 6.52 | 4.77 |
| Max Chl Dpth (ft) | 6.08 | Hydr. Depth (ft) | 0.41 | 3.30 | 0.65 |
| Conv. Total (cfs) | 5948.2 | Conv. (cfs) | 459.1 | 3985.6 | 1503.5 |
| Length Wtd. (ft) | 3.00 | Wetted Per. (ft) | 129.21 | 99.87 | 82.41 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.42 | 1.90 | 1.19 |
| Alpha | 1.19 | Stream Power (lb/ft s) | 1.10 | 12.38 | 5.66 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 10.10 | 2.64 | 21.42 |
| C & E Loss (ft) | 0.09 | Cum SA (acres) | 4.43 | 0.73 | 3.75 |

Errors Warnings and Notes

| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
|---|---|
| | 1.4. This may indicate the need for additional cross sections. |
| Note: | Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. |

Plan: Plan 01 Nestor Creek 1 RS: 154.5 BR D Profile: PF 1

| E.G. Elev (ft) | 33.16 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.26 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.91 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | 31.02 | Flow Area (sq ft) | 31.99 | 108.09 | 116.30 |
| E.G. Slope (ft/ft) | 0.010636 | Area (sq ft) | 31.99 | 108.09 | 116.30 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 79.98 | 437.86 | 497.16 |
| Top Width (ft) | 185.82 | Top Width (ft) | 60.68 | 26.80 | 98.34 |
| Vel Total (ft/s) | 3.96 | Avg. Vel. (ft/s) | 2.50 | 4.05 | 4.27 |
| Max Chl Dpth (ft) | 5.91 | Hydr. Depth (ft) | 0.53 | 4.03 | 1.18 |
| Conv. Total (cfs) | 9841.9 | Conv. (cfs) | 775.5 | 4245.7 | 4820.6 |

Plan: Plan 01 Nestor Creek 1 RS: 154.5 BR D Profile: PF 1 (Continued)

| | | | | | |
|---|---|---|---|---|---|
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 60.70 | 99.41 | 98.67 |
| Min Ch El (ft) | 27.00 | Shear (lb/sq ft) | 0.35 | 0.72 | 0.78 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.87 | 2.92 | 3.35 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 10.10 | 2.64 | 21.42 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 4.42 | 0.73 | 3.74 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |
| Note: | Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used. |

'CC'
Plan: Plan 01 Nestor Creek 1 RS: 154 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 33.15 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.24 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.91 | Reach Len. (ft) | 35.00 | 35.00 | 35.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 32.16 | 148.22 | 116.68 |
| E.G. Slope (ft/ft) | 0.003742 | Area (sq ft) | 32.16 | 148.22 | 116.68 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 47.81 | 670.66 | 296.53 |
| Top Width (ft) | 185.92 | Top Width (ft) | 60.77 | 26.80 | 98.35 |
| Vel Total (ft/s) | 3.42 | Avg. Vel. (ft/s) | 1.49 | 4.52 | 2.54 |
| Max Chl Dpth (ft) | 5.91 | Hydr. Depth (ft) | 0.53 | 5.53 | 1.19 |
| Conv. Total (cfs) | 16592.9 | Conv. (cfs) | 781.5 | 10963.8 | 4847.6 |
| Length Wtd. (ft) | 35.00 | Wetted Per. (ft) | 60.78 | 52.75 | 98.64 |
| Min Ch El (ft) | 27.00 | Shear (lb/sq ft) | 0.12 | 0.66 | 0.28 |
| Alpha | 1.33 | Stream Power (lb/ft s) | 0.18 | 2.97 | 0.70 |
| Frctn Loss (ft) | 0.22 | Cum Volume (acre-ft) | 10.10 | 2.63 | 21.42 |
| C & E Loss (ft) | 0.11 | Cum SA (acres) | 4.42 | 0.73 | 3.74 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross |
| | sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

'BB'
Plan: Plan 01 Nestor Creek 1 RS: 153 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.82 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 1.33 | Wt. n-Val. | | 0.040 | 0.040 |
| W.S. Elev (ft) | 31.49 | Reach Len. (ft) | 245.00 | 245.00 | 245.00 |
| Crit W.S. (ft) | 31.48 | Flow Area (sq ft) | | 105.99 | 9.69 |
| E.G. Slope (ft/ft) | 0.013122 | Area (sq ft) | | 105.99 | 9.69 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | | 990.56 | 24.44 |
| Top Width (ft) | 50.69 | Top Width (ft) | | 29.55 | 21.14 |
| Vel Total (ft/s) | 8.77 | Avg. Vel. (ft/s) | | 9.35 | 2.52 |
| Max Chl Dpth (ft) | 4.81 | Hydr. Depth (ft) | | 3.59 | 0.46 |
| Conv. Total (cfs) | 8860.5 | Conv. (cfs) | | 8647.2 | 213.3 |
| Length Wtd. (ft) | 245.00 | Wetted Per. (ft) | | 32.57 | 21.22 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | | 2.67 | 0.37 |
| Alpha | 1.11 | Stream Power (lb/ft s) | | 24.92 | 0.94 |
| Frctn Loss (ft) | 0.01 | Cum Volume (acre-ft) | 10.08 | 2.53 | 21.37 |
| C & E Loss (ft) | 0.40 | Cum SA (acres) | 4.40 | 0.70 | 3.69 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross |

Errors Warnings and Notes (Continued)

| | |
|---|---|
| | sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 152 'AA' Profile: PF 1

| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | 240.00 | 210.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 80.91 | 216.84 | 1995.42 |
| E.G. Slope (ft/ft) | 0.000014 | Area (sq ft) | 80.91 | 216.84 | 1995.42 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 12.36 | 69.16 | 933.48 |
| Top Width (ft) | 448.84 | Top Width (ft) | 70.45 | 59.89 | 318.50 |
| Vel Total (ft/s) | 0.44 | Avg. Vel. (ft/s) | 0.15 | 0.32 | 0.47 |
| Max Chl Dpth (ft) | 7.16 | Hydr. Depth (ft) | 1.15 | 3.62 | 6.27 |
| Conv. Total (cfs) | 270443.5 | Conv. (cfs) | 3294.1 | 18426.8 | 248722.6 |
| Length Wtd. (ft) | 155.15 | Wetted Per. (ft) | 70.52 | 62.67 | 324.65 |
| Min Ch El (ft) | 26.67 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.01 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 9.86 | 1.62 | 15.73 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 4.20 | 0.45 | 2.74 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The cross-section end points had to be extended vertically for the computed water surface. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 151'Z' Profile: PF 1

| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | 280.00 | 140.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 244.11 | 209.64 | 3676.92 |
| E.G. Slope (ft/ft) | 0.000004 | Area (sq ft) | 244.11 | 209.64 | 3676.92 |
| Q Total (cfs) | 1015.00 | Flow (cfs) | 28.01 | 44.56 | 942.43 |
| Top Width (ft) | 668.02 | Top Width (ft) | 115.54 | 37.15 | 515.33 |
| Vel Total (ft/s) | 0.25 | Avg. Vel. (ft/s) | 0.11 | 0.21 | 0.26 |
| Max Chl Dpth (ft) | 8.62 | Hydr. Depth (ft) | 2.11 | 5.64 | 7.14 |
| Conv. Total (cfs) | 539967.4 | Conv. (cfs) | 14901.2 | 23705.1 | 501361.0 |
| Length Wtd. (ft) | 159.66 | Wetted Per. (ft) | 115.89 | 39.48 | 522.86 |
| Min Ch El (ft) | 25.66 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 8.96 | 0.60 | 5.96 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.69 | 0.22 | 1.30 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The cross-section end points had to be extended vertically for the computed water surface. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 150'Y' Profile: PF 1

| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 28.64 | Flow Area (sq ft) | 2543.83 | 161.56 | 1515.53 |
| E.G. Slope (ft/ft) | 0.000012 | Area (sq ft) | 2543.83 | 161.56 | 1515.53 |

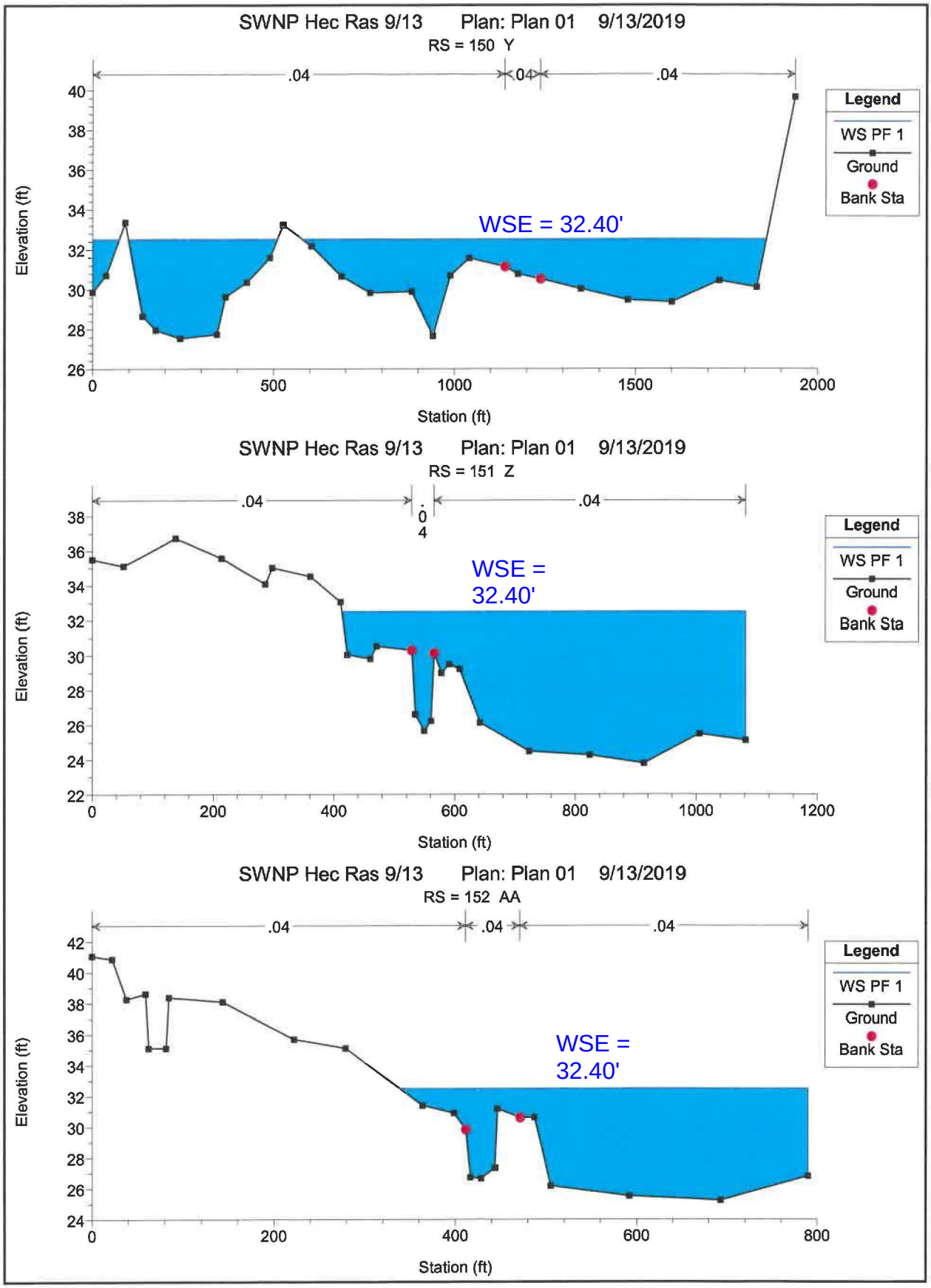
Plan: Plan 01  Nestor Creek  1  RS: 150'Y' Profile: PF 1 (Continued)

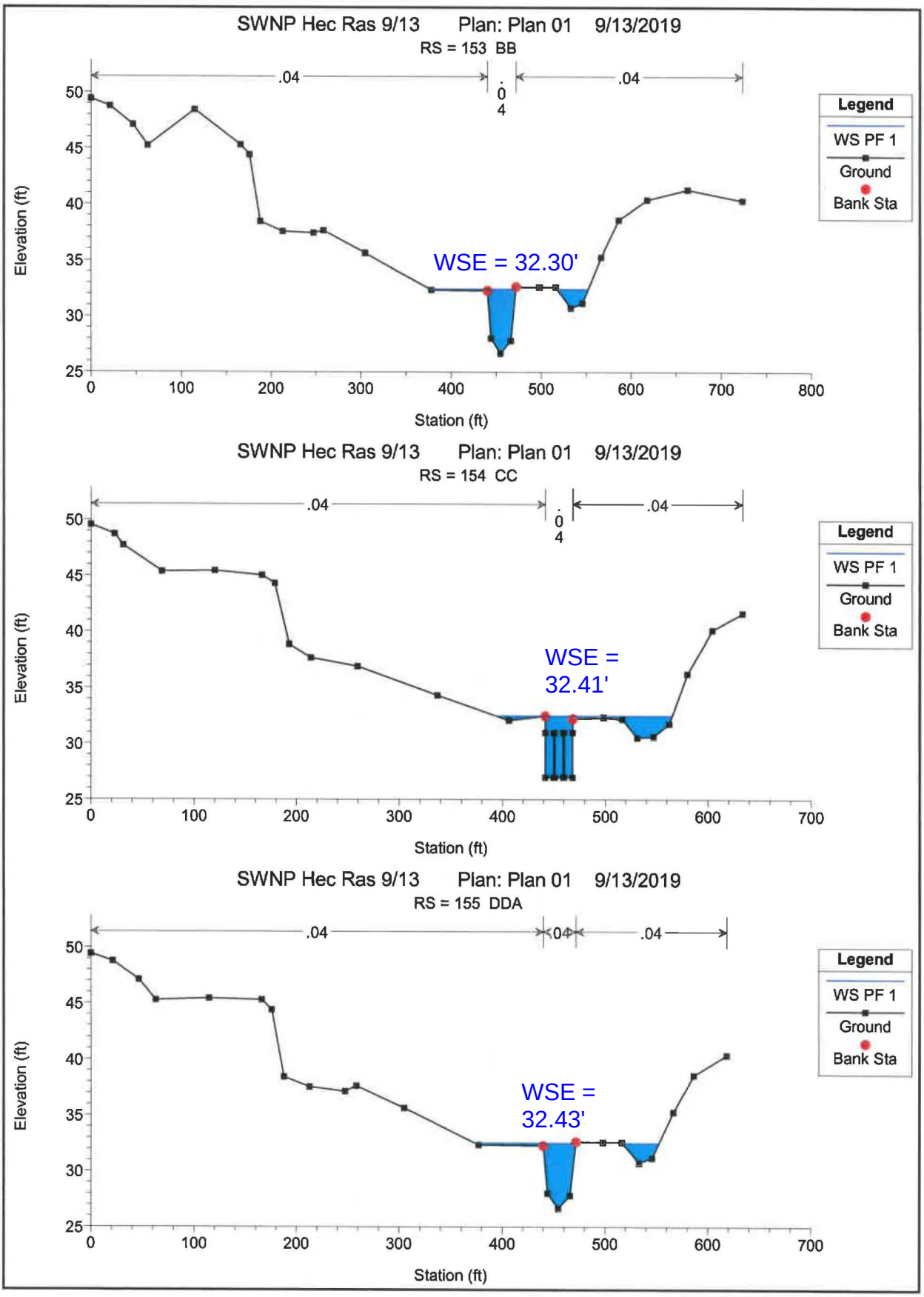
| | | | | | |
|---|---|---|---|---|---|
| Q Total (cfs) | 1015.00 | Flow (cfs) | 628.48 | 29.21 | 357.31 |
| Top Width (ft) | 1750.41 | Top Width (ft) | 1032.12 | 98.40 | 619.89 |
| Vel Total (ft/s) | 0.24 | Avg. Vel. (ft/s) | 0.25 | 0.18 | 0.24 |
| Max Chl Dpth (ft) | 4.87 | Hydr. Depth (ft) | 2.46 | 1.64 | 2.44 |
| Conv. Total (cfs) | 290205.6 | Conv. (cfs) | 179692.4 | 8352.9 | 102160.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 1035.17 | 98.40 | 620.00 |
| Min Ch El (ft) | 30.52 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

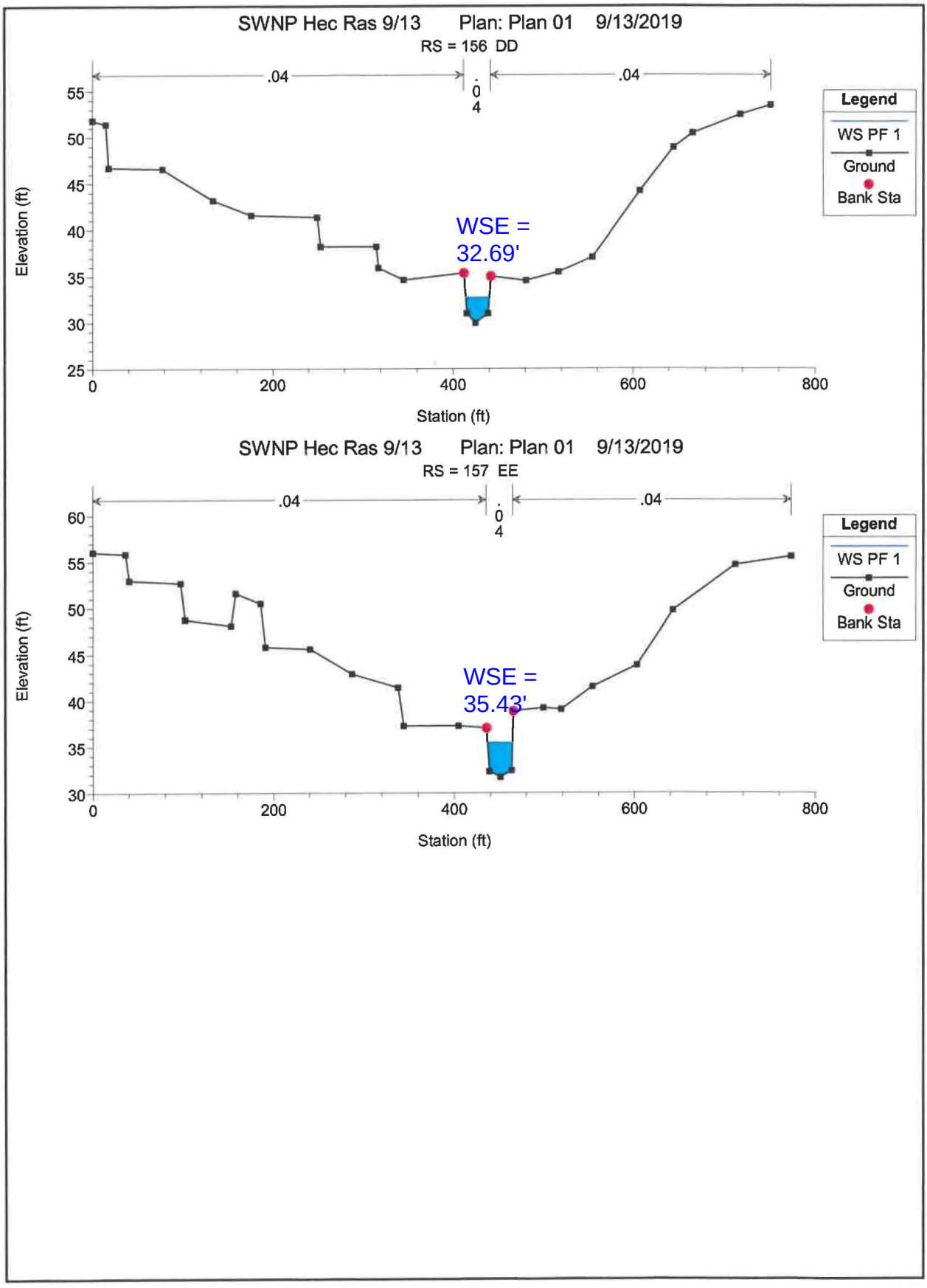
Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |

Corrected Model
456cfs




SWNP Hec Ras 9/13 Plan: Plan 01 9/13/2019
RS = 153 BB
.04
.04
.04
WSE = 32.30'
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13 Plan: Plan 01 9/13/2019
RS = 154 CC
.04
.04
.04
WSE = 32.41'
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13 Plan: Plan 01 9/13/2019
RS = 155 DDA
.04
.04
.04
WSE = 32.43'
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


SWNP Hec Ras 9/13 Plan: Plan 01 9/13/2019
RS = 156 DD
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.69'
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13 Plan: Plan 01 9/13/2019
RS = 157 EE
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 35.43'
Elevation (ft)
Station (ft)

'EE'

Plan: Plan 01 Nestor Creek 1 RS: 157 Profile: PF 1

| E.G. Elev (ft) | 35.83 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.40 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 35.43 | Reach Len. (ft) | 235.00 | 235.00 | 235.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 90.15 | |
| E.G. Slope (ft/ft) | 0.004686 | Area (sq ft) | | 90.15 | |
| Q Total (cfs) | 456.00 | Flow (cfs) | | 456.00 | |
| Top Width (ft) | 28.08 | Top Width (ft) | | 28.08 | |
| Vel Total (ft/s) | 5.06 | Avg. Vel. (ft/s) | | 5.06 | |
| Max Chl Dpth (ft) | 3.73 | Hydr. Depth (ft) | | 3.21 | |
| Conv. Total (cfs) | 6661.6 | Conv. (cfs) | | 6661.6 | |
| Length Wtd. (ft) | 235.00 | Wetted Per. (ft) | | 32.13 | |
| Min Ch El (ft) | 31.70 | Shear (lb/sq ft) | | 0.82 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 4.15 | |
| Frctn Loss (ft) | 2.01 | Cum Volume (acre-ft) | 10.10 | 3.61 | 21.56 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 4.63 | 1.03 | 3.87 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross |
| | sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |
| Warning: | The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate |
| | the need for additional cross sections. |

'DDA'

Plan: Plan 01 Nestor Creek 1 RS: 156 Profile: PF 1

| E.G. Elev (ft) | 33.75 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.06 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 32.69 | Reach Len. (ft) | 230.00 | 230.00 | 230.00 |
| Crit W.S. (ft) | 32.69 | Flow Area (sq ft) | | 55.11 | |
| E.G. Slope (ft/ft) | 0.020244 | Area (sq ft) | | 55.11 | |
| Q Total (cfs) | 456.00 | Flow (cfs) | | 456.00 | |
| Top Width (ft) | 26.36 | Top Width (ft) | | 26.36 | |
| Vel Total (ft/s) | 8.27 | Avg. Vel. (ft/s) | | 8.27 | |
| Max Chl Dpth (ft) | 2.73 | Hydr. Depth (ft) | | 2.09 | |
| Conv. Total (cfs) | 3204.9 | Conv. (cfs) | | 3204.9 | |
| Length Wtd. (ft) | 230.00 | Wetted Per. (ft) | | 28.14 | |
| Min Ch El (ft) | 29.96 | Shear (lb/sq ft) | | 2.48 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 20.48 | |
| Frctn Loss (ft) | 0.67 | Cum Volume (acre-ft) | 10.10 | 3.22 | 21.56 |
| C & E Loss (ft) | 0.28 | Cum SA (acres) | 4.63 | 0.88 | 3.87 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The energy equation could not be balanced within the specified number of iterations. The program used critical |
| | depth for the water surface and continued on with the calculations. |
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross |
| | sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |
| Warning: | The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate |
| | the need for additional cross sections. |
| Warning: | During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated |
| | water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The |
| | program defaulted to critical depth. |

'DD'

Plan: Plan 01  Nestor Creek  1  RS: 155  Profile: PF 1

| E.G. Elev (ft) | 32.56 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.13 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.43 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | 29.64 | Flow Area (sq ft) | 7.24 | 134.72 | 35.71 |
| E.G. Slope (ft/ft) | 0.001110 | Area (sq ft) | 7.24 | 134.72 | 35.71 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 2.08 | 408.66 | 45.26 |
| Top Width (ft) | 130.52 | Top Width (ft) | 64.90 | 31.40 | 34.22 |
| Vel Total (ft/s) | 2.57 | Avg. Vel. (ft/s) | 0.29 | 3.03 | 1.27 |
| Max Chl Dpth (ft) | 5.75 | Hydr. Depth (ft) | 0.11 | 4.29 | 1.04 |
| Conv. Total (cfs) | 13687.5 | Conv. (cfs) | 62.4 | 12266.5 | 1358.7 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 64.90 | 35.11 | 34.45 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.01 | 0.27 | 0.07 |
| Alpha | 1.28 | Stream Power (lb/ft s) | 0.00 | 0.81 | 0.09 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 10.09 | 2.72 | 21.47 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 4.46 | 0.73 | 3.78 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4.  This may indicate the need for additional cross sections. |

Plan: Plan 01  Nestor Creek  1  RS: 154.5  BR U  Profile: PF 1

| E.G. Elev (ft) | 32.56 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.20 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.36 | Reach Len. (ft) | 3.00 | 3.00 | 3.00 |
| Crit W.S. (ft) | 29.65 | Flow Area (sq ft) | 2.24 | 95.43 | 33.08 |
| E.G. Slope (ft/ft) | 0.006541 | Area (sq ft) | 2.24 | 95.43 | 33.08 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 0.71 | 356.44 | 98.85 |
| Top Width (ft) | 100.40 | Top Width (ft) | 63.20 | 4.06 | 33.14 |
| Vel Total (ft/s) | 3.49 | Avg. Vel. (ft/s) | 0.32 | 3.74 | 2.99 |
| Max Chl Dpth (ft) | 5.68 | Hydr. Depth (ft) | 0.04 | 23.51 | 1.00 |
| Conv. Total (cfs) | 5638.2 | Conv. (cfs) | 8.8 | 4407.2 | 1222.2 |
| Length Wtd. (ft) | 3.00 | Wetted Per. (ft) | 73.66 | 68.84 | 33.35 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.01 | 0.57 | 0.41 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 2.11 | 1.21 |
| Frctn Loss (ft) | 0.02 | Cum Volume (acre-ft) | 10.09 | 2.72 | 21.47 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 4.45 | 0.73 | 3.78 |

Plan: Plan 01  Nestor Creek  1  RS: 154.5  BR D  Profile: PF 1

| E.G. Elev (ft) | 32.52 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.12 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.39 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | 29.23 | Flow Area (sq ft) | 5.41 | 97.20 | 66.40 |
| E.G. Slope (ft/ft) | 0.004495 | Area (sq ft) | 5.41 | 97.20 | 66.40 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 3.84 | 294.06 | 158.11 |
| Top Width (ft) | 129.91 | Top Width (ft) | 35.67 | | 94.23 |
| Vel Total (ft/s) | 2.70 | Avg. Vel. (ft/s) | 0.71 | 3.03 | 2.38 |
| Max Chl Dpth (ft) | 5.39 | Hydr. Depth (ft) | 0.15 | | 0.70 |
| Conv. Total (cfs) | 6801.3 | Conv. (cfs) | 57.2 | 4385.9 | 2358.2 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 35.68 | 72.61 | 94.47 |
| Min Ch El (ft) | 27.00 | Shear (lb/sq ft) | 0.04 | 0.38 | 0.20 |
| Alpha | 1.08 | Stream Power (lb/ft s) | 0.03 | 1.14 | 0.47 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 10.09 | 2.71 | 21.47 |

Plan: Plan 01 Nestor Creek 1 RS: 154.5 BR D Profile: PF 1 (Continued)

| | | | | | |
|---|---|---|---|---|---|
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 4.45 | 0.73 | 3.78 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

'CC'

Plan: Plan 01 Nestor Creek 1 RS: 154 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.51 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.10 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.41 | Reach Len. (ft) | 35.00 | 35.00 | 35.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 5.83 | 134.72 | 67.60 |
| E.G. Slope (ft/ft) | 0.001599 | Area (sq ft) | 5.83 | 134.72 | 67.60 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 2.53 | 374.34 | 79.13 |
| Top Width (ft) | 160.24 | Top Width (ft) | 37.03 | 26.79 | 96.42 |
| Vel Total (ft/s) | 2.19 | Avg. Vel. (ft/s) | 0.43 | 2.78 | 1.17 |
| Max Chl Dpth (ft) | 5.41 | Hydr. Depth (ft) | 0.16 | 5.03 | 0.70 |
| Conv. Total (cfs) | 11403.1 | Conv. (cfs) | 63.2 | 9361.2 | 1978.8 |
| Length Wtd. (ft) | 35.00 | Wetted Per. (ft) | 37.04 | 52.66 | 96.64 |
| Min Ch El (ft) | 27.00 | Shear (lb/sq ft) | 0.02 | 0.26 | 0.07 |
| Alpha | 1.37 | Stream Power (lb/ft s) | 0.01 | 0.71 | 0.08 |
| Frctn Loss (ft) | 0.05 | Cum Volume (acre-ft) | 10.09 | 2.71 | 21.46 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 4.45 | 0.73 | 3.78 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |

'BB'

Plan: Plan 01 Nestor Creek 1 RS: 153 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.45 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.15 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.30 | Reach Len. (ft) | 245.00 | 245.00 | 245.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 0.06 | 130.53 | 31.29 |
| E.G. Slope (ft/ft) | 0.001266 | Area (sq ft) | 0.06 | 130.53 | 31.29 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 0.00 | 415.75 | 40.25 |
| Top Width (ft) | 74.87 | Top Width (ft) | 11.26 | 31.24 | 32.37 |
| Vel Total (ft/s) | 2.82 | Avg. Vel. (ft/s) | 0.04 | 3.18 | 1.29 |
| Max Chl Dpth (ft) | 5.62 | Hydr. Depth (ft) | 0.01 | 4.18 | 0.97 |
| Conv. Total (cfs) | 12816.7 | Conv. (cfs) | 0.1 | 11685.3 | 1131.3 |
| Length Wtd. (ft) | 245.00 | Wetted Per. (ft) | 11.26 | 34.89 | 32.58 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.00 | 0.30 | 0.08 |
| Alpha | 1.18 | Stream Power (lb/ft s) | 0.00 | 0.94 | 0.10 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 10.08 | 2.60 | 21.42 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 4.43 | 0.71 | 3.73 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

'AA'

Plan: Plan 01 Nestor Creek 1 RS: 152 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | 240.00 | 210.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 80.89 | 216.82 | 1995.34 |

'AA'

Plan: Plan 01 Nestor Creek 1 RS: 152 Profile: PF 1 (Continued)

| | | | | | |
|---|---|---|---|---|---|
| E.G. Slope (ft/ft) | 0.000003 | Area (sq ft) | 80.89 | 216.82 | 1995.34 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 5.55 | 31.07 | 419.38 |
| Top Width (ft) | 448.83 | Top Width (ft) | 70.44 | 59.89 | 318.50 |
| Vel Total (ft/s) | 0.20 | Avg. Vel. (ft/s) | 0.07 | 0.14 | 0.21 |
| Max Chl Dpth (ft) | 7.16 | Hydr. Depth (ft) | 1.15 | 3.62 | 6.26 |
| Conv. Total (cfs) | 270424.7 | Conv. (cfs) | 3293.1 | 18424.8 | 248706.8 |
| Length Wtd. (ft) | 155.15 | Wetted Per. (ft) | 70.51 | 62.67 | 324.65 |
| Min Ch El (ft) | 26.67 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.06 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 9.86 | 1.62 | 15.73 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 4.20 | 0.45 | 2.74 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The cross-section end points had to be extended vertically for the computed water surface. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

'Z'

Plan: Plan 01 Nestor Creek 1 RS: 151 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | 280.00 | 140.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 244.03 | 209.62 | 3676.55 |
| E.G. Slope (ft/ft) | 0.000001 | Area (sq ft) | 244.03 | 209.62 | 3676.55 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 12.58 | 20.02 | 423.40 |
| Top Width (ft) | 668.02 | Top Width (ft) | 115.54 | 37.15 | 515.33 |
| Vel Total (ft/s) | 0.11 | Avg. Vel. (ft/s) | 0.05 | 0.10 | 0.12 |
| Max Chl Dpth (ft) | 8.62 | Hydr. Depth (ft) | 2.11 | 5.64 | 7.13 |
| Conv. Total (cfs) | 539870.1 | Conv. (cfs) | 14893.0 | 23700.1 | 501277.0 |
| Length Wtd. (ft) | 159.66 | Wetted Per. (ft) | 115.88 | 39.48 | 522.86 |
| Min Ch El (ft) | 25.66 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.05 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 8.96 | 0.60 | 5.96 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.69 | 0.22 | 1.30 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The cross-section end points had to be extended vertically for the computed water surface. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

'Y'

Plan: Plan 01 Nestor Creek 1 RS: 150 Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 28.27 | Flow Area (sq ft) | 2543.83 | 161.56 | 1515.53 |
| E.G. Slope (ft/ft) | 0.000002 | Area (sq ft) | 2543.83 | 161.56 | 1515.53 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 282.35 | 13.12 | 160.52 |
| Top Width (ft) | 1750.41 | Top Width (ft) | 1032.12 | 98.40 | 619.89 |
| Vel Total (ft/s) | 0.11 | Avg. Vel. (ft/s) | 0.11 | 0.08 | 0.11 |
| Max Chl Dpth (ft) | 4.87 | Hydr. Depth (ft) | 2.46 | 1.64 | 2.44 |
| Conv. Total (cfs) | 290205.6 | Conv. (cfs) | 179692.4 | 8352.9 | 102160.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 1035.17 | 98.40 | 620.00 |
| Min Ch El (ft) | 30.52 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |

'Y'

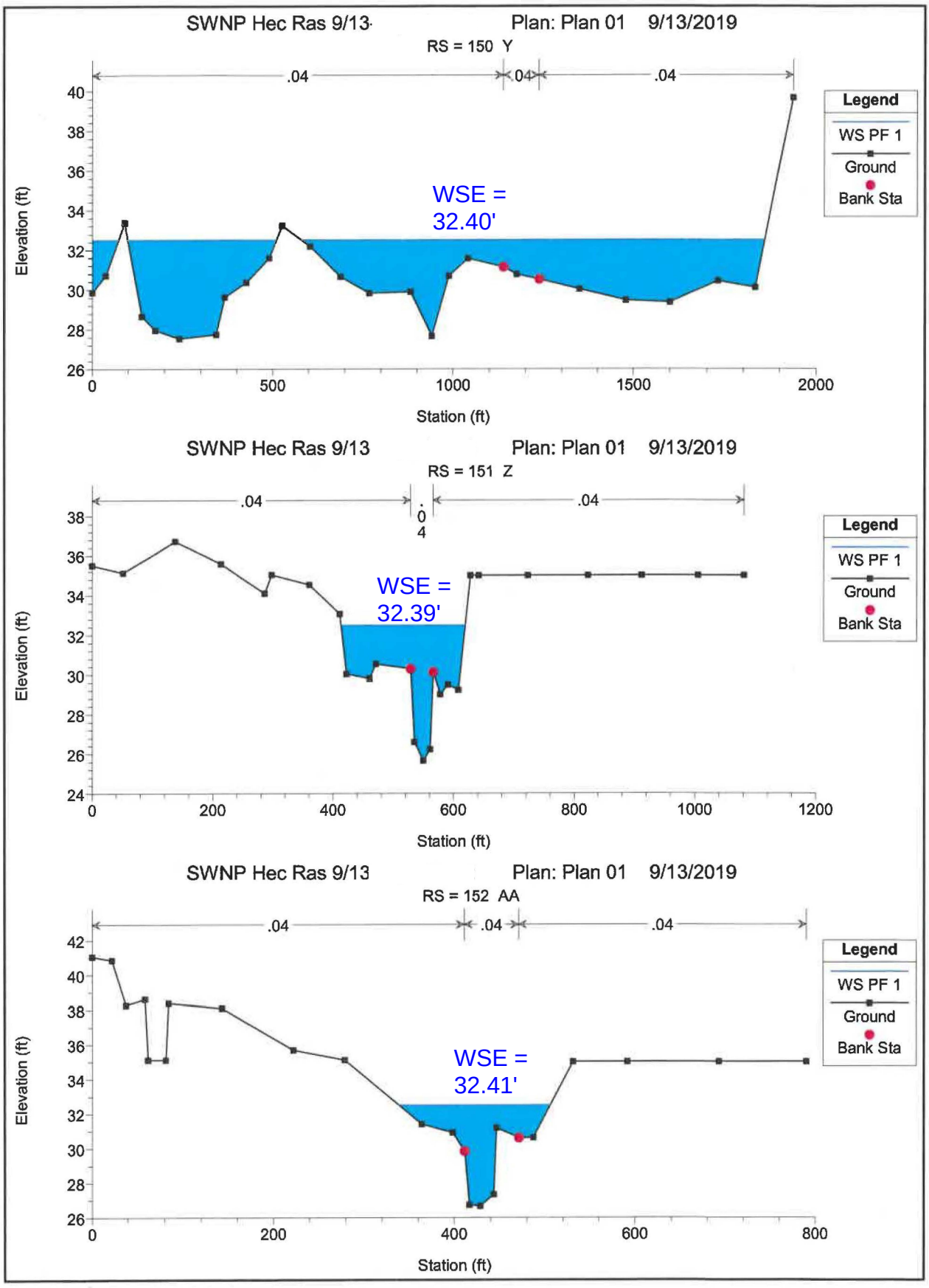
Plan: Plan 01  Nestor Creek  1  RS: 150  Profile: PF 1 (Continued)

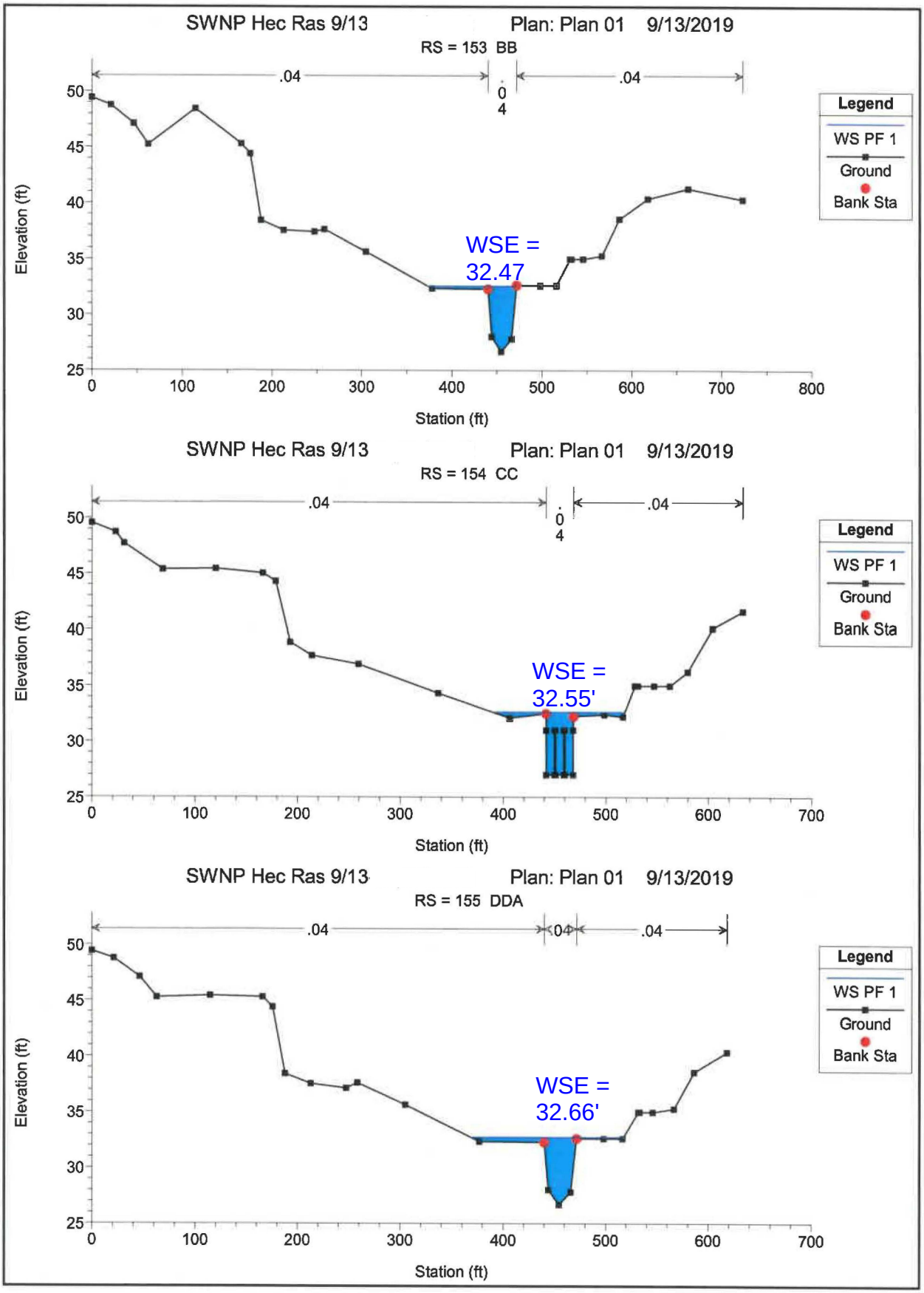
| | | | | | |
|---|---|---|---|---|---|
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

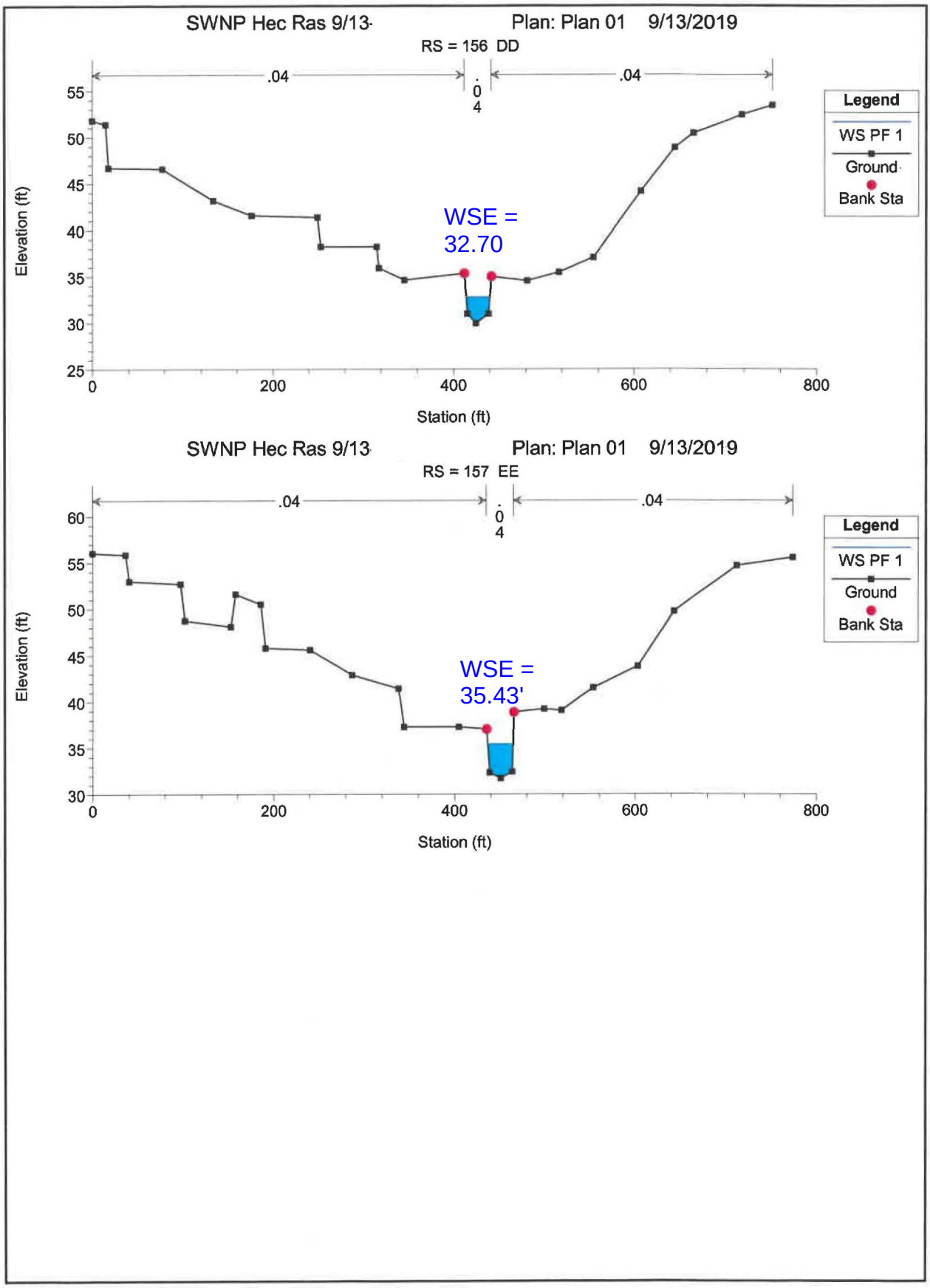
Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |

Proposed Condition
Model
456cfs




SWNP Hec Ras 9/13
Plan: Plan 01 9/13/2019
RS = 153 BB
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.47
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13
Plan: Plan 01 9/13/2019
RS = 154 CC
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.55'
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13
Plan: Plan 01 9/13/2019
RS = 155 DDA
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.66'
Elevation (ft)
Station (ft)


SWNP Hec Ras 9/13
Plan: Plan 01 9/13/2019
RS = 156 DD
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 32.70
Elevation (ft)
Station (ft)
SWNP Hec Ras 9/13
Plan: Plan 01 9/13/2019
RS = 157 EE
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
WSE = 35.43'
Elevation (ft)
Station (ft)

'EE'

Plan: Plan 01 Nestor Creek 1 RS: 157 Profile: PF 1

| E.G. Elev (ft) | 35.83 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.40 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 35.43 | Reach Len. (ft) | 235.00 | 235.00 | 235.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | | 90.04 | |
| E.G. Slope (ft/ft) | 0.004702 | Area (sq ft) | | 90.04 | |
| Q Total (cfs) | 456.00 | Flow (cfs) | | 456.00 | |
| Top Width (ft) | 28.08 | Top Width (ft) | | 28.08 | |
| Vel Total (ft/s) | 5.06 | Avg. Vel. (ft/s) | | 5.06 | |
| Max Chl Dpth (ft) | 3.73 | Hydr. Depth (ft) | | 3.21 | |
| Conv. Total (cfs) | 6649.7 | Conv. (cfs) | | 6649.7 | |
| Length Wtd. (ft) | 235.00 | Wetted Per. (ft) | | 32.12 | |
| Min Ch El (ft) | 31.70 | Shear (lb/sq ft) | | 0.82 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 4.17 | |
| Frctn Loss (ft) | 2.01 | Cum Volume (acre-ft) | 10.18 | 3.65 | 2.36 |
| C & E Loss (ft) | 0.07 | Cum SA (acres) | 4.82 | 1.03 | 1.16 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. |
| Warning: | The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections. |

'DDA'

Plan: Plan 01 Nestor Creek 1 RS: 156 Profile: PF 1

| E.G. Elev (ft) | 33.75 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 1.06 | Wt. n-Val. | | 0.040 | |
| W.S. Elev (ft) | 32.70 | Reach Len. (ft) | 230.00 | 230.00 | 230.00 |
| Crit W.S. (ft) | 32.69 | Flow Area (sq ft) | | 55.29 | |
| E.G. Slope (ft/ft) | 0.020038 | Area (sq ft) | | 55.29 | |
| Q Total (cfs) | 456.00 | Flow (cfs) | | 456.00 | |
| Top Width (ft) | 26.37 | Top Width (ft) | | 26.37 | |
| Vel Total (ft/s) | 8.25 | Avg. Vel. (ft/s) | | 8.25 | |
| Max Chl Dpth (ft) | 2.74 | Hydr. Depth (ft) | | 2.10 | |
| Conv. Total (cfs) | 3221.4 | Conv. (cfs) | | 3221.4 | |
| Length Wtd. (ft) | 230.00 | Wetted Per. (ft) | | 28.16 | |
| Min Ch El (ft) | 29.96 | Shear (lb/sq ft) | | 2.46 | |
| Alpha | 1.00 | Stream Power (lb/ft s) | | 20.26 | |
| Frctn Loss (ft) | 0.67 | Cum Volume (acre-ft) | 10.18 | 3.26 | 2.36 |
| C & E Loss (ft) | 0.27 | Cum SA (acres) | 4.82 | 0.89 | 1.16 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections. |
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections. |

'DD'

Plan: Plan 01 Nestor Creek 1 RS: 155 Profile: PF 1

| E.G. Elev (ft) | 32.81 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.15 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.66 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | 29.64 | Flow Area (sq ft) | 22.73 | 141.96 | 2.01 |
| E.G. Slope (ft/ft) | 0.001105 | Area (sq ft) | 22.73 | 141.96 | 2.01 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 13.27 | 442.42 | 0.31 |

'DD'

Plan: Plan 01 Nestor Creek 1 RS: 155 Profile: PF 1 (Continued)

| | | | | | |
|---|---|---|---|---|---|
| Top Width (ft) | 146.75 | Top Width (ft) | 69.91 | 31.63 | 45.21 |
| Vel Total (ft/s) | 2.74 | Avg. Vel. (ft/s) | 0.58 | 3.12 | 0.15 |
| Max Chl Dpth (ft) | 5.98 | Hydr. Depth (ft) | 0.33 | 4.49 | 0.04 |
| Conv. Total (cfs) | 13718.2 | Conv. (cfs) | 399.3 | 13309.6 | 9.4 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 69.91 | 35.41 | 45.22 |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.02 | 0.28 | 0.00 |
| Alpha | 1.26 | Stream Power (lb/ft s) | 0.01 | 0.86 | 0.00 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 10.12 | 2.74 | 2.36 |
| C & E Loss (ft) | 0.02 | Cum SA (acres) | 4.63 | 0.73 | 1.04 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 154.5 BR U Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.79 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.34 | Wt. n-Val. | 0.040 | 0.040 | |
| W.S. Elev (ft) | 32.45 | Reach Len. (ft) | 3.00 | 3.00 | 3.00 |
| Crit W.S. (ft) | 29.65 | Flow Area (sq ft) | 8.41 | 95.84 | |
| E.G. Slope (ft/ft) | 0.010362 | Area (sq ft) | 8.41 | 95.84 | |
| Q Total (cfs) | 456.00 | Flow (cfs) | 6.62 | 449.38 | |
| Top Width (ft) | 69.76 | Top Width (ft) | 65.29 | 4.47 | |
| Vel Total (ft/s) | 4.37 | Avg. Vel. (ft/s) | 0.79 | 4.69 | |
| Max Chl Dpth (ft) | 5.77 | Hydr. Depth (ft) | 0.13 | 21.43 | |
| Conv. Total (cfs) | 4479.7 | Conv. (cfs) | 65.0 | 4414.7 | |
| Length Wtd. (ft) | 3.00 | Wetted Per. (ft) | 98.33 | 69.40 | |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.06 | 0.89 | |
| Alpha | 1.13 | Stream Power (lb/ft s) | 0.04 | 4.19 | |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 10.12 | 2.74 | 2.36 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 4.63 | 0.73 | 1.04 |

Plan: Plan 01 Nestor Creek 1 RS: 154.5 BR D Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.75 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.31 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.44 | Reach Len. (ft) | 1.00 | 1.00 | 1.00 |
| Crit W.S. (ft) | 29.23 | Flow Area (sq ft) | 7.13 | 97.20 | 6.06 |
| E.G. Slope (ft/ft) | 0.010159 | Area (sq ft) | 7.13 | 97.20 | 6.06 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 8.33 | 442.05 | 5.62 |
| Top Width (ft) | 89.93 | Top Width (ft) | 40.94 | | 48.99 |
| Vel Total (ft/s) | 4.13 | Avg. Vel. (ft/s) | 1.17 | 4.55 | 0.93 |
| Max Chl Dpth (ft) | 5.44 | Hydr. Depth (ft) | 0.17 | | 0.12 |
| Conv. Total (cfs) | 4524.3 | Conv. (cfs) | 82.6 | 4385.9 | 55.8 |
| Length Wtd. (ft) | 1.00 | Wetted Per. (ft) | 40.95 | 72.61 | 49.05 |
| Min Ch El (ft) | 27.00 | Shear (lb/sq ft) | 0.11 | 0.85 | 0.08 |
| Alpha | 1.18 | Stream Power (lb/ft s) | 0.13 | 3.86 | 0.07 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 10.12 | 2.73 | 2.36 |
| C & E Loss (ft) | 0.05 | Cum SA (acres) | 4.63 | 0.73 | 1.04 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

'CC'

Plan: Plan 01 Nestor Creek 1 RS: 154 Profile: PF 1

| E.G. Elev (ft) | 32.70 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.15 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.55 | Reach Len. (ft) | 35.00 | 35.00 | 35.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 12.14 | 138.50 | 11.48 |
| E.G. Slope (ft/ft) | 0.002027 | Area (sq ft) | 12.14 | 138.50 | 11.48 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 7.94 | 440.83 | 7.23 |
| Top Width (ft) | 126.05 | Top Width (ft) | 49.61 | 26.80 | 49.64 |
| Vel Total (ft/s) | 2.81 | Avg. Vel. (ft/s) | 0.65 | 3.18 | 0.63 |
| Max Chl Dpth (ft) | 5.55 | Hydr. Depth (ft) | 0.24 | 5.17 | 0.23 |
| Conv. Total (cfs) | 10128.4 | Conv. (cfs) | 176.3 | 9791.4 | 160.7 |
| Length Wtd. (ft) | 35.00 | Wetted Per. (ft) | 49.62 | 52.75 | 49.68 |
| Min Ch El (ft) | 27.00 | Shear (lb/sq ft) | 0.03 | 0.33 | 0.03 |
| Alpha | 1.24 | Stream Power (lb/ft s) | 0.02 | 1.06 | 0.02 |
| Frctn Loss (ft) | 0.06 | Cum Volume (acre-ft) | 10.12 | 2.73 | 2.36 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 4.63 | 0.73 | 1.04 |

'BB'

Plan: Plan 01 Nestor Creek 1 RS: 153 Profile: PF 1

| E.G. Elev (ft) | 32.64 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.17 | Wt. n-Val. | 0.040 | 0.040 | |
| W.S. Elev (ft) | 32.47 | Reach Len. (ft) | 245.00 | 245.00 | 245.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 9.39 | 135.79 | |
| E.G. Slope (ft/ft) | 0.001328 | Area (sq ft) | 9.39 | 135.79 | |
| Q Total (cfs) | 456.00 | Flow (cfs) | 3.51 | 452.49 | |
| Top Width (ft) | 96.22 | Top Width (ft) | 64.79 | 31.43 | |
| Vel Total (ft/s) | 3.14 | Avg. Vel. (ft/s) | 0.37 | 3.33 | |
| Max Chl Dpth (ft) | 5.79 | Hydr. Depth (ft) | 0.14 | 4.32 | |
| Conv. Total (cfs) | 12515.0 | Conv. (cfs) | 96.2 | 12418.8 | |
| Length Wtd. (ft) | 245.00 | Wetted Per. (ft) | 64.80 | 35.15 | |
| Min Ch El (ft) | 26.68 | Shear (lb/sq ft) | 0.01 | 0.32 | |
| Alpha | 1.12 | Stream Power (lb/ft s) | 0.00 | 1.07 | |
| Frctn Loss (ft) | 0.15 | Cum Volume (acre-ft) | 10.11 | 2.62 | 2.35 |
| C & E Loss (ft) | 0.04 | Cum SA (acres) | 4.58 | 0.71 | 1.02 |

Errors Warnings and Notes

| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
|---|---|
| | 1.4. This may indicate the need for additional cross sections. |

'AA'

Plan: Plan 01 Nestor Creek 1 RS: 152 Profile: PF 1

| E.G. Elev (ft) | 32.44 | Element | Left OB | Channel | Right OB |
|---|---|---|---|---|---|
| Vel Head (ft) | 0.03 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.41 | Reach Len. (ft) | 240.00 | 210.00 | 150.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 81.61 | 217.43 | 44.46 |
| E.G. Slope (ft/ft) | 0.000366 | Area (sq ft) | 81.61 | 217.43 | 44.46 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 63.83 | 354.33 | 37.83 |
| Top Width (ft) | 164.43 | Top Width (ft) | 70.68 | 59.89 | 33.87 |
| Vel Total (ft/s) | 1.33 | Avg. Vel. (ft/s) | 0.78 | 1.63 | 0.85 |
| Max Chl Dpth (ft) | 5.74 | Hydr. Depth (ft) | 1.15 | 3.63 | 1.31 |
| Conv. Total (cfs) | 23823.2 | Conv. (cfs) | 3334.9 | 18511.7 | 1976.6 |
| Length Wtd. (ft) | 207.81 | Wetted Per. (ft) | 70.75 | 62.67 | 33.95 |
| Min Ch El (ft) | 26.67 | Shear (lb/sq ft) | 0.03 | 0.08 | 0.03 |
| Alpha | 1.25 | Stream Power (lb/ft s) | 0.02 | 0.13 | 0.03 |
| Frctn Loss (ft) | 0.03 | Cum Volume (acre-ft) | 9.85 | 1.62 | 2.23 |
| C & E Loss (ft) | 0.01 | Cum SA (acres) | 4.20 | 0.45 | 0.92 |

Errors Warnings and Notes

| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
|---|---|

Errors Warnings and Notes (Continued)

| | |
|---|---|
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 151 'Z' Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.01 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.39 | Reach Len. (ft) | 280.00 | 140.00 | 100.00 |
| Crit W.S. (ft) | | Flow Area (sq ft) | 243.26 | 209.37 | 143.87 |
| E.G. Slope (ft/ft) | 0.000087 | Area (sq ft) | 243.26 | 209.37 | 143.87 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 138.44 | 220.99 | 96.57 |
| Top Width (ft) | 205.65 | Top Width (ft) | 115.52 | 37.15 | 52.98 |
| Vel Total (ft/s) | 0.76 | Avg. Vel. (ft/s) | 0.57 | 1.06 | 0.67 |
| Max Chl Dpth (ft) | 6.73 | Hydr. Depth (ft) | 2.11 | 5.64 | 2.72 |
| Conv. Total (cfs) | 48807.2 | Conv. (cfs) | 14817.4 | 23653.7 | 10336.1 |
| Length Wtd. (ft) | 193.32 | Wetted Per. (ft) | 115.86 | 39.48 | 53.50 |
| Min Ch El (ft) | 25.66 | Shear (lb/sq ft) | 0.01 | 0.03 | 0.01 |
| Alpha | 1.26 | Stream Power (lb/ft s) | 0.01 | 0.03 | 0.01 |
| Frctn Loss (ft) | 0.00 | Cum Volume (acre-ft) | 8.96 | 0.60 | 1.90 |
| C & E Loss (ft) | 0.00 | Cum SA (acres) | 3.69 | 0.22 | 0.77 |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than |
| | 1.4. This may indicate the need for additional cross sections. |

Plan: Plan 01 Nestor Creek 1 RS: 150 'Y' Profile: PF 1

| | | | | | |
|---|---|---|---|---|---|
| E.G. Elev (ft) | 32.40 | Element | Left OB | Channel | Right OB |
| Vel Head (ft) | 0.00 | Wt. n-Val. | 0.040 | 0.040 | 0.040 |
| W.S. Elev (ft) | 32.40 | Reach Len. (ft) | | | |
| Crit W.S. (ft) | 28.27 | Flow Area (sq ft) | 2543.83 | 161.56 | 1515.53 |
| E.G. Slope (ft/ft) | 0.000002 | Area (sq ft) | 2543.83 | 161.56 | 1515.53 |
| Q Total (cfs) | 456.00 | Flow (cfs) | 282.35 | 13.12 | 160.52 |
| Top Width (ft) | 1750.41 | Top Width (ft) | 1032.12 | 98.40 | 619.89 |
| Vel Total (ft/s) | 0.11 | Avg. Vel. (ft/s) | 0.11 | 0.08 | 0.11 |
| Max Chl Dpth (ft) | 4.87 | Hydr. Depth (ft) | 2.46 | 1.64 | 2.44 |
| Conv. Total (cfs) | 290205.6 | Conv. (cfs) | 179692.4 | 8352.9 | 102160.3 |
| Length Wtd. (ft) | | Wetted Per. (ft) | 1035.17 | 98.40 | 620.00 |
| Min Ch El (ft) | 30.52 | Shear (lb/sq ft) | 0.00 | 0.00 | 0.00 |
| Alpha | 1.01 | Stream Power (lb/ft s) | 0.00 | 0.00 | 0.00 |
| Frctn Loss (ft) | | Cum Volume (acre-ft) | | | |
| C & E Loss (ft) | | Cum SA (acres) | | | |

Errors Warnings and Notes

| | |
|---|---|
| Warning: | Divided flow computed for this cross-section. |

# APPENDIX D

FLOOD INSURANCE RATE MAP

# NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations (BFEs)** shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey **at (301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

**Base map** information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). this information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

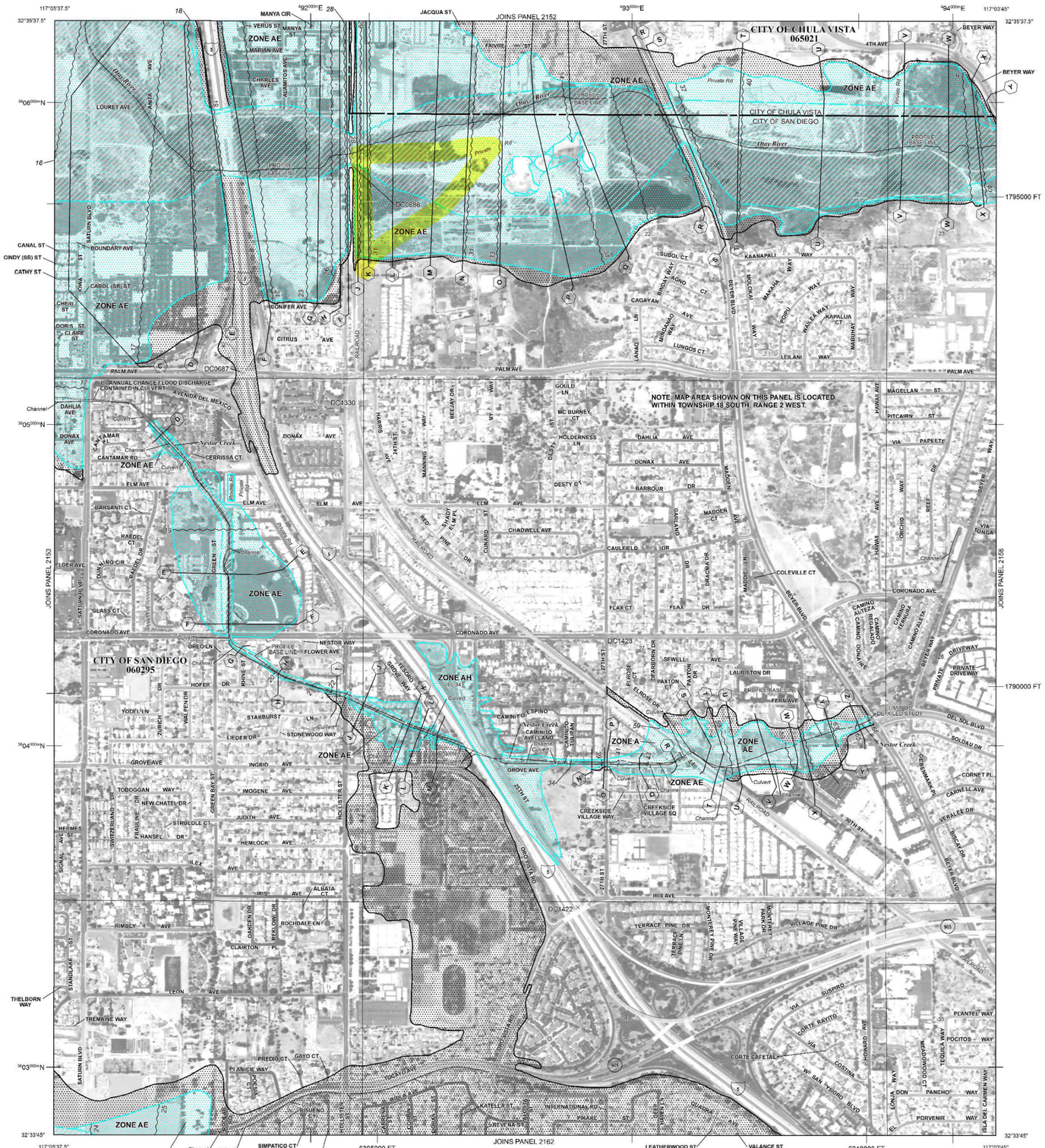
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.




# LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

| | |
|---|---|
| ZONE A | No Base Flood Elevations determined. |
| ZONE AE | Base Flood Elevations determined. |
| ZONE AH | Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined. |
| ZONE AO | Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined. |
| ZONE AR | Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. |
| ZONE A99 | Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined. |
| ZONE V | Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined. |
| ZONE VE | Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined. |

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

| | |
|---|---|
| ZONE X | Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. |

OTHER AREAS

| | |
|---|---|
| ZONE X | Areas determined to be outside the 0.2% annual chance floodplain. |
| ZONE D | Areas in which flood hazards are undetermined, but possible. |

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

| | |
|---|---|
| | 1% annual chance floodplain boundary |
| | 0.2% annual chance floodplain boundary |
| | Floodway boundary |
| | Zone D boundary |
| | CBRS and OPA boundary |
| | Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities |
| 513 (EL 987) | Base Flood Elevation line and value; elevation in feet* |
| | Base Flood Elevation value where uniform within zone; elevation in feet* |

* Referenced to the North American Vertical Datum of 1988

| | |
|---|---|
| A A | Cross section line |
| 23 23 | Transect line |
| 97°07'30", 32°22'30" | Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere |
| 4275000mE | 1000-meter Universal Transverse Mercator grid ticks, zone 11 |
| 6000000 FT | 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection |
| DX5510 | Bench mark (see explanation in Notes to Users section of this FIRM panel) |
| M1.5 | River Mile |

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 - to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.
April 5, 2016 - to remove Provisionally Accredited Levee note

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2154H

# FIRM

## FLOOD INSURANCE RATE MAP

## SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

**PANEL 2154 OF 2375**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| CHULA VISTA, CITY OF | 065021 | 2154 | H |
| SAN DIEGO, CITY OF | 060295 | 2154 | H |

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

**MAP NUMBER**
**06073C2154H**

**MAP REVISED**
**APRIL 5, 2016**

Federal Emergency Management Agency

# APPENDIX E

CITY OF SAN DIEGO WORK MAPS

# CITY OF SAN DIEGO
# FLOODPLAIN MAP

- LEGEND -

△ Horizontal Control Monument Second Order or Better

+ Geographic Tick

CITY OF SAN DIEGO — City Boundary Line

Subdivision Parcel Map Boundary Line

Rancho Boundary Line

Pueblo Lot Line / Section Line

PREPARED UNDER THE DIRECTION OF THE CITY ENGINEER OF THE CITY OF SAN DIEGO CALIFORNIA

MAP CONTROL DATA FURNISHED BY THE CITY OF SAN DIEGO

HORIZONTAL CONTROL IS BASED ON NORTH AMERICAN 1927 DATUM

LAND LINES SHOWN ARE APPROXIMATE

TOPOGRAPHY COMPILED BY PHOTOGRAMETRIC METHODS FROM PHOTOGRAPHY DATED 1 11 77

SAN LO AERIAL SURVEYS
SAN DIEGO, CALIFORNIA

ORTHOPHOTO IMAGE PREPARED FROM PHOTOGRAPHY DATED 1 11 77

CITY OF SAN DIEGO
NESTOR CREEK
LMMP

100 YEAR Floodplain
100 YEAR Floodway
Tic Mark on X-Section line For Sta. 2000 feet

DEC. 1989

| FLOODPLAIN DATA | FLOODPLAIN LEGEND | NOTES |
|---|---|---|
| BOYLE ENGR. CORP. | 235 | |

CITY OF SAN DIEGO, CALIFORNIA
SCALE 1 INCH = 200 FEET
DATUM IS MEAN SEA LEVEL

NESTOR CREEK
SHEET 2 OF 4

SEE ENGINEERING AND DEVELOPMENT DEPARTMENT FOR LATEST FLOODPLAIN INFORMATION

50-1743
146-1737 | 146-1749
142-1743

146-1743

SANDIEGO_CAWork
MapsSANDIEGO_CA 2813

# CITY OF SAN DIEGO
## TOPOGRAPHIC SURVEY

146-1743

**-LEGEND-**

△ Horizontal Control Monument Second Order or Better

+ Geographic Tick

CITY OF SAN DIEGO City Boundary Line

Subdivision / Parcel Map Boundary Line

Rancho Boundary Line

Pueblo Lot Line / Section Line

PREPARED UNDER THE DIRECTION OF THE CITY ENGINEER OF THE CITY OF SAN DIEGO CALIFORNIA.

MAP CONTROL DATA FURNISHED BY THE CITY OF SAN DIEGO

HORIZONTAL CONTROL IS BASED ON NORTH AMERICAN 1927 DATUM.

LAND LINES SHOWN ARE APPROXIMATE.

TOPOGRAPHY COMPILED BY PHOTOGRAMETRIC METHODS FROM PHOTOGRAPHY DATED 1/11/77.

SAN LO AERIAL SURVEYS
SAN DIEGO, CALIFORNIA

ORTHOPHOTO IMAGE PREPARED FROM PHOTOGRAPHY DATED 1/11/77.


CITY OF SAN DIEGO, CALIFORNIA

SCALE 1 INCH = 200 FEET
DATUM IS MEAN SEA LEVEL

| | | |
|---|---|---|
| | 150-1743 | |
| 146-1737 | | 146-1749 |
| | 142-1743 | |

SANDIEGO_CAWork
MapsSANDIEGO_CA 2806
146-1743

# APPENDIX G

LOMR CASE NO. 03-09-0633P

# Federal Emergency Management Agency

Washington, D.C. 20472

**AUG 2 2 2003**

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Richard M. Murphy
Mayor, City of San Diego
202 C Street, 11th Floor
San Diego, CA 92101

IN REPLY REFER TO:

| | |
|---|---|
| Case No.: | 03-09-0633P |
| Follows Conditional Case No.: | 02-09-372R |
| Community Name: | City of San Diego, CA |
| Community No.: | 060295 |
| Effective Date of This Revision: | AUG 2 2 2003 |

Dear Mayor Murphy:

The Flood Insurance Rate Map and Flood Insurance Study report for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Chief, National Flood Insurance Program Branch, Federal Insurance and Mitigation Division of the Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7184, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Max H. Yuan, P.E., Project Engineer
Hazard Study Branch
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., Acting Chief
Hazard Study Branch
Emergency Preparedness
and Response Directorate

List of Enclosures:
Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: Mr. Walter Gefrom
Floodplain Manager
Transportation & Drainage Design Division
Department of Public Works
City of San Diego

Mr. Frank Belock
Engineering Director
City of San Diego

[redacted] P.E.
Masson & Associates, Inc.

 | Issue Date: AUG 2 2 2003 | Effective Date: AUG 2 2 2003 | Case No.: 03-09-0633P | LOMR-APP

Follows Conditional Case No.: 02-09-372R

# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT

| COMMUNITY AND REVISION INFORMATION | | PROJECT DESCRIPTION | BASIS OF REQUEST |
|---|---|---|---|
| COMMUNITY | City of San Diego<br>San Diego County<br>California | CHANNELIZATION<br>CULVERT<br>FILL | HYDRAULIC ANALYSIS<br>NEW TOPOGRAPHIC DATA |
| | COMMUNITY NO.: 060295 | | |
| IDENTIFIER | Tesoro Grove | APPROXIMATE LATITUDE & LONGITUDE: 32.573, -117.080<br>SOURCE: USGS QUADRANGLE DATUM: NAD 27 | |
| FLOODING SOURCE(S) & REVISED REACH(ES) | Nestor Creek – from Interstate Highway 5 to approximately 760 feet downstream | | |

**SUMMARY OF REVISIONS**

| | | | |
|---|---|---|---|
| Effective Flooding: | Zone AE | BFEs* | Floodway |
| Revised Flooding: | Zone AE | BFEs* | Floodway |
| Increases: | NONE | YES | YES |
| Decreases: | YES | NONE | YES |

* BFEs – Base Flood Elevations

| ANNOTATED MAPPING ENCLOSURES | ANNOTATED STUDY ENCLOSURES |
|---|---|
| TYPE: FIRM* NO: 06073C2154 F Date: June 19, 1997 | DATE OF EFFECTIVE FLOOD INSURANCE STUDY REPORT: July 2, 2002<br>FLOODWAY DATA TABLE 8<br>PROFILE: 199P<br>PROFILE: 200P |

* FIRM – Flood Insurance Rate Map; ** FBFM – Flood Boundary and Floodway Map; *** FHBM – Flood Hazard Boundary Map

## DETERMINATION

This document provides the determination from the Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Doug Bellomo, P.E., Acting Chief
Hazard Study Branch
Emergency Preparedness and Response Directorate Version 1.0 10080301DA03090633102IC

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

## COMMUNITY INFORMATION

### APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the modified channel and culvert rests with your community. We may request that your community submit a description and schedule of channel and culvert activities.

### COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Doug Bellomo, P.E., Acting Chief
Hazard Study Branch
Emergency Preparedness and Response Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION
# DETERMINATION DOCUMENT (CONTINUED)

## COMMUNITY INFORMATION (CONTINUED)

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Jack Eldridge
Chief, National Flood Insurance Program Branch
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7184

**STATUS OF THE COMMUNITY NFIP MAPS**

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Doug Bellomo, P.E., Acting Chief
Hazard Study Branch
Emergency Preparedness and Response Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

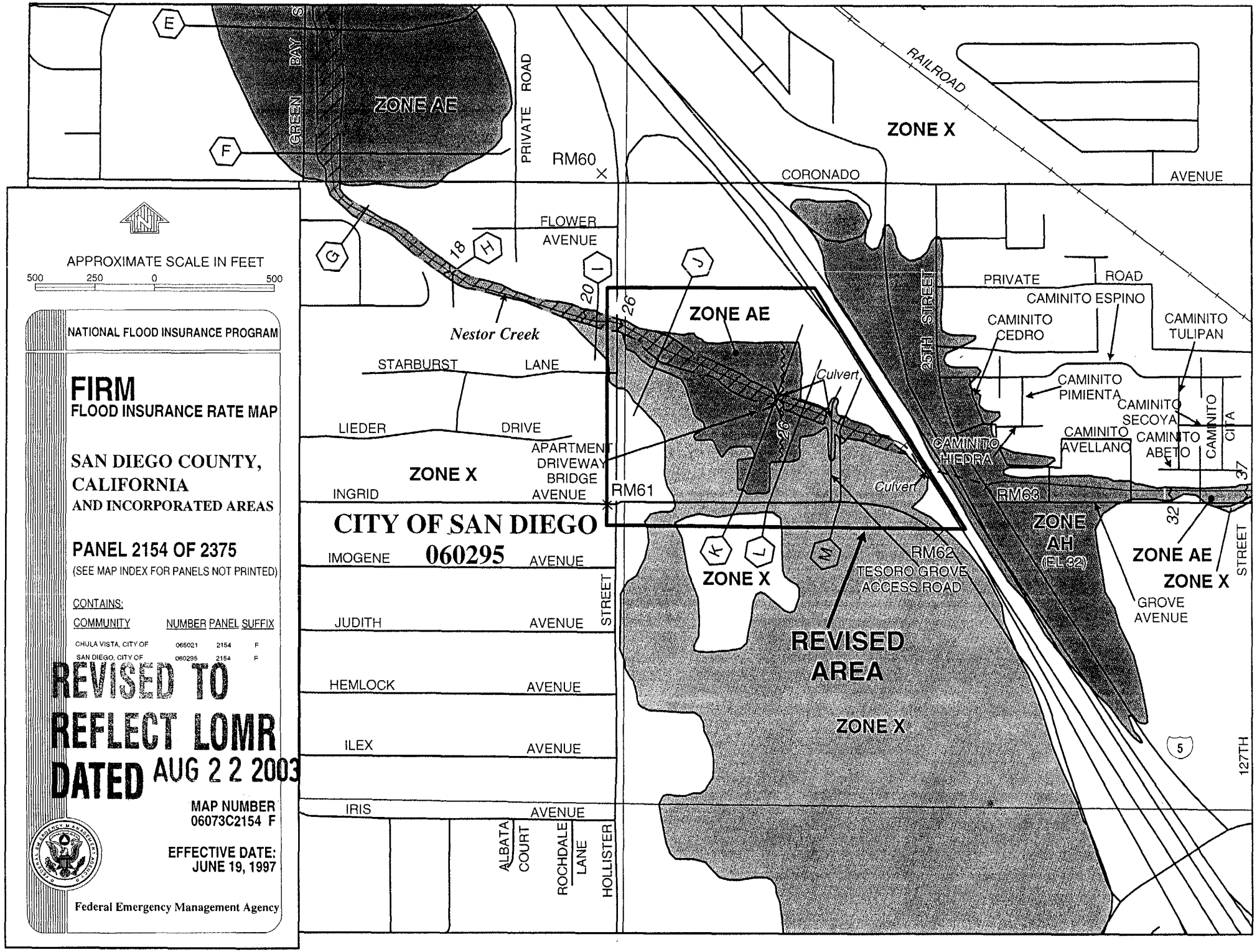
# LETTER OF MAP REVISION
# DETERMINATION DOCUMENT (CONTINUED)

## PUBLIC NOTIFICATION OF REVISION

This revision is effective as of the date of this letter. Any requests to review or alter this determination should be made within 30 days and must be based on scientific or technical data. Although the BFEs increased along Nestor Creek, all increases were less than 0.5 foot and did not affect the whole-foot BFEs shown on the FIRM; therefore, no public notification will be made.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Doug Bellomo, P.E., Acting Chief
Hazard Study Branch
Emergency Preparedness and Response Directorate Version 1.0 10080301DA03090633102IC


APPROXIMATE SCALE IN FEET
500 250 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 2154 OF 2375
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
CHULA VISTA, CITY OF 065021 2154 F
SAN DIEGO, CITY OF 060295 2154 F
REVISED TO REFLECT LOMR DATED AUG 2 2 2003
MAP NUMBER 06073C2154 F
EFFECTIVE DATE: JUNE 19, 1997
Federal Emergency Management Agency
ZONE AE
ZONE X
RM60
RM61
RM62
RM63
CORONADO AVENUE
PRIVATE ROAD
RAILROAD
FLOWER AVENUE
Nestor Creek
STARBURST LANE
LIEDER DRIVE
APARTMENT DRIVEWAY BRIDGE
INGRID AVENUE
CITY OF SAN DIEGO
060295
IMOGENE AVENUE
JUDITH AVENUE
HEMLOCK AVENUE
ILEX AVENUE
IRIS AVENUE
ALBATA COURT
ROCHDALE LANE
HOLLISTER STREET
25TH STREET
CAMINITO ESPINO
CAMINITO CEDRO
CAMINITO TULIPAN
CAMINITO PIMIENTA
CAMINITO SECOYA
CAMINITO AVELLANO
CAMINITO ABETO
CAMINITO CITA
CAMINITO HIEDRA
Culvert
ZONE AH
(EL 32)
TESORO GROVE ACCESS ROAD
GROVE AVENUE
REVISED AREA
127TH STREET
E
F
G
H
I
J
K
L
M
18
20
26
32
37
5

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Nestor Creek | | | | | | | | |
| A | 2,000 | 52 | 262 | 4.2 | 12.9 | 12.1[2] | 12.2[2] | 0.1 |
| B | 3,000 | 160 | 637 | 1.7 | 13.4 | 12.7[2] | 13.4[2] | 0.7 |
| C | 3,988 | 28 | 230 | 4.7 | 14.0 | 12.7[2] | 13.4[2] | 0.7 |
| D | 5,772 | 68 | 482 | 1.8 | 16.8 | 16.8 | 17.1 | 0.3 |
| E | 7,500 | 100 | 479 | 1.7 | 17.2 | 17.2 | 17.7 | 0.5 |
| F | 8,000 | 100 | 433 | 1.8 | 17.2 | 17.2 | 17.8 | 0.6 |
| G | 8,310 | 50 | 294 | 2.4 | 17.7 | 17.7 | 18.2 | 0.5 |
| H | 8,760 | 64 | 249 | 2.8 | 18.1 | 18.1 | 18.5 | 0.4 |
| I | 9,400 | 39 | 111 | 6.3 | 20.7 | 20.7 | 20.7 | 0.0 |
| J | 9,700 | 127 | 578 | 0.9 | 26.1 | 26.1 | 26.1 | 0.0 |
| K | 10,180 | 21 | 182 | 2.7 | 26.2 | 26.2 | 26.2 | 0.0 |
| L | 10,300 | 40 | 200 | 2.5 | 26.2 | 26.2 | 26.4 | 0.2 |
| M | 10,500 | 68 | 295 | 1.6 | 26.3 | 26.3 | 26.6 | 0.3 |

REVISED DATA

1Feet Above Confluence With Otay River
2Elevation Computed Without Consideration of Influence from Otay River

TABLE 8

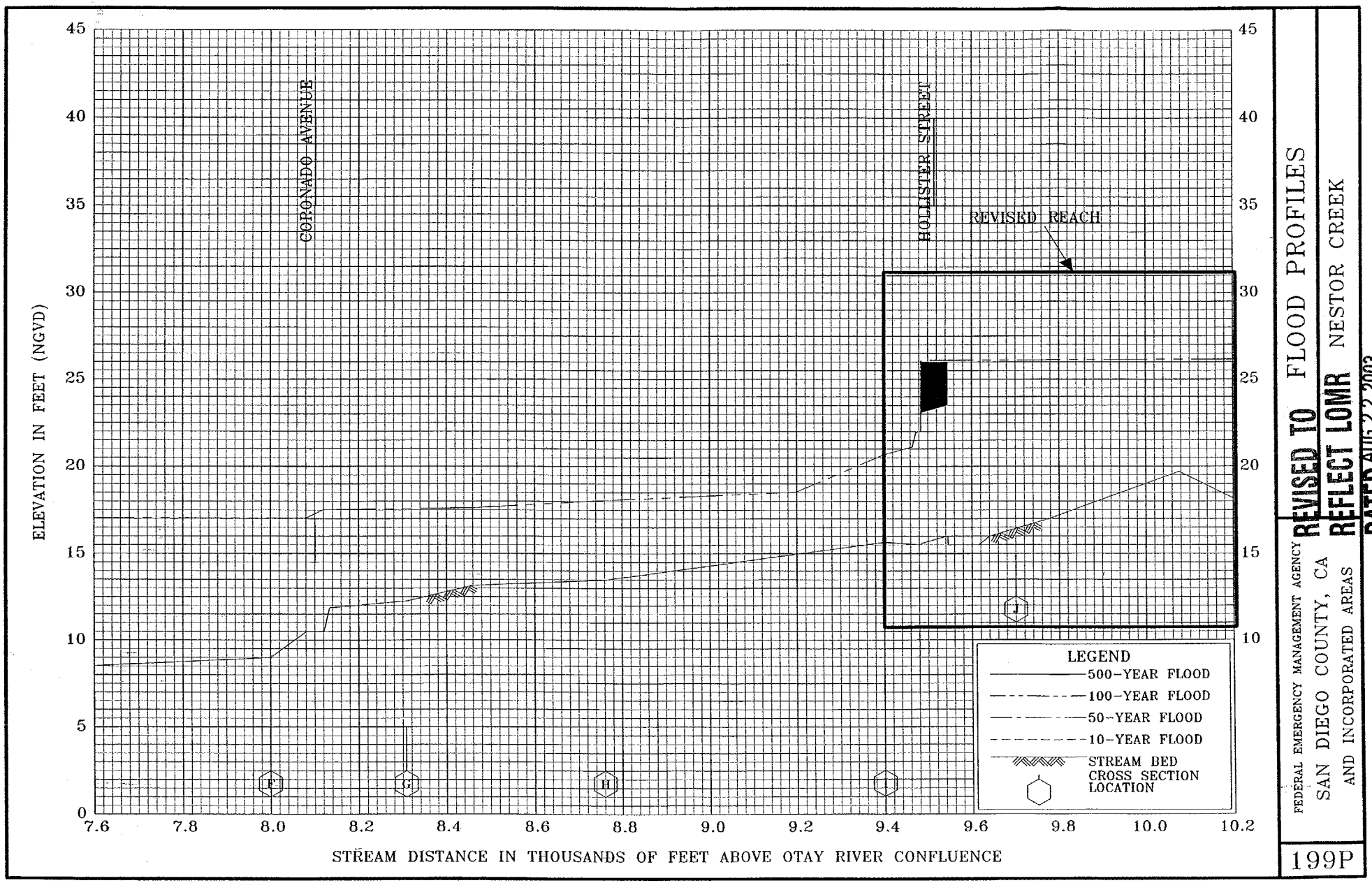
FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA AND INCORPORATED AREAS

REVISED TO REFLECT LOMR DATED AUG 2 2 2003

# FLOODWAY DATA

NESTOR CREEK




FEDERAL EMERGENCY MANAGEMENT AGENCY

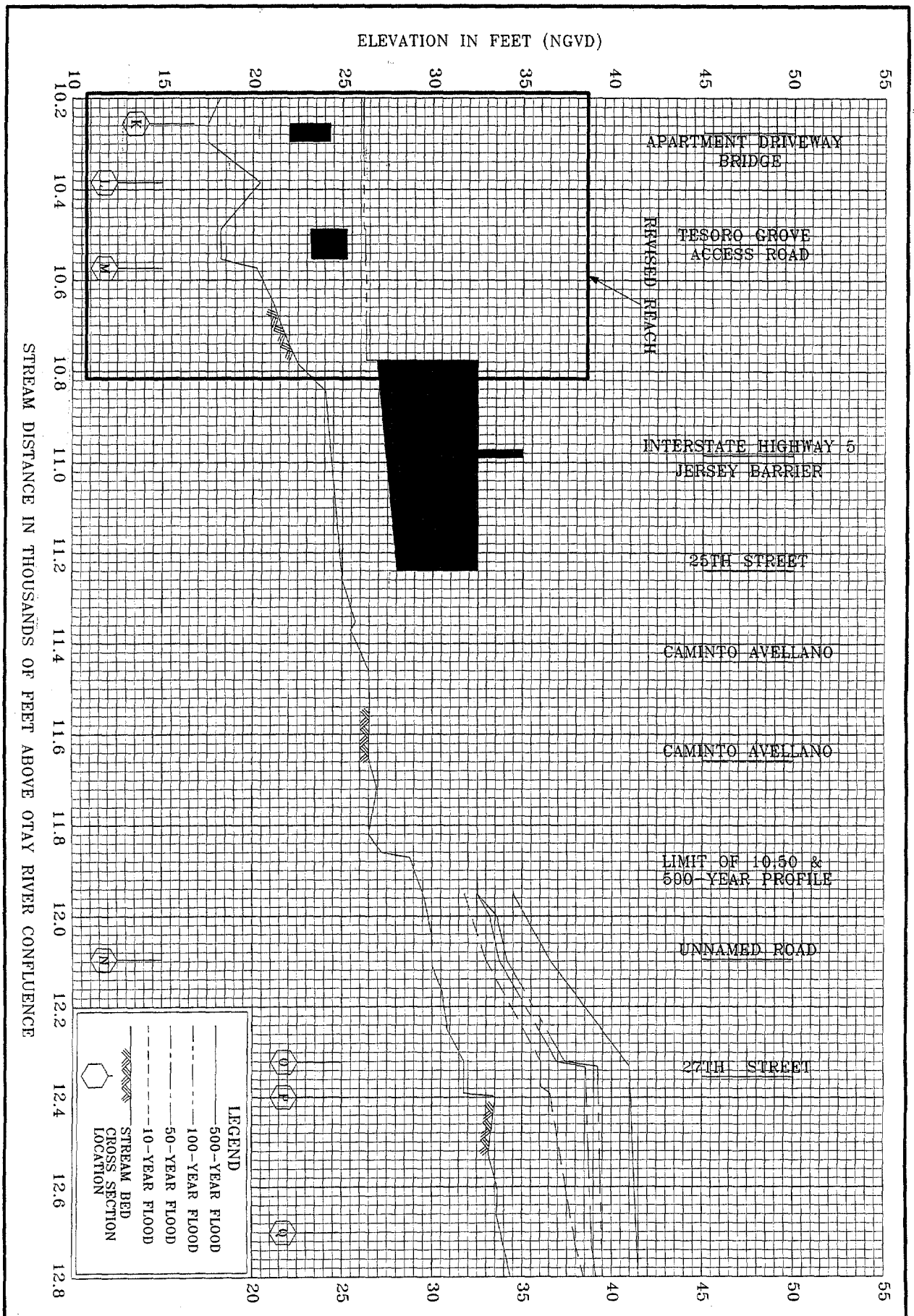
SAN DIEGO COUNTY, CA AND INCORPORATED AREAS

# FLOOD PROFILES

NESTOR CREEK

**REVISED TO REFLECT LOMR DATED** AUG 2 2 2003

199P




200P

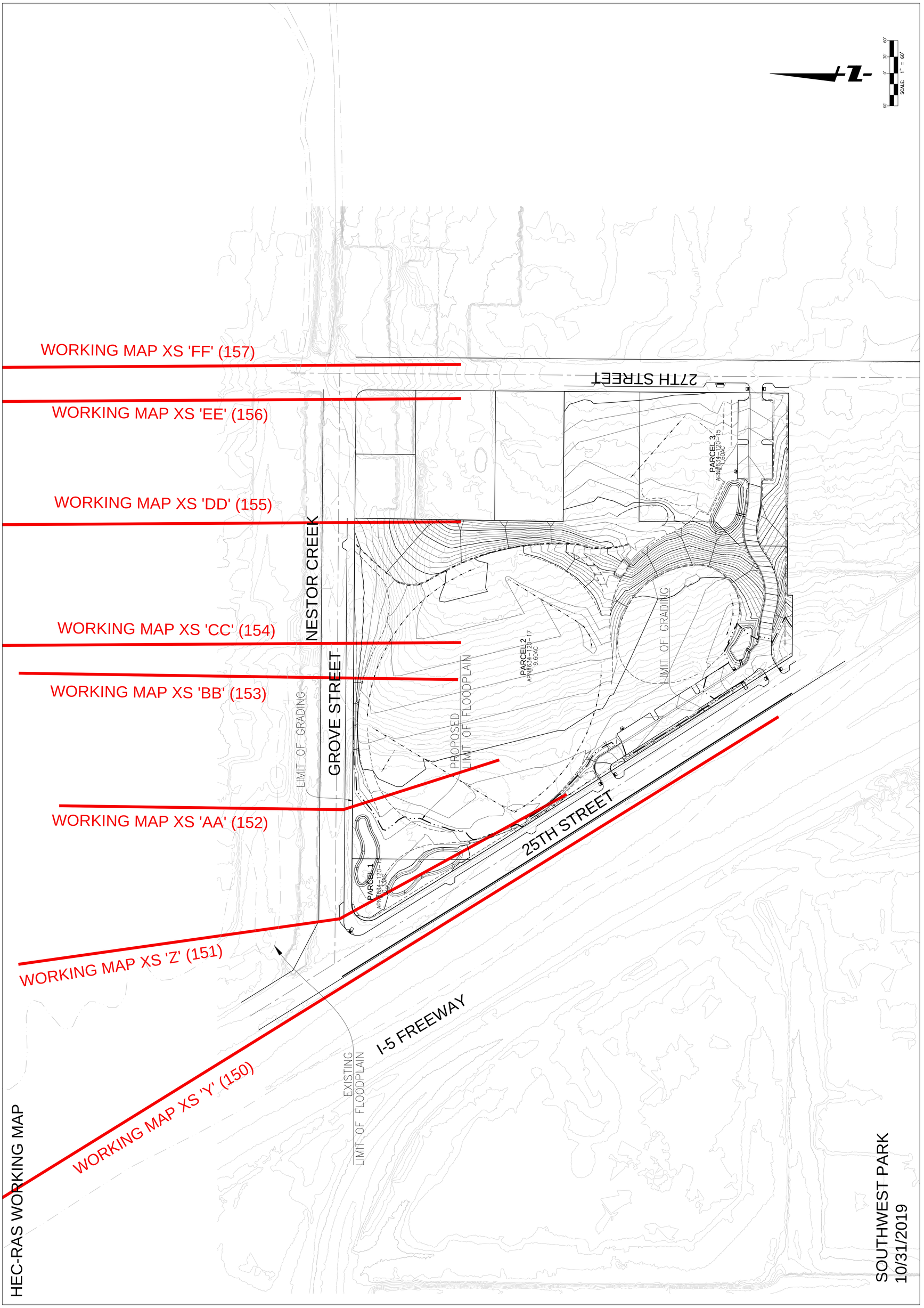
FEDERAL EMERGENCY MANAGEMENT AGENCY
SAN DIEGO COUNTY, CA
AND INCORPORATED AREAS

REVISED TO REFLECT LOMR DATED AUG 2 2 2003

FLOOD PROFILES
NESTOR CREEK

# APPENDIX H

HEC-RAS WORK MAP (PROPOSED)


WORKING MAP XS 'FF' (157)
WORKING MAP XS 'EE' (156)
WORKING MAP XS 'DD' (155)
WORKING MAP XS 'CC' (154)
WORKING MAP XS 'BB' (153)
WORKING MAP XS 'AA' (152)
WORKING MAP XS 'Z' (151)
WORKING MAP XS 'Y' (150)
27TH STREET
NESTOR CREEK
GROVE STREET
25TH STREET
I-5 FREEWAY
LIMIT OF GRADING
PROPOSED LIMIT OF FLOODPLAIN
EXISTING LIMIT OF FLOODPLAIN
PARCEL 1
APN#634-120-13
9.60AC
PARCEL 2
APN#634-120-17
9.60AC
PARCEL 3
APN#634-120-15
9.60AC
SCALE: 1" = 60'
HEC-RAS WORKING MAP
SOUTHWEST PARK
10/31/2019