Michael Baker
INTERNATIONAL

Final Drainage Report

TO 30 – Concrete Panel Replacement - Coast Boulevard

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER T. LEARY
No. C 87309
EXP. 9/21
CIVIL
STATE OF CALIFORNIA

Prepared For:
City of San Diego

Prepared By:
Christopher T. Leary
Michael Baker International
5050 Avenida Encinas, Suite 260
Carlsbad, CA 92008-4386
(760)476-9193

Date:
January 14, 2020

MBI JN:
175050

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Attachment A. FEMA FIRM Panel and FIRMette
Attachment B. Soils Exhibit & Excerpts from SD-DDM
Attachment C. Hydrology Exhibit & Calculations
Attachment D. Hydraulics & Inlet Sizing
Attachment E. Plan Sheets

1 PROJECT DESCRIPTION

1.1 PROJECT DATA

Project Owner:	City of San Diego Public Works Department Louis Schultz
Project Site Address:	Coast Boulevard & Cave St, San Diego, CA 92037
Project Location:	Latitude: 32.849059 Longitude: -117.270445
Watershed Area:	15.92 Acres
Adjacent Areas:	North: La Jolla Cove West: Prospect St South: Prospect Pl East: Coast Walk Trail
Adjacent Land Uses:	North: Caves & Cliffs South: Residential & Business East: Residential & Business West: Business

1.2 DESCRIPTION OF PROJECT

The City of San Diego recently undertook an emergency project to stabilize a portion of Coast Boulevard. Following this emergency project, the City has elected to replace in kind the entire concrete roadway along Coast Boulevard on both sides of the emergency project limits (from Prospect Place down to the life guard station).

This report will focus on the hydrology and hydraulics of the proposed storm drain improvements.

1.3 EXISTING CONDITION

The easterly drainage areas consist of businesses, local restaurants, and residences, that discharge runoff into Coast Boulevard. This storm water is collected in three existing grate inlets, located in Coast Boulevard and within the Cave Store parking lot. It is then discharged over the sea bluff and into the Pacific Ocean. Additional runoff is collected on Prospect Place and piped within a 12" RCP that connects to the existing grate inlet in the Cave store parking lot. There is noticeable erosion at 12" RCP outfall location on the sea bluff.

Drainage along the westerly extents of the projects flows down Coast Boulevard to an existing inlet located next to the lifeguard station. This inlet discharges to the Pacific Ocean.

The emergency project was located between the easterly and westerly portions of the Coast Boulevard Project and included the replacement of the concrete road and the existing 24" outfall.

1.4 PROPOSED CONDITION

The project proposes to replace the concrete road in kind; minor grading will occur, but it is not expected to change the pattern of surface flows. The existing parking lot, next to the Cave Store, will be redesigned and impervious area will be reduced, with the addition of landscaped areas.

The project proposes to install a 24" RCP from the upstream limits of Coast Boulevard and connect into the existing 24" RCP located within the emergency project. The existing 12" RCP and outfall will be replaced/abandoned per the Grading Plans. The three existing grate inlets within the project limits will be removed and replaced with three curb inlets. The two existing 12" RCPs that collect water from Prospect Place will connect to the proposed 24" RCP system that is being installed within Coast Boulevard.

No drainage improvements are proposed on the westerly portion of the site. Storm water will flow down Coast Boulevard in the same manner as the existing condition. No further analysis was performed for this project area.

1.5 LOCATION

The location of the site is along La Jolla Coast Boulevard in the La Jolla Neighborhood of the City of San Diego. The approximate location of the project area can be seen on Figure 1 - Vicinity Map.

FIGURE 1 - VICINITY MAP (N.T.S.)

2 STUDY OBJECTIVES

The purpose of this report is to analyze the existing and proposed drainage and provide design backup for proposed improvements, with specific objectives as follows:

- Document the tributary drainage area associated with the project site;
- Develop hydrologic parameters and calculate 50-year and 100-year flow rates per the City of San Diego Drainage Design Manual;
- Design a new pipe system with curb inlets to convey and redirect flow north-west to an existing 24" HDPE outfall.

3 METHODOLOGY

3.1 HYDROLOGY

This project is replacing the existing impervious area in kind and only minor grading is proposed. Therefore, the rational method is presented under this cover to generate peak flow rates per tributary area to size the proposed inlets.

Hydrologic parameters have been developed using the Rational Method procedures according to Appendix A of The City of San Diego Drainage Design Manual (SD-DDM):

$$Q = CIA$$

Where:

Q = flow rate, cubic feet per second (cfs);

C = Coefficient of runoff (unitless) Per Table A-1. Runoff Coefficients for Rational Method;

I = intensity of rainfall based on the time of concentration and the 100-year & 50-year precipitation, inches per hours (in/hr) per SD-DDM Figure A-1, Intensity-Duration-Frequency Design Chart, this figure can be viewed in Attachment B; and

A = Area of the basin, acres (ac).

Calculations have been performed utilizing these parameters within a standard excel spreadsheet.

- Federal Emergency Management Agency (FEMA) Panels have been reviewed for the site. Neither the site, nor surrounding area is located within a floodplain. The FIRM and FIRMette for the site can be found in Attachment A.
- Runoff coefficients were determined from public domain aerial photography and land-use determinations per Table A-1 of the SD-DDM. This table can be viewed in Attachment B.
- A conservative 5-minute time of concentration was used for smaller drainage areas per Figure A-1 of the SD-DDM. This figure can be viewed in Attachment B.
- The drainage area (A) was determined based on available topographic information from SANGIS. A site inspection was conducted to verify the potential presence of physical drainage features too insignificant to be identified as part of an area-wide aerial topographic survey, but capable of impacting flow paths. The drainage area delineation can be found on the Hydrology Exhibit in Attachment C.

3.2 HYDRAULICS

Storm Drain Sizing

Storm drain sizing and design for the proposed system within Coast Boulevard was conducted using Hydraflow Storm Sewers Extension. This program is a full-featured application designed primarily for hydrologic and hydraulic analysis of storm sewer networks. Hydrology parameters from the rational method (time of concentration, tributary area, and run-off coefficient) were inputted into the Hydraflow model to generate peak flow rates through the system. These peak flow rates from this analysis are presented on the plans and can be viewed in Attachment D.

The proposed system will connect into the existing emergency project storm drain system located in the middle of the Coast Boulevard project. This system discharges to the Pacific Ocean through a 24" HDPE pipe. This pipe functions under inlet control and Figure 5-1: Inlet Control Nomograph, found in Appendix D, was used to confirm that the required head over the orifice would have to be a maximum of 5.8' in order to discharge the 50-year peak flow rate without surcharging. The results of both analyses can be viewed in Attachment D.

Inlet Sizing

Three curb inlets are being located and designed per Chapter 3 of the SD-DDM. The inlet in the Cave Store parking lot will be designed in sag and the remaining two inlets along Coast Boulevard will be designed on-grade. The inlet capacity calculations can be viewed in Attachment D.

4 RESULTS

4.1 HYDROLOGY

The summary of peak flow rates for the 50 and 100-year event are summarized in Table 5-1 below. The calculations themselves can be reviewed in Attachment C.

TABLE 5-1- HYDROLOGY SUMMARY 50 & 100 YEAR PEAK FLOW RATE

Drainage Areas	Area (ac)	C	Tc (min)*	Q50		Q100	
				Intensity	Discharge (CFS)	Intensity	Discharge (CFS)
1	0.26	0.95	1.14	4.20	1.0	4.40	1.1
2	1.08	0.95	2.54	4.20	4.3	4.40	4.5
3	0.36	0.85	2.41	4.20	1.3	4.40	1.3
4	0.85	0.85	2.57	4.20	3.0	4.40	3.2
5	2.31	0.70	12.81	3.00	4.9	3.20	5.2
6	11.06	0.70	13.50	2.90	22.5	3.10	24.0

- A minimum of 5-minute Tc is used for all intensity calculations. Per Figure A-4

4.2 HYDRAULICS

Proposed Storm Drain

The inlet control nomograph results show that a 24" pipe with grooved ends can convey 35cfs with 5 feet of head. The existing box is 5.8 feet deep and the proposed peak flow rate through the outfall is 33.6 cfs.

The results of the Hydraflow Storm Sewer analysis show that the proposed pipe can convey the 50-year peak flow rate of 30 cfs from the upstream tributary areas to the existing 24" outfall without surcharging.

Inlet Sizing and Flooded Width

Inlet calculations provided in Attachment D show that the three proposed inlets area sized correctly to capture the entirety of the 50-year peak flow rate from their respective basins. The Inlet length opening are summarized in Table 5-2 below.

TABLE 5-2- INLET LENGTH SUMMARY

Inlet ID	Condition	Q50 Flow Rate (cfs)	Required Inlet Length (ft)	Proposed Inlet Length (ft)
1	Sag	1.30	1.3	4
2	On-Grade	3.00	6.9	7
3	On-Grade	4.90	11.2	11.5

5 CONCLUSIONS AND RECOMMENDATIONS

Hydrology

The project is proposing to replace the existing road, parking lot, and sidewalk in kind (no added impervious area). In total the project will be a minor loss of impervious area due to the addition of planter areas in the cave store parking lot. Additionally, the minor grading will not change the slope or flow path of the project site. The hydrology study was conducted to determine project site peak flow rates to design the proposed storm drain system.

Storm Drain Pipe Sizing

The project proposes to abandon an existing 12" RCP outfall and pipe system that is undersized and eroding the coastal bluff. Installing a larger pipe in the same location as the existing 12" pipe is considered infeasible due to construction constraints and sea bluff erosion issues. Instead a 24" RCP will be installed under Coast Boulevard to redirect and convey this flow westward towards an existing 24" HDPE outfall. Utilizing the inlet control nomograph from Figure 5-1 of the SD-DDM, it was determined that the existing 24" outfall has sufficient head to convey and discharge the redirected peak 50-year flow rate under an inlet control condition.

The proposed storm drain pipes have been sized to convey the peak 50-year flow rate to the existing outfall without surcharging.

Proposed Curb Inlet Sizing

The proposed inlets have been sized and located to capture and convey the peak 50-year flow rate to the existing outfall.

6 REFERENCES

City of San Diego Drainage Design Manual (June 2017).

FEMA. (1997). *Flood Insurance Rate Map.* San Diego.

List of Referenced Tables and Figures (SDDDM, 2017)

Runoff Coefficients for Rational Method, Table A-1

Intensity Duration Frequency Design Chart, Figure A-1

Overland Time of Flow Nomograph, Figure A-4

Inlet Control Nomograph, Figure 5-1

Michael Baker
INTERNATIONAL

Attachment A.
FEMA FIRM Panel and FIRMette

32°52'36.68"N
117°16'51.74"W

117°14'58.25"W
USGS The National Map: Orthoimagery. Data refreshed April, 2019.
32°50'30.86"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X*
	Effective LOMRs
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	B 20.2 Cross Sections with 1% Annual Chance
	17.5 Water Surface Elevation
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood 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 beordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to 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.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **10/15/2019 5:16:42 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

N

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map please see the Flood Insurance Study(FIS) Report for your community at https://msc.fema.gov

1 inch = 500 feet 1:6,000

0 250 500 1,000 1,500 2,000 Feet

0 50 100 200 300 400 Meters

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL **1582** OF **2300**

Panel Contains:

COMMUNITY	NUMBER	PANEL
CITY OF SAN DIEGO CALIFORNIA	060295	1582

MAP NUMBER
06073C1582G
EFFECTIVE DATE
05/16/2012

National Flood Hazard Layer FIRMette

FEMA

32°51'12.42"N

117°16'32.56"W

117°15'55.11"W

32°50'42.19"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

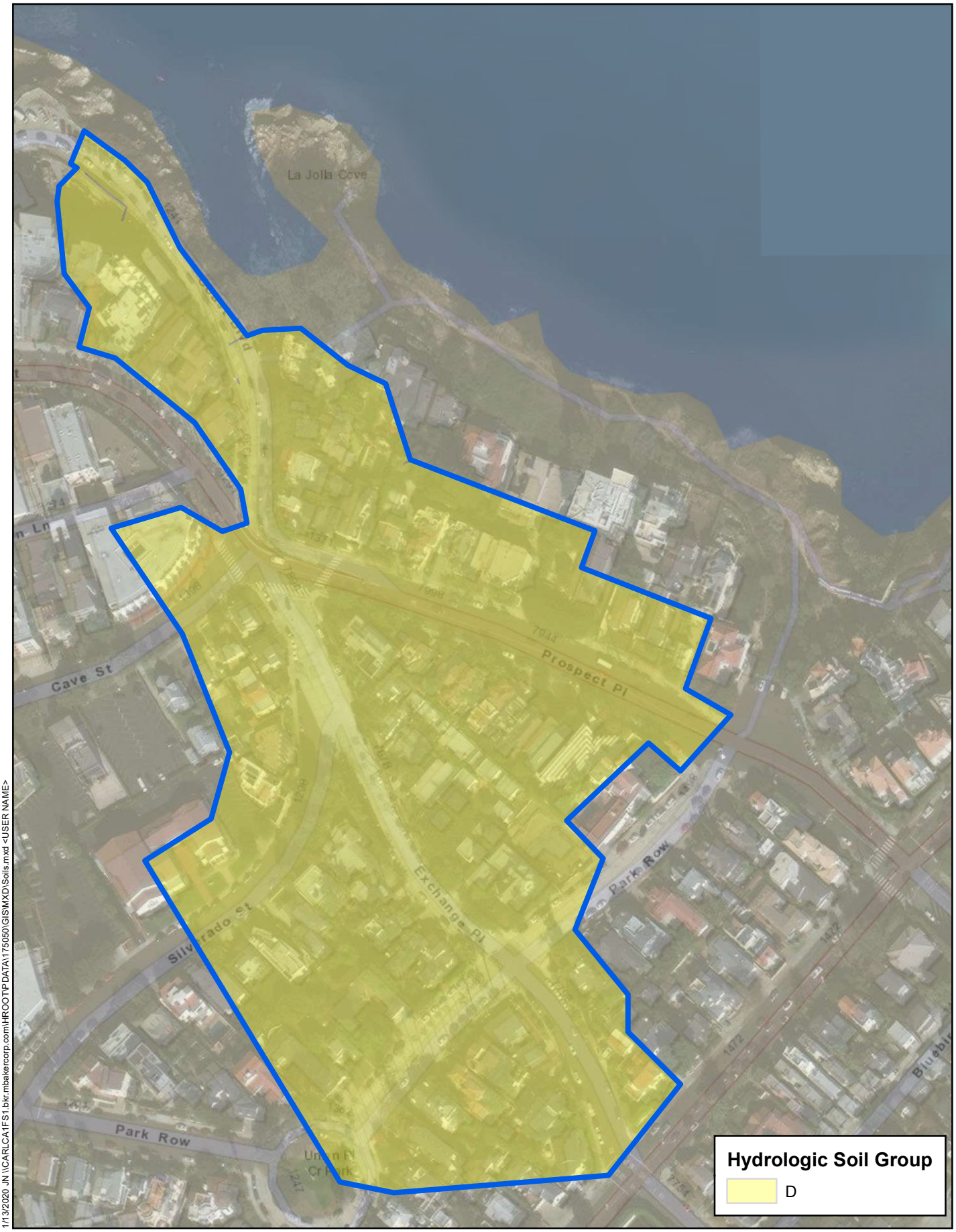
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/15/2019 at 5:19:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Michael Baker
INTERNATIONAL

Attachment B.
Soils Exhibit & Excerpts from SD-DDM



1/13/2020 JN \\CARLCA1FS1.bkr.mbakercorp.com\HROOT\PDATA\175050\GIS\MXD\Soils.mxd <USER NAME>

Michael Baker INTERNATIONAL

0 75 150 300 Feet

Source:

LA JOLLA COAST BOULEVARD

Soils Exhibit

MBI JN 175050

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_C for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_C calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

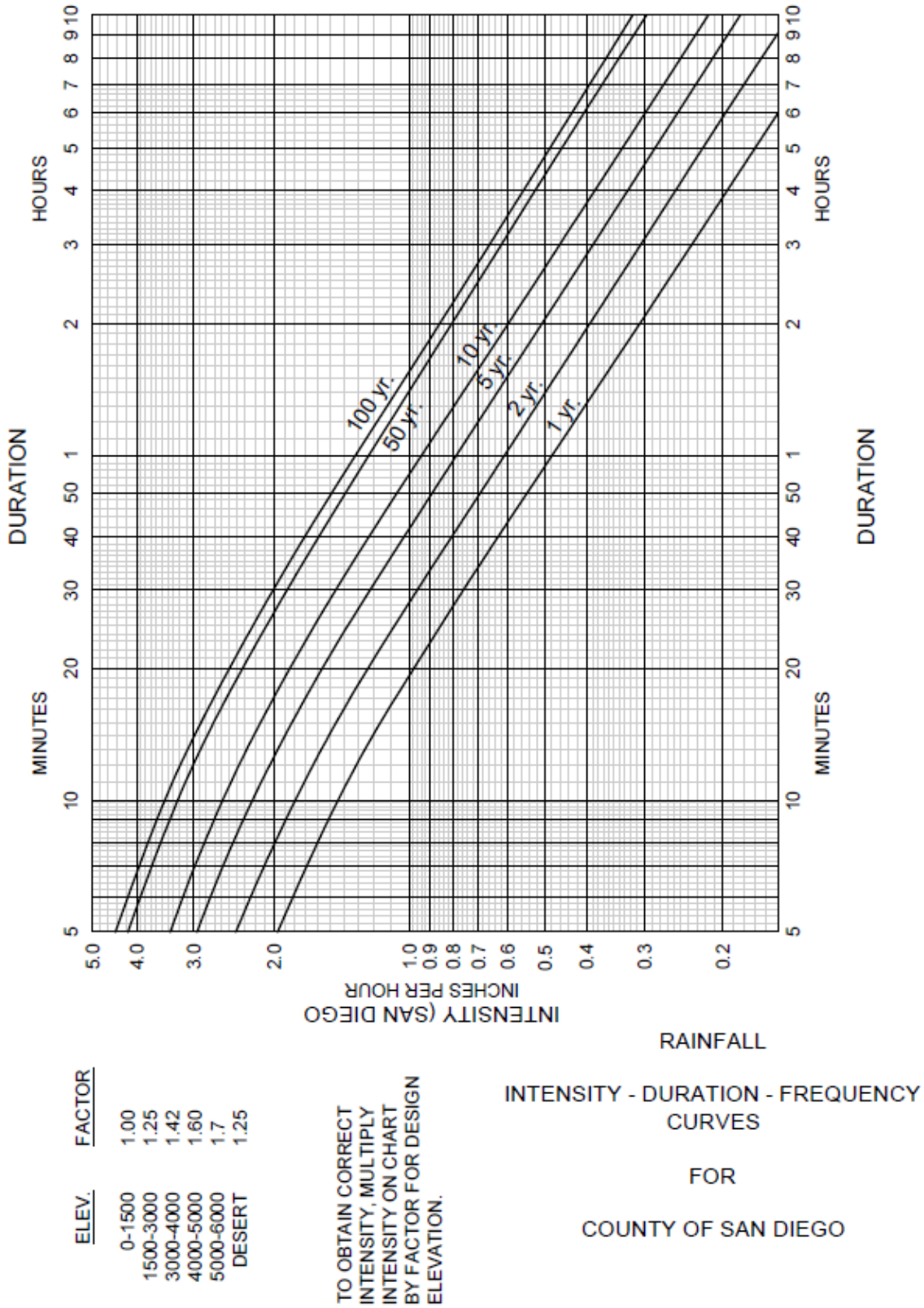
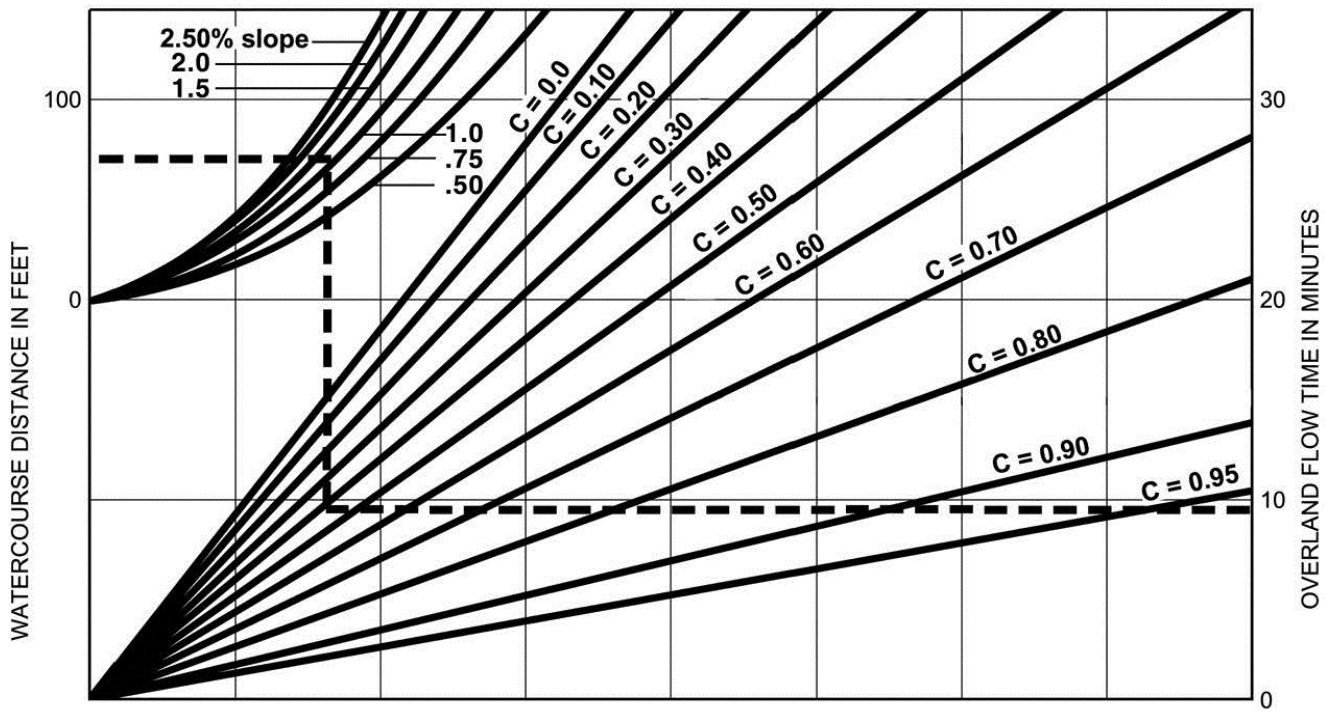


Figure A-1. Intensity-Duration-Frequency Design Chart



EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

SOURCE: Airport Drainage, Federal Aviation Administration, 1965

Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

Michael Baker
INTERNATIONAL

Attachment C.
Hydrology Exhibit
& Calculations

Rational Method Calculations per Appendix A of the City of San Diego Drainage Design Manual											
Drainage Area ID	u/s elev	d/s elev	Avg Slope (ft/ft)	Flow Path (ft)	T (min)[1]	Runoff Coefficient C[2]	Intensity (in/hr) 100 yr storm[3]	Intensity (in/hr) 50 yr storm[3]	Drainage Area (Acre)	Discharge (cfs) Q100	Discharge (cfs) Q50
1 - Emergency South	112	50	34	185	1.14	0.95	4.40	4.20	0.26	1.1	1.0
2 - Emergency North	116	52	13	490	2.54	0.95	4.40	4.20	1.08	4.5	4.3
3 - PR. Inlet 1	118	81	19	200	2.41	0.85	4.40	4.20	0.36	1.3	1.3
4 - PR. Inlet 2	114	89	14	185	2.57	0.85	4.40	4.20	0.85	3.2	3.0
5 - PR. Inlet 3	137	114	3	700	12.81	0.7	3.20	3.00	2.31	5.2	4.9
6 - Prospect Inlets	170	122	5	1,000	13.50	0.7	3.10	2.90	11.06	24.0	22.5

1. Figure A-4. Rational Formula - Overland Time of Flow Nomograph: A minimum of 5 minute T is used for all intensity calculations

2. Per Table A-1. Runoff Coefficients for Rational Method

3. Figure A-1. Intensity-Duration-Frequency Design Chart

12/18/2019 JN H:\PDATA\175050\GIS\MXD\Proposed.mxd <USER NAME>

0 75 150 300 Feet

Source:

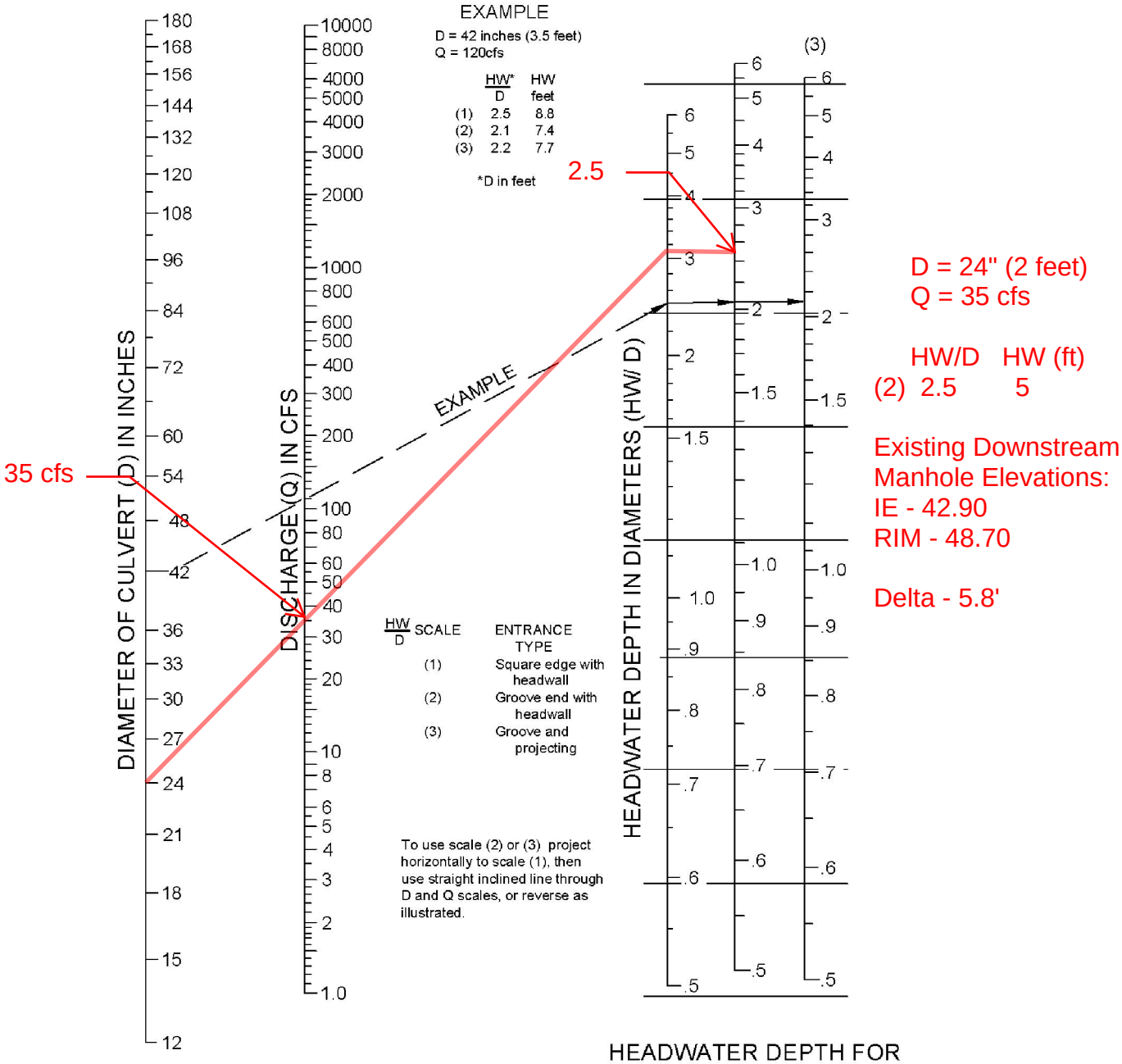
LA JOLLA COAST BOULEVARD

Hydrology Map

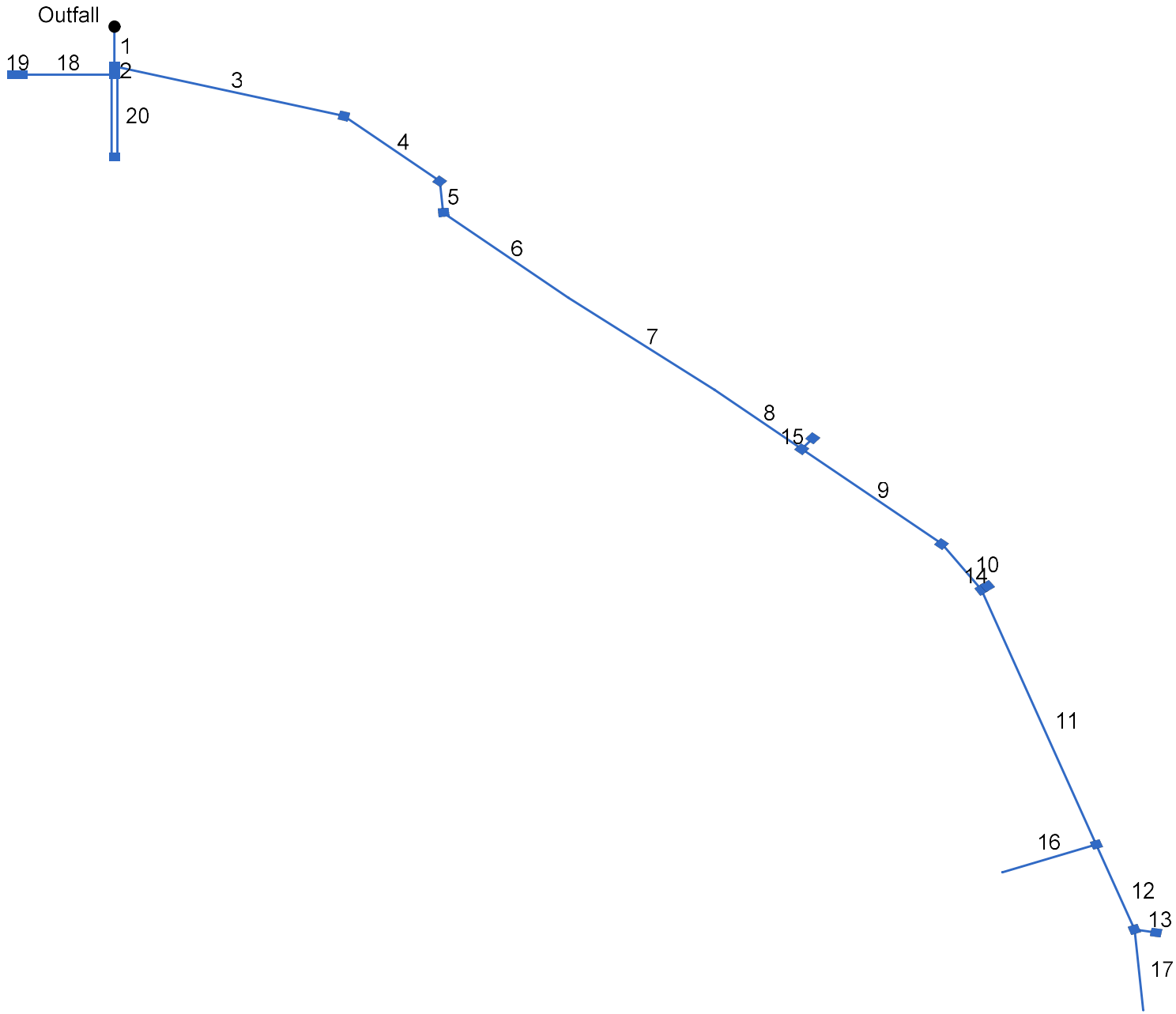
MBI JN 175050

Michael Baker
INTERNATIONAL

Attachment D.
Hydraulics & Inlet Sizing


EXAMPLE
D = 42 inches (3.5 feet)
Q = 120cfs
HW*/D HW feet
(1) 2.5 8.8
(2) 2.1 7.4
(3) 2.2 7.7
*D in feet
2.5
35 cfs
EXAMPLE
DIAMETER OF CULVERT (D) IN INCHES
DISCHARGE (Q) IN CFS
HEADWATER DEPTH IN DIAMETERS (HW/ D)
HW/D SCALE
ENTRANCE TYPE
(1) Square edge with headwall
(2) Groove end with headwall
(3) Groove and projecting
To use scale (2) or (3) project horizontally to scale (1), then use straight inclined line through D and Q scales, or reverse as illustrated.
D = 24" (2 feet)
Q = 35 cfs
HW/D HW (ft)
(2) 2.5 5
Existing Downstream Manhole Elevations:
IE - 42.90
RIM - 48.70
Delta - 5.8'
HEADWATER SCALES 2 & 3
REVISED MAY 1964
HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL
BUREAU OF PUBLIC ROADS
JAN. 1963

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: La Jolla Coast.stm	Number of lines: 20	Date: 1/13/2020

Storm Sewers v2018.30

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1		33.57	24	Cir	19.620	29.77	38.25	43.221	31.77	40.16	n/a	43.98 i	End	Manhole
2		5.34	24	Cir	4.140	40.69	42.90	53.382	43.98	43.80	n/a	43.97 i	1	Manhole
3		29.91	24	Cir	94.950	40.55	55.15	15.377	43.98	57.01	n/a	59.98 i	1	Manhole
4		29.91	24	Cir	50.160	55.25	61.63	12.719	59.98	63.49	n/a	66.46 i	3	Manhole
5		29.91	24	Cir	15.780	61.73	61.89	1.014	66.46*	66.74*	0.00	66.74	4	Manhole
6		29.91	24	Cir	65.350	61.99	67.94	9.105	66.74	69.80	n/a	69.80 j	5	None
7		29.91	24	Cir	74.120	67.94	69.61	2.253	69.80	71.47	n/a	71.47	6	None
8		29.91	24	Cir	45.580	69.61	72.00	5.244	71.47	73.86	n/a	76.83 i	7	Manhole
9		29.03	24	Cir	73.130	72.10	77.04	6.755	76.83	78.89	n/a	81.67 i	8	Manhole
10		29.03	24	Cir	27.610	77.14	80.14	10.866	81.67	82.08	n/a	84.63 i	9	Manhole
11		26.95	24	Cir	134.380	80.24	100.13	14.801	84.63	101.94	n/a	104.33 i	10	Manhole
12		15.80	24	Cir	44.710	100.49	107.41	15.478	104.33	108.84	n/a	109.87 i	11	Manhole
13		4.77	18	Cir	8.820	107.51	107.61	1.134	109.87*	109.89*	0.00	109.89	12	Curb-Horiz
14		3.03	18	Cir	2.910	80.24	80.60	12.371	84.63*	84.63*	0.00	84.63	10	Curb-Horiz
15		1.28	18	Cir	6.910	72.60	73.51	13.169	76.83*	76.83*	0.00	76.83	8	Curb-Horiz
16		11.15	12	Cir	40.000	102.55	120.00	43.625	104.33	121.00	n/a	121.00 j	11	None
17		11.15	12	Cir	40.000	109.00	120.00	27.500	109.87	121.00	0.00	121.00	12	None
18		4.30	18	Cir	36.820	43.00	43.37	1.005	43.97	44.16	n/a	44.60 i	2	Manhole
19		4.30	18	Cir	4.000	43.47	43.51	1.000	44.60	44.30	n/a	44.74 i	18	Curb-Horiz
20		1.04	12	Cir(2b)	40.610	45.64	47.13	3.669	45.80	47.38	n/a	47.72 i	2	Grate

Project File: La Jolla Coast.stm | Number of lines: 20 | Run Date: 1/13/2020

NOTES: Return period = 50 Yrs. ; *Surcharged (HGL above crown). ; i - Inlet control. ; j - Line contains hyd. jump.

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
1	3.09	3.09	n/a	0.20	0.50	0.90	148.70	1.91	....	....	....	90.000	2.00	1.91**	Outfall	0.00	465.92	33.55	43.98 i	10.437
2	3.14	1.37	n/a	0.20	0.50	0.90	165.25	0.81	....	....	....	0.000	2.00	0.90	1	0.00	465.92	44.03	43.97 i	-0.063
3	3.05	3.05	n/a	0.20	0.50	0.90	88.69	1.86	....	....	....	-75.000	2.00	1.86**	1	0.00	557.64	45.39	59.98 i	14.589
4	3.05	3.05	n/a	0.20	0.50	0.90	80.66	1.86	....	....	....	25.000	2.00	1.86**	3	0.00	596.06	61.39	66.46 i	5.070
5	3.14	3.14	n/a	0.20	0.50	0.90	22.77	1.86	....	....	....	45.000	2.00	2.00	4	0.00	597.44	67.87	68.15	0.276
6	3.05	3.05	n/a	0.20	0.50	0.90	68.25	1.86	....	....	....	-45.000	2.00	1.86**	5	0.00	647.50	68.15	71.30	1.066
7	3.05	3.05	n/a	0.20	0.50	0.90	33.95	1.86	....	....	....	-2.000	1.86	1.86**	6	0.00	705.91	71.30	72.97	0.000
8	3.05	3.05	n/a	0.20	0.50	0.90	51.79	1.86	....	....	....	2.000	1.86	1.86**	7	0.00	740.82	72.97	76.83 i	3.862
9	3.03	3.03	n/a	0.20	0.50	0.90	58.78	1.85	....	....	....	0.000	2.00	1.85**	8	0.00	796.84	78.16	81.67 i	3.515
10	3.14	3.11	n/a	0.20	0.50	0.90	74.56	1.85	....	....	....	15.000	2.00	1.94	9	0.00	812.68	83.00	84.63 i	1.623
11	2.99	2.99	n/a	0.20	0.50	0.90	87.02	1.81	....	....	....	15.000	2.00	1.81**	10	0.00	858.64	85.77	104.33 i	18.558
12	2.41	2.41	n/a	0.20	0.50	0.90	88.98	1.43	....	....	....	0.000	2.00	1.43**	11	0.00	873.93	104.72	109.87 i	5.147
13	1.77	1.77	Sag	0.20	0.50	0.90	11.18	0.84	0.050	0.020	4.00	-60.000	1.50	1.50	12	2.31	882.62	109.98	110.00	0.018
14	1.77	1.77	Sag	0.20	0.50	0.90	36.94	0.66	0.050	0.020	4.00	-90.000	1.50	1.50	10	0.85	815.06	84.67	84.67	0.002
15	1.77	1.77	Sag	0.20	0.50	0.90	38.11	0.42	0.050	0.020	4.00	-90.000	1.50	1.50	8	0.36	745.26	76.84	76.84	0.001
16	0.79	0.79	n/a	0.20	0.50	0.90	23.52	1.00	....	....	....	90.000	1.00	1.00**	11	5.53	821.05	107.46	124.13	3.818
17	0.72	0.79	n/a	0.20	0.50	0.90	18.68	1.00	....	....	....	15.000	0.87	1.00**	12	5.53	877.42	113.00	124.13	0.000
18	0.95	0.95	n/a	0.20	0.50	0.90	10.53	0.79	....	....	....	90.000	0.97	0.79**	2	0.00	429.10	44.28	44.60 i	0.312
19	0.95	0.95	Sag	0.20	0.50	0.90	10.50	0.79	0.050	0.020	4.00	0.000	1.13	0.79**	18	1.08	425.10	44.91	44.74 i	-0.178
20	0.17	0.31	Sag	0.20	0.50	0.90	17.74	0.25	0.050	0.020	....	0.000	0.16	0.25**	2	0.26	465.92	45.98	47.72 i	1.735

Project File: La Jolla Coast.stm | Number of lines: 20 | Date: 1/13/2020

NOTES: i Inlet control; ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	Inlet Eff (%)
33.57	n/a	n/a	....	....	....	48.10	48.70	....	....	....	....	31.77	40.16 j	43.98 i	32.52	36.15	0.00	0.00	....	....
5.34	n/a	n/a	....	....	....	48.70	48.70	....	....	....	....	43.98	43.80	43.97 i	....	....	0.00	0.00	....	....
29.91	n/a	n/a	....	....	....	48.70	60.89	....	....	....	....	43.98	57.01 j	59.98 i	45.33	45.99	0.00	0.00	....	....
29.91	n/a	n/a	....	....	....	60.89	67.89	....	....	....	....	59.98	63.49 j	66.46 i	59.16	59.46	0.00	0.00	....	....
29.91	1.749	1.749	....	....	....	67.89	69.19	....	....	....	....	66.46	66.74	66.74	....	....	0.00	0.00	....	....
29.91	1.631	1.749	....	....	....	69.19	73.00	....	....	....	....	66.74	69.80 j	69.80	66.97	67.01	0.00	0.00	....	....
29.91	0.000	0.000	....	....	....	73.00	76.00	....	....	....	....	69.80	71.47	71.47	....	....	0.00	0.00	....	....
29.91	n/a	n/a	....	....	....	76.00	78.59	....	....	....	....	71.47	73.86	76.83 i	....	....	0.00	0.00	....	....
29.03	n/a	n/a	....	....	....	78.59	83.46	....	....	....	....	76.83	78.89 j	81.67 i	77.56	77.50	0.00	0.00	....	....
29.03	n/a	n/a	....	....	....	83.46	86.63	....	....	....	....	81.67	82.08	84.63 i	....	....	0.00	0.00	....	....
26.95	n/a	n/a	....	....	....	86.63	107.03	....	....	....	....	84.63	101.94 j	104.33 i	86.02	86.52	0.00	0.00	....	....
15.80	n/a	n/a	....	....	....	107.03	113.59	....	....	....	....	104.33	108.84 j	109.87 i	103.87	104.07	0.00	0.00	....	....
4.77	0.206	0.207	....	....	....	113.59	114.73	0.52	Sag	22.76	2.00	109.87	109.89	109.89	....	....	1.62	4.77	0.52	100
3.03	0.083	0.083	....	....	....	86.63	86.50	0.37	Sag	15.53	2.00	84.63	84.63	84.63	....	....	0.72	3.03	0.37	100
1.28	0.015	0.015	....	....	....	78.59	78.50	0.24	Sag	8.76	2.00	76.83	76.83	76.83	....	....	0.31	1.28	0.24	100
11.15	9.545	9.800	....	....	....	107.03	124.00	....	....	....	....	104.33	121.00 j	121.00	105.29	107.23	3.87	11.15	....	....
11.15	0.000	0.000	....	....	....	113.59	124.00	....	....	....	....	109.87	121.00	121.00	....	....	3.87	11.15	....	....
4.30	n/a	n/a	....	....	....	48.70	47.50	....	....	....	....	43.97	44.16 j	44.60 i	43.91	43.85	0.00	0.00	....	....
4.30	n/a	n/a	....	....	....	47.50	48.00	0.46	Sag	19.78	2.00	44.60	44.30	44.74 i	....	....	1.03	4.30	0.46	100
1.04	n/a	n/a	2.00	2.00	2.00	48.70	49.10	0.20	Sag	6.95	2.00	45.80	47.38	47.72 i	....	....	0.25	1.04	0.20	100

Project File: La Jolla Coast.stm | Number of lines: 20 | Date: 1/13/2020

NOTES: i Inlet control; ** Critical depth

MyReport

Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	Line ID	
New	Sag		0.0	2.88	0.00	29.77	38.25	1.96	9.53	1.84	3.14	0.00	MH	0.00	1,578	1,420	1,341		
	Sag		0.0	4.19	0.00	40.69	42.90	....	....	0.00	0.00	0.00	MH	0.00	324	292	275		
	Sag		0.0	2.88	0.00	40.55	55.15	18.99	9.30	1.50	4.55	0.00	MH	0.00	4,998	4,498	4,248		
	Sag		0.0	2.88	0.00	55.25	61.63	15.05	10.00	1.41	5.30	0.00	MH	0.00	2,498	2,248	2,123		
	Sag		0.0	2.88	0.00	61.73	61.89	....	....	0.00	0.00	0.00	MH	0.00	936	842	796		
	Sag		0.0	2.88	0.00	61.99	67.94	32.68	10.00	1.41	4.12	0.00 z	None	0.00	3,272	2,945	2,781		
	Sag		0.0	2.88	0.00	67.94	69.61	....	....	0.00	0.00	0.00 z	None	0.00	3,562	3,206	3,028		
	Sag		0.0	2.88	0.00	69.61	72.00	....	....	0.00	0.00	0.00	MH	0.00	2,496	2,246	2,122		
	Sag		0.0	2.88	0.00	72.10	77.04	51.19	10.00	1.33	2.95	0.00	MH	0.00	3,926	3,533	3,337		
	Sag		0.0	2.88	0.00	77.14	80.14	....	....	0.00	0.00	0.00	MH	0.00	1,560	1,404	1,326		
New	Sag		0.0	2.88	0.00	80.24	100.13	26.88	9.03	1.27	5.02	0.00	MH	0.00	7,098	6,388	6,033		
	Sag		0.0	2.88	0.00	100.49	107.41	8.94	10.00	0.39	5.02	0.00	MH	0.00	2,444	2,200	2,077		
	Sag		12.8	2.95	2.95	107.51	107.61	....	....	0.00	0.00	0.00	Curb	0.00	513	461	436		
	Sag		5.0	4.19	4.19	80.24	80.60	....	....	0.00	0.00	0.00	Curb	0.00	230	207	196		
	Sag		5.0	4.19	4.19	72.60	73.51	....	....	0.00	0.00	0.00	Curb	0.00	380	342	323		
	Sag		13.5	2.88	2.88	102.55	120.00	4.00	4.98	3.13	4.70	0.00 z	None	0.00	1,299	1,169	1,104		
	Sag		13.5	2.88	2.88	109.00	120.00	....	....	0.00	0.00	0.00 z	None	0.00	1,299	1,169	1,104		
	Sag		0.0	4.19	0.00	43.00	43.37	11.05	3.99	0.31	0.45	0.00	MH	0.00	1,580	1,422	1,343		
	Sag		5.0	4.19	4.19	43.47	43.51	....	....	0.00	0.00	0.00	Curb	0.00	280	252	238		
	Sag		5.0	4.19	4.19	45.64	47.13	....	....	0.00	0.00	0.00	Grate	0.00	1,234	1,111	1,049		

Project File: La Jolla Coast.stm | Number of lines: 20 | Date: 1/13/2020

NOTES: Intensity = 24.42 / (Inlet time + 7.10) ^ 0.71 -- Return period = 50 Yrs. ; i Inlet control; ** Critical depth

MyReport

Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)	Area A3 (ac)	Tc (min)	Throat Ht (in)	Total Area (ac)	Total CxA
19.620	24	43.22	Cir	....	....	0.013	n/a	-159.10	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	15.92	11.66
4.140	24	53.38	Cir	....	....	0.013	n/a	-163.24	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	5.0	....	1.34	1.27
94.950	24	15.38	Cir	....	....	0.013	n/a	-183.67	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.58	10.39
50.160	24	12.72	Cir	....	....	0.013	n/a	-215.92	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.58	10.39
15.780	24	1.01	Cir	....	....	0.013	0.00	-231.64	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.58	10.39
65.350	24	9.10	Cir	....	....	0.013	n/a	-273.64	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.58	10.39
74.120	24	2.25	Cir	....	....	0.013	n/a	-319.27	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.58	10.39
45.580	24	5.24	Cir	....	....	0.013	n/a	-348.57	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.58	10.39
73.130	24	6.76	Cir	....	....	0.013	n/a	-395.58	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.22	10.08
27.610	24	10.87	Cir	....	....	0.013	n/a	-418.20	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	14.22	10.08
134.380	24	14.80	Cir	....	....	0.013	n/a	-544.47	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	13.37	9.36
44.710	24	15.48	Cir	....	....	0.013	n/a	-586.49	0.00	....	....	....	24	0.00	24	0.00	0.00	0.00	13.5	....	7.84	5.49
8.820	18	1.13	Cir	0.0	....	0.013	0.00	-588.02	0.00	0.00	4.77	0.00	18	0.70	18	0.00	0.00	0.00	12.8	4.0	2.31	1.62
2.910	18	12.37	Cir	0.0	....	0.013	0.00	-416.53	0.00	0.00	3.03	0.00	18	0.85	18	0.00	0.00	0.00	5.0	4.0	0.85	0.72
6.910	18	13.17	Cir	0.0	....	0.013	0.00	-343.28	0.00	0.00	1.28	0.00	18	0.85	18	0.00	0.00	0.00	5.0	4.0	0.36	0.31
40.000	12	43.62	Cir	....	....	0.013	n/a	-558.15	0.00	....	....	....	12	0.70	12	0.00	0.00	0.00	13.5	....	5.53	3.87
40.000	12	27.50	Cir	....	....	0.013	0.00	-626.33	0.00	....	....	....	12	0.70	12	0.00	0.00	0.00	13.5	....	5.53	3.87
36.820	18	1.00	Cir	....	....	0.013	n/a	-163.24	0.00	....	....	....	18	0.00	18	0.00	0.00	0.00	5.0	....	1.08	1.03
4.000	18	1.00	Cir	0.0	....	0.013	n/a	-163.24	0.00	0.00	4.30	0.00	18	0.95	18	0.00	0.00	0.00	5.0	4.0	1.08	1.03
40.610	12(2b)	3.67	Cir	0.0	....	0.010	n/a	-203.85	0.00	0.00	1.04	0.00	12	0.95	12	0.00	0.00	0.00	5.0	....	0.26	0.25

Project File: La Jolla Coast.stm | Number of lines: 20 | Date: 1/13/2020

NOTES: i Inlet control; ** Critical depth

MyReport

Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
33.57	10.78	10.69	1.78	1.84	10.87	16.33	8.45	61.21
5.34	2.80	1.70	0.04	0.24	3.90	6.01	3.80	11.78
29.91	9.67	9.52	1.41	1.50	9.82	6.15	3.74	296.71
29.91	9.67	9.52	1.41	1.50	9.82	3.64	4.26	156.74
29.91	9.52	9.52	1.41	1.41	9.52	4.16	5.30	49.56
29.91	9.67	9.52	1.41	1.50	9.82	5.20	3.06	204.21
29.91	9.82	9.82	1.50	1.50	9.82	3.06	4.39	225.69
29.91	9.82	9.82	1.50	1.50	9.82	4.39	4.59	138.79
29.03	9.41	9.24	1.33	1.43	9.58	4.49	4.42	228.34
29.03	9.28	9.24	1.33	1.35	9.32	4.32	4.49	86.59
26.95	8.80	8.58	1.14	1.27	9.03	4.39	4.90	418.59
15.80	5.80	5.03	0.39	0.67	6.56	4.54	4.18	134.96
4.77	2.70	2.70	0.11	0.11	2.70	4.58	5.62	15.58
3.03	1.71	1.71	0.05	0.05	1.71	4.89	4.40	5.14
1.28	0.73	0.73	0.01	0.01	0.73	4.49	3.49	12.21
11.15	14.20	14.19	3.13	3.13	14.20	3.48	3.00	31.41
11.15	14.79	15.38	3.13	3.13	14.20	3.59	3.00	30.40
4.30	4.05	3.58	0.32	0.32	4.53	4.20	2.63	39.66
4.30	3.77	3.02	0.32	0.32	4.53	2.53	2.99	4.77
1.04	4.77	6.16	0.18	0.18	3.38	2.06	0.97	9.57

Project File: La Jolla Coast.stm | Number of lines: 20 | Date: 1/13/2020

NOTES: i Inlet control; ** Critical depth

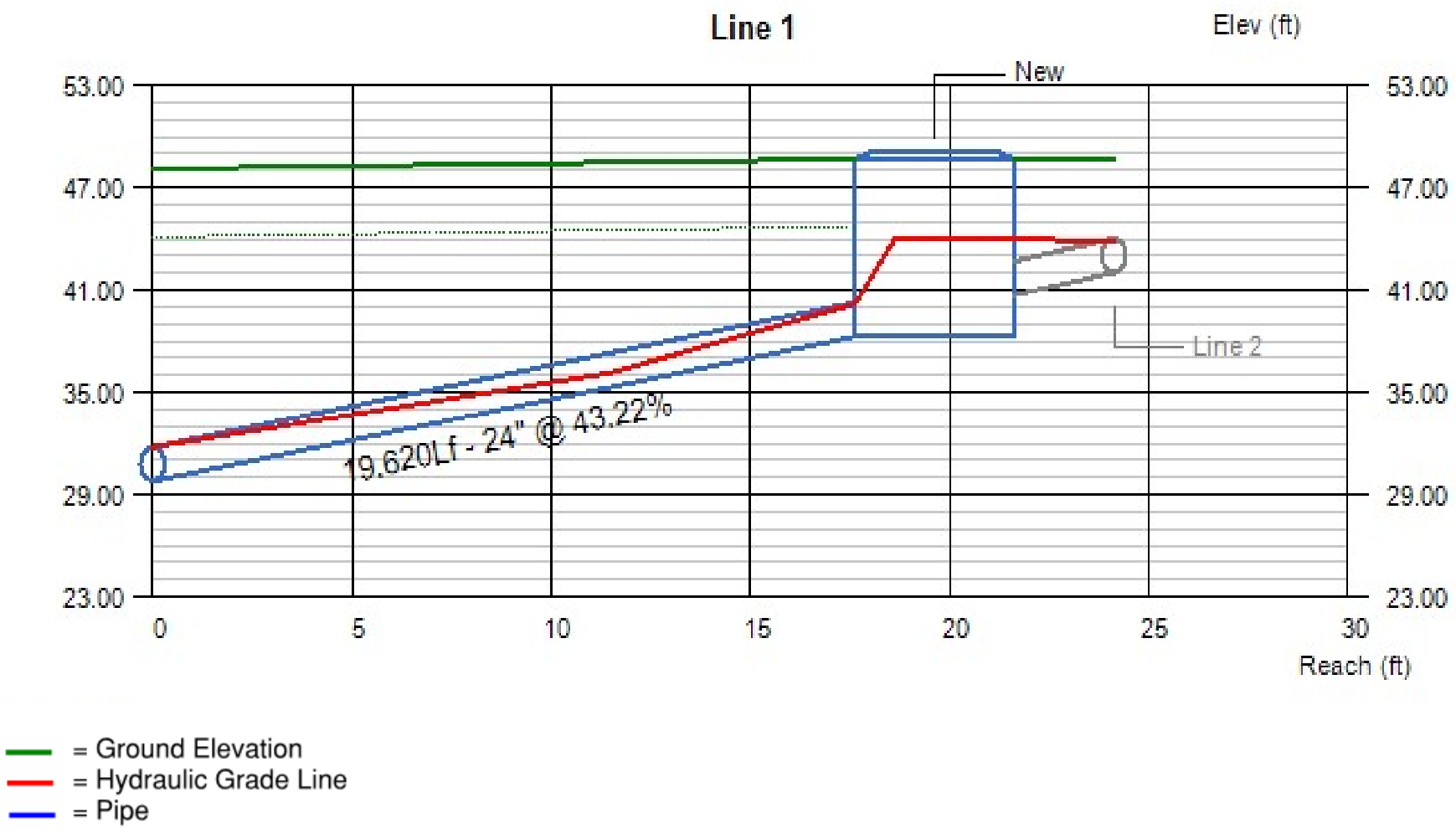
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	33.57	29.77	31.77	2.00	3.09	10.69	1.78	33.55	n/a	19.620	38.25	40.16 j	1.91**	3.09	10.87	1.84	41.99i	n/a	n/a	n/a	0.00	n/a
2	24	5.34	40.69	43.98	2.00	3.14	1.70	0.04	44.03	n/a	4.140	42.90	43.80	0.90	1.37	3.90	0.24	44.04i	n/a	n/a	-0.230	0.00	n/a
3	24	29.91	40.55	43.98	2.00	3.05	9.52	1.41	45.39	n/a	94.950	55.15	57.01 j	1.86**	3.05	9.82	1.50	58.51i	n/a	n/a	n/a	0.00	n/a
4	24	29.91	55.25	59.98	2.00	3.05	9.52	1.41	61.39	n/a	50.160	61.63	63.49 j	1.86**	3.05	9.82	1.50	64.99i	n/a	n/a	n/a	0.00	n/a
5	24	29.91	61.73	66.46	2.00	3.14	9.52	1.41	67.87	1.749	15.780	61.89	66.74	2.00	3.14	9.52	1.41	68.15	1.749	1.749	0.276	0.00	0.00
6	24	29.91	61.99	66.74	2.00	3.05	9.52	1.41	68.15	1.749	65.350	67.94	69.80 j	1.86**	3.05	9.82	1.50	71.30	1.513	1.631	n/a	0.00	n/a
7	24	29.91	67.94	69.80	1.86*	3.05	9.82	1.50	71.30	0.000	74.120	69.61	71.47	1.86**	3.05	9.82	1.50	72.97	0.000	0.000	n/a	0.00	n/a
8	24	29.91	69.61	71.47	1.86*	3.05	9.82	1.50	72.97	n/a	45.580	72.00	73.86	1.86**	3.05	9.82	1.50	75.36i	n/a	n/a	n/a	0.00	n/a
9	24	29.03	72.10	76.83	2.00	3.03	9.24	1.33	78.16	n/a	73.130	77.04	78.89 j	1.85**	3.03	9.58	1.43	80.31i	n/a	n/a	n/a	0.00	n/a
10	24	29.03	77.14	81.67	2.00	3.14	9.24	1.33	83.00	n/a	27.610	80.14	82.08	1.94	3.11	9.32	1.35	83.43i	n/a	n/a	-0.924	0.00	n/a
11	24	26.95	80.24	84.63	2.00	2.99	8.58	1.14	85.77	n/a	134.380	100.13	101.94 j	1.81**	2.99	9.03	1.27	103.20i	n/a	n/a	n/a	0.00	n/a
12	24	15.80	100.49	104.33	2.00	2.41	5.03	0.39	104.72	n/a	44.710	107.41	108.84 j	1.43**	2.41	6.56	0.67	109.51i	n/a	n/a	n/a	0.00	n/a
13	18	4.77	107.51	109.87	1.50	1.77	2.70	0.11	109.98	0.207	8.820	107.61	109.89	1.50	1.77	2.70	0.11	110.00	0.206	0.206	0.018	0.00	0.00
14	18	3.03	80.24	84.63	1.50	1.77	1.71	0.05	84.67	0.083	2.910	80.60	84.63	1.50	1.77	1.71	0.05	84.67	0.083	0.083	0.002	0.00	0.00
15	18	1.28	72.60	76.83	1.50	1.77	0.73	0.01	76.84	0.015	6.910	73.51	76.83	1.50	1.77	0.73	0.01	76.84	0.015	0.015	0.001	0.00	0.00
16	12	11.15	102.55	104.33	1.00	0.79	14.19	3.13	107.46	9.800	40.000	120.00	121.00 j	1.00**	0.79	14.20	3.13	124.13	9.290	9.545	n/a	0.00	0.00
17	12	11.15	109.00	109.87	0.87	0.72	15.38	3.13	113.00	0.000	40.000	120.00	121.00	1.00**	0.79	14.20	3.13	124.13	0.000	0.000	n/a	0.00	0.00
18	18	4.30	43.00	43.97	0.97	0.95	3.58	0.32	44.28	n/a	36.820	43.37	44.16 j	0.79**	0.95	4.53	0.32	44.48i	n/a	n/a	n/a	0.00	n/a
19	18	4.30	43.47	44.60	1.13	0.95	3.02	0.32	44.91	n/a	4.000	43.51	44.30	0.79**	0.95	4.53	0.32	44.62i	n/a	n/a	n/a	0.00	n/a
20	12(2b)	1.04	45.64	45.80	0.16*	0.17	6.16	0.18	45.98	n/a	40.610	47.13	47.38	0.25**	0.31	3.38	0.18	47.56i	n/a	n/a	n/a	0.00	n/a

Project File: La Jolla Coast.stm | Number of lines: 20 | Run Date: 1/13/2020

Notes: * Crown depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

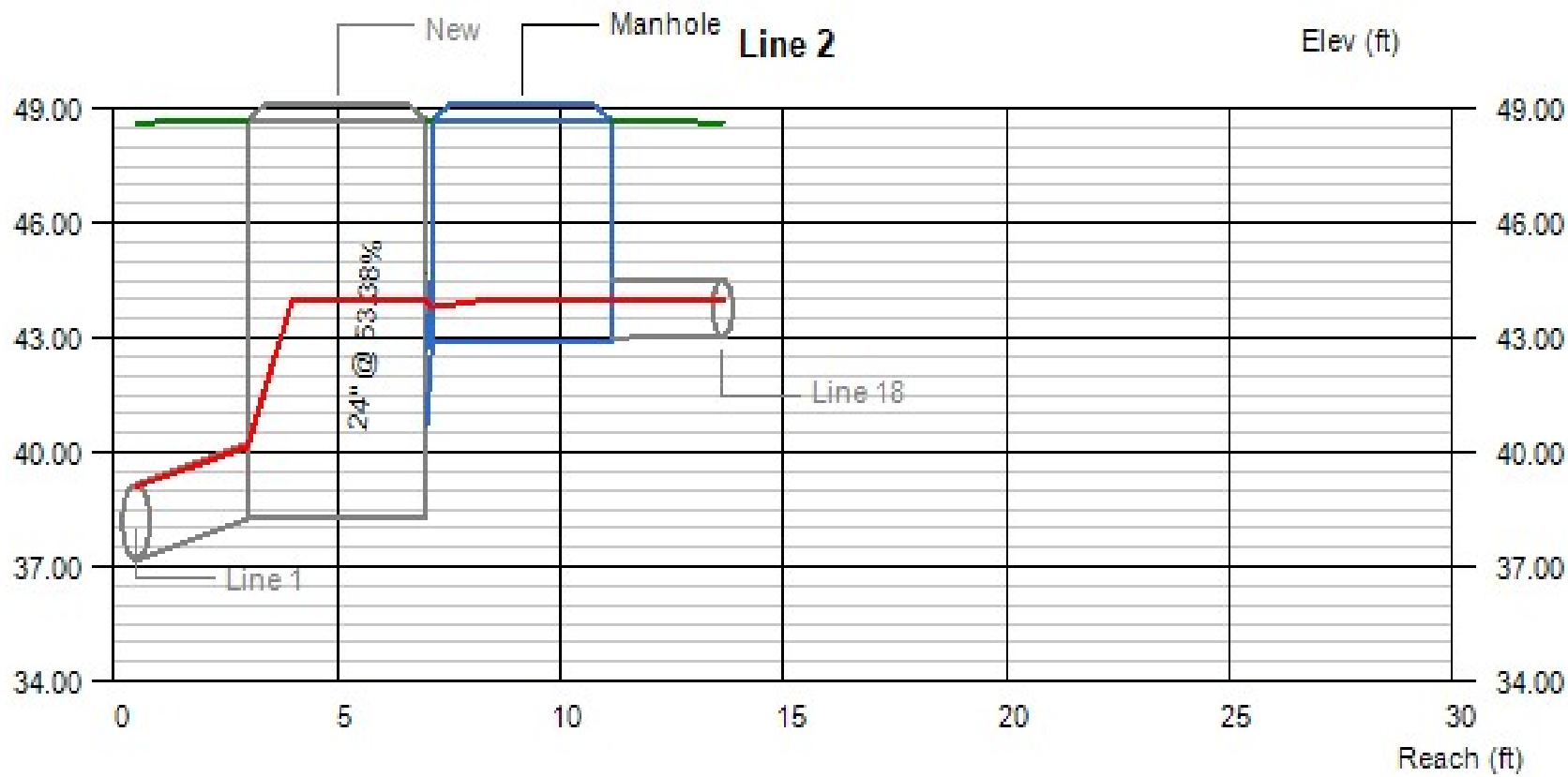
Line Profile (Line 1)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
1	33.57	29.77	38.25	2.00	1.91	5.73	31.77	40.16 j	43.98 i	10.69	10.87	16.33	8.45

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 2)

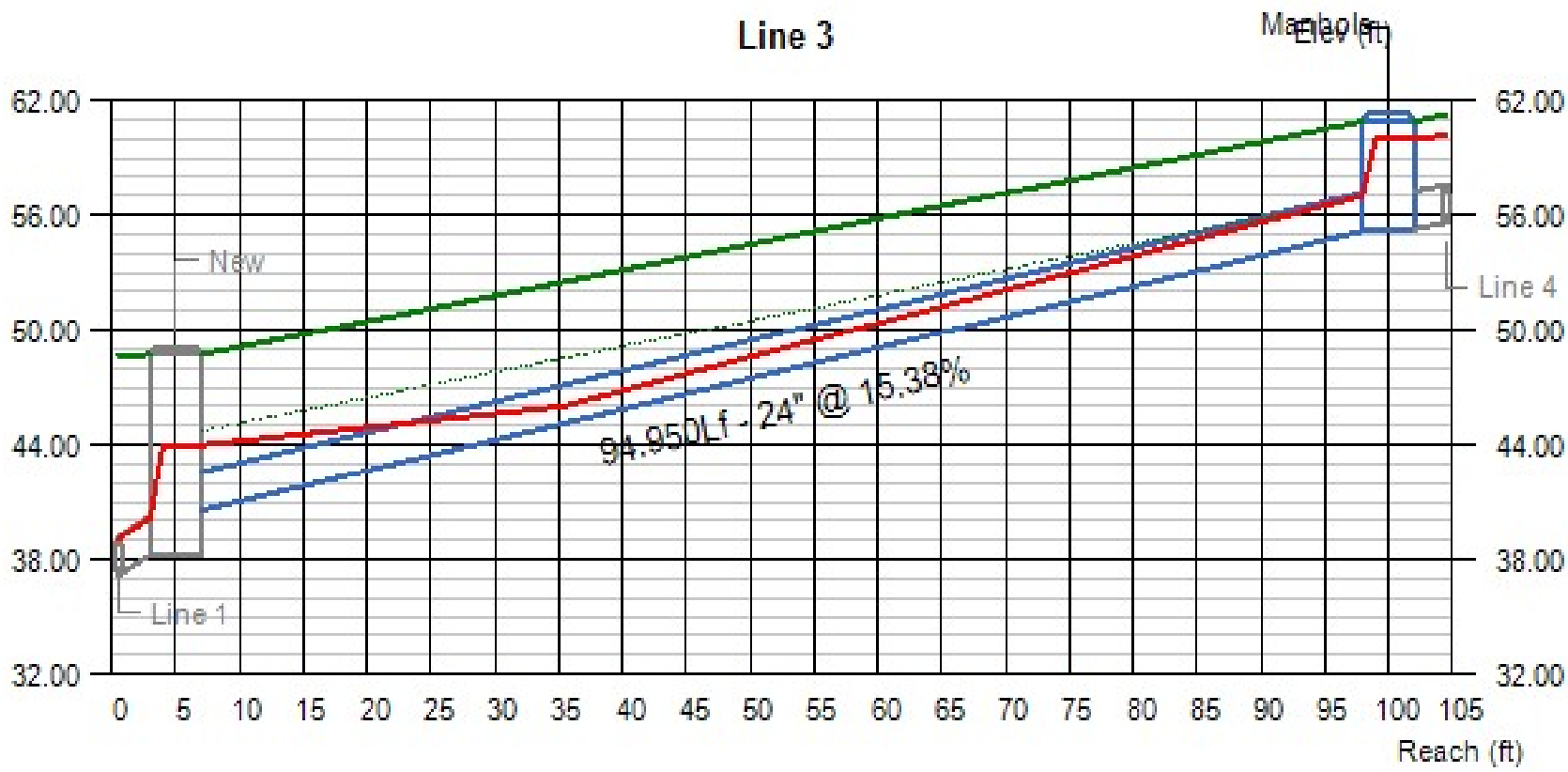


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
2	5.34	40.69	42.90	2.00	0.90	1.07	43.98	43.80	43.97 i	1.70	3.90	6.01	3.80

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 3)

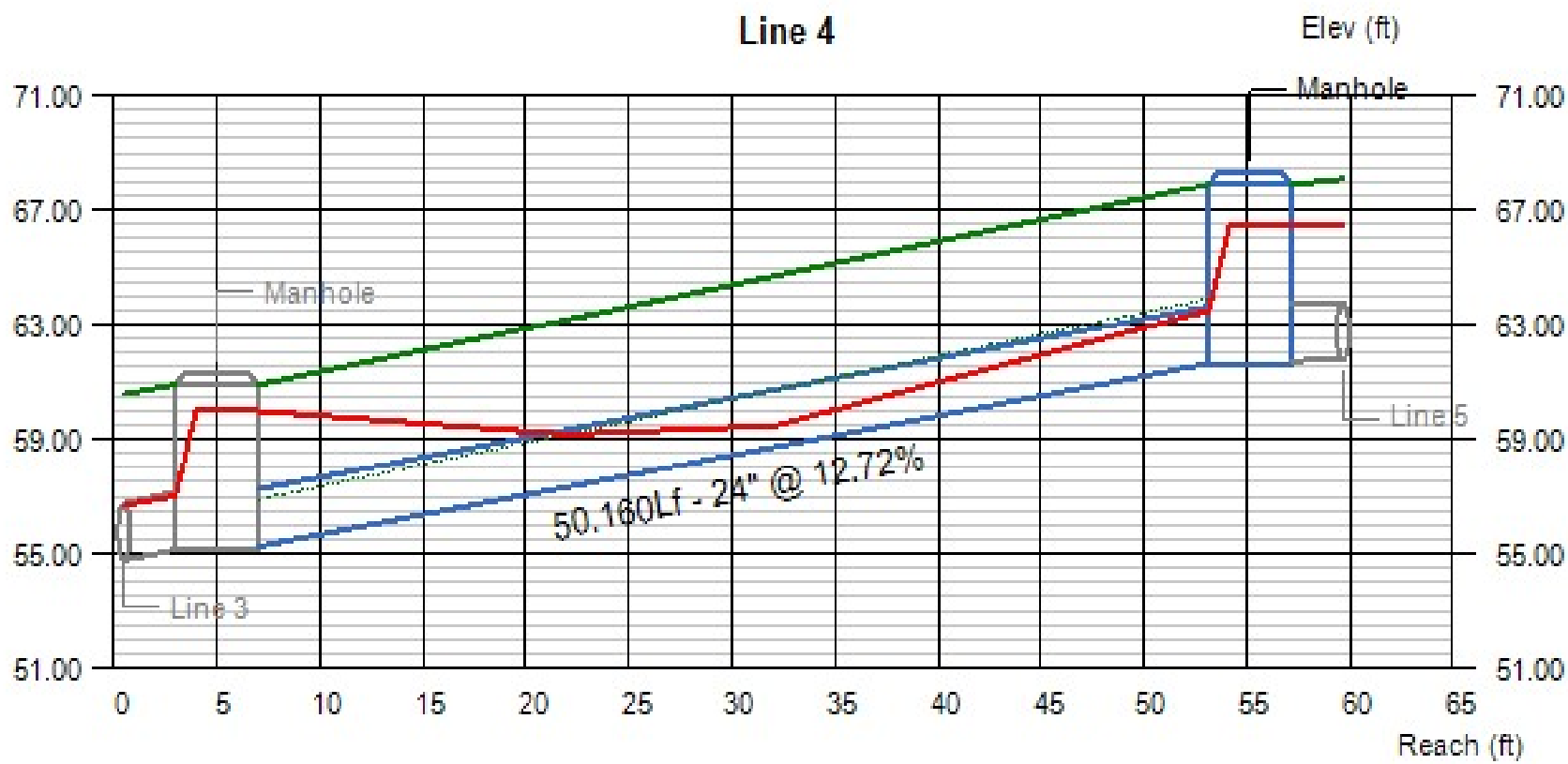


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
3	29.91	40.55	55.15	2.00	1.86	4.83	43.98	57.01 j	59.98 i	9.52	9.82	6.15	3.74

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 4)

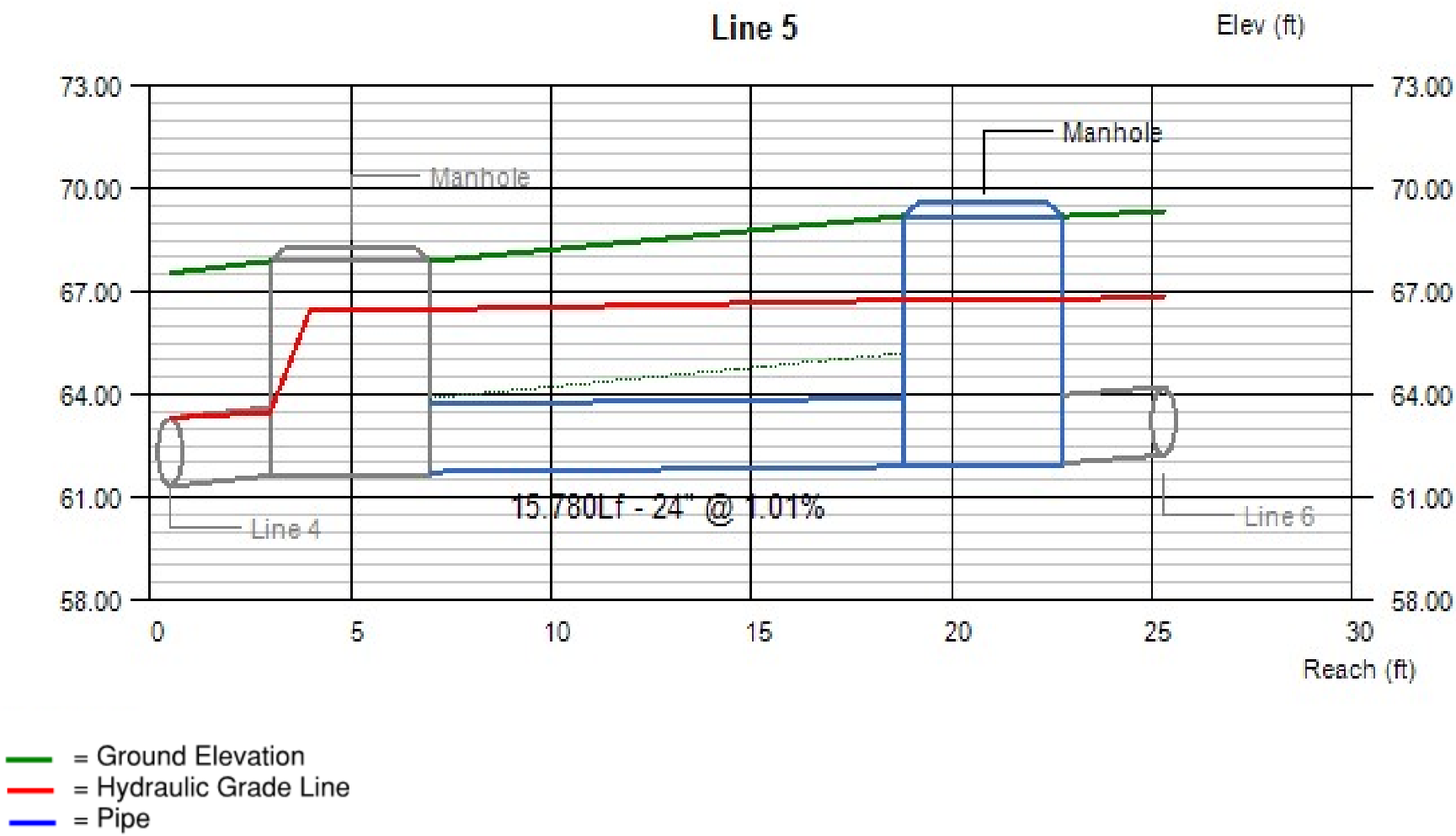


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
4	29.91	55.25	61.63	2.00	1.86	4.83	59.98	63.49 j	66.46 i	9.52	9.82	3.64	4.26

Project File:	No. Lines: 20	Run Date: 1/13/2020

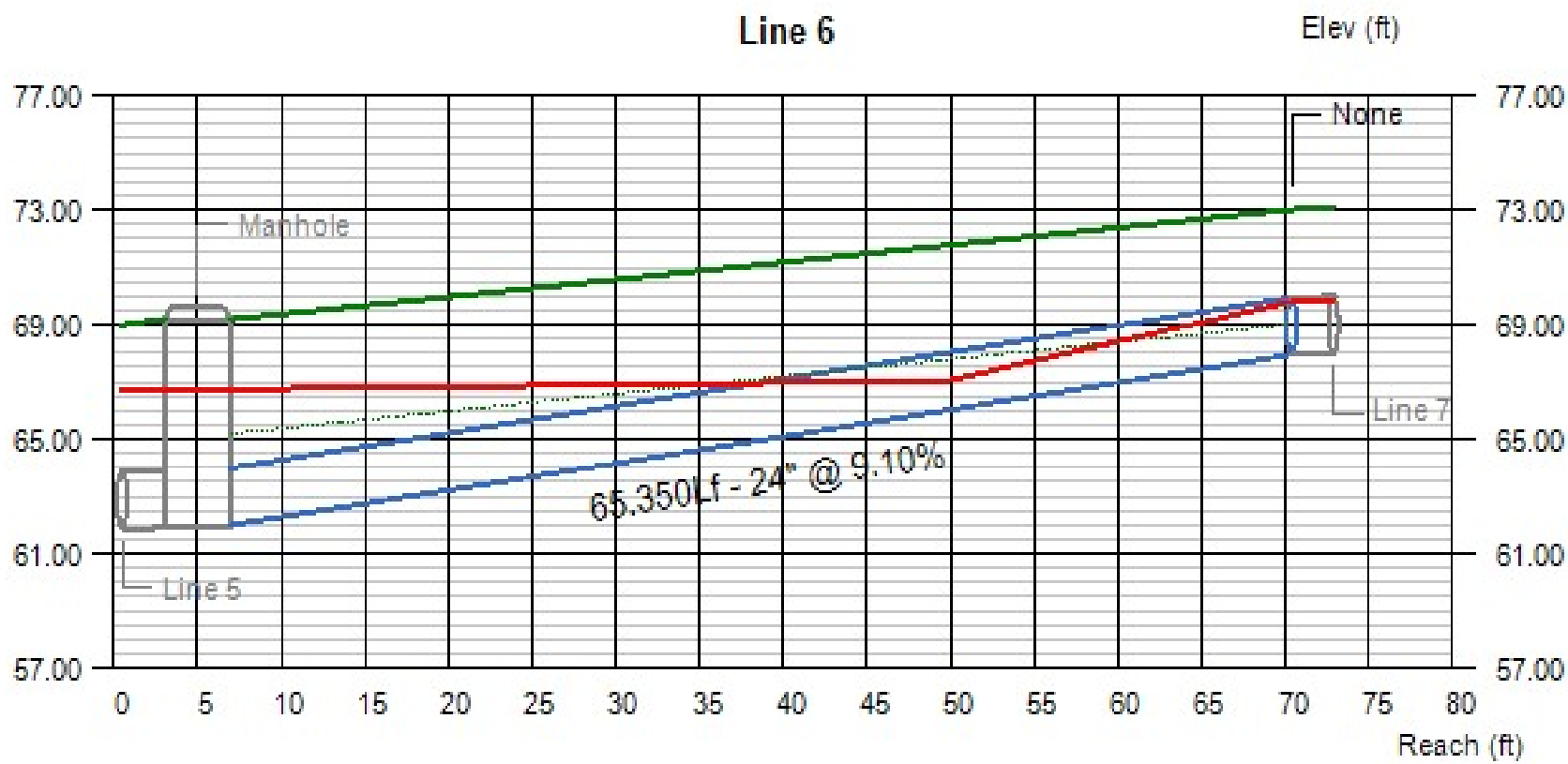
Line Profile (Line 5)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
5	29.91	61.73	61.89	2.00	2.00	4.85	66.46	66.74	66.74	9.52	9.52	4.16	5.30

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 6)

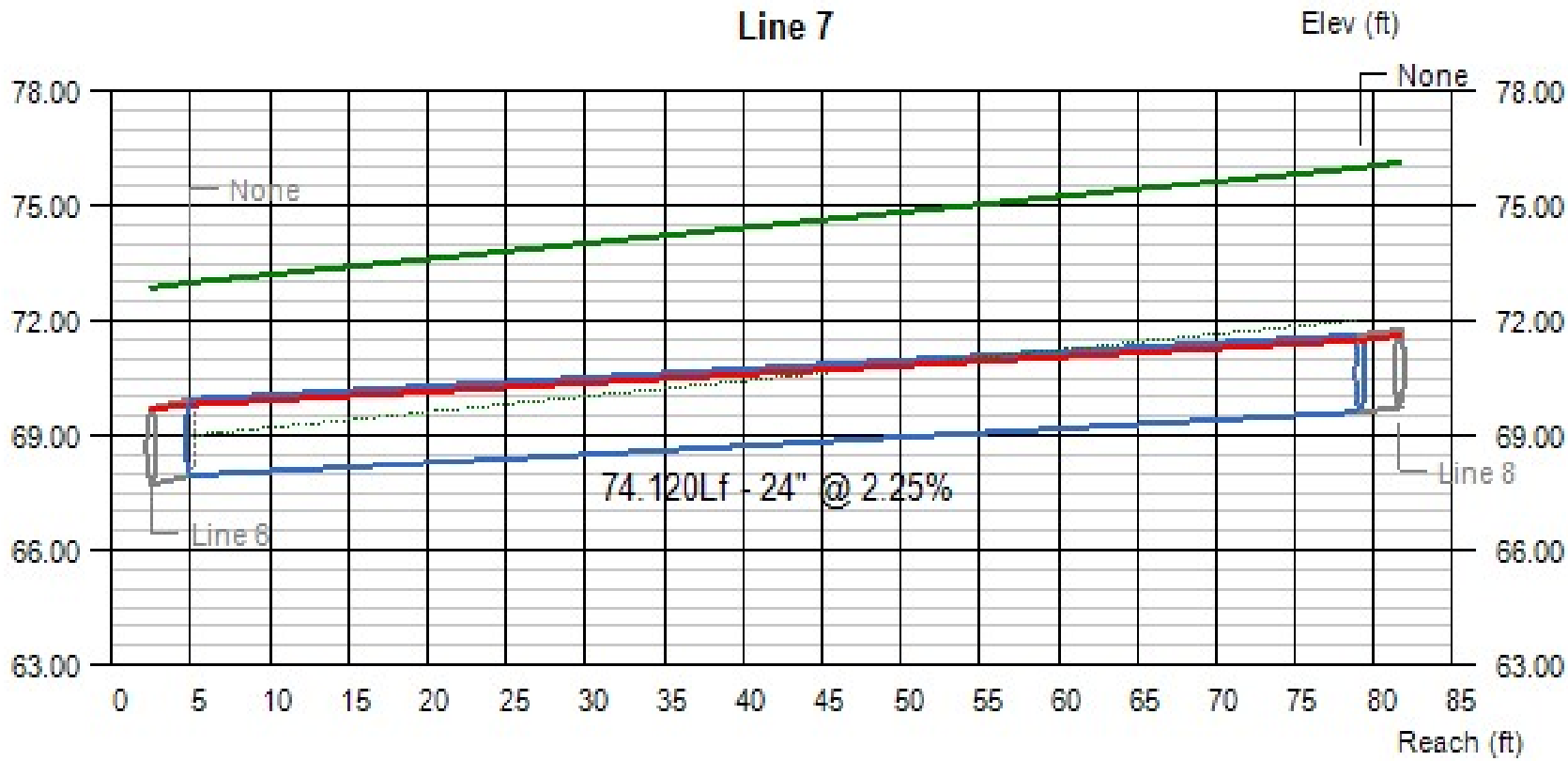


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
6	29.91	61.99	67.94	2.00	1.86	1.86	66.74	69.80 j	69.80	9.52	9.82	5.20	3.06

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 7)

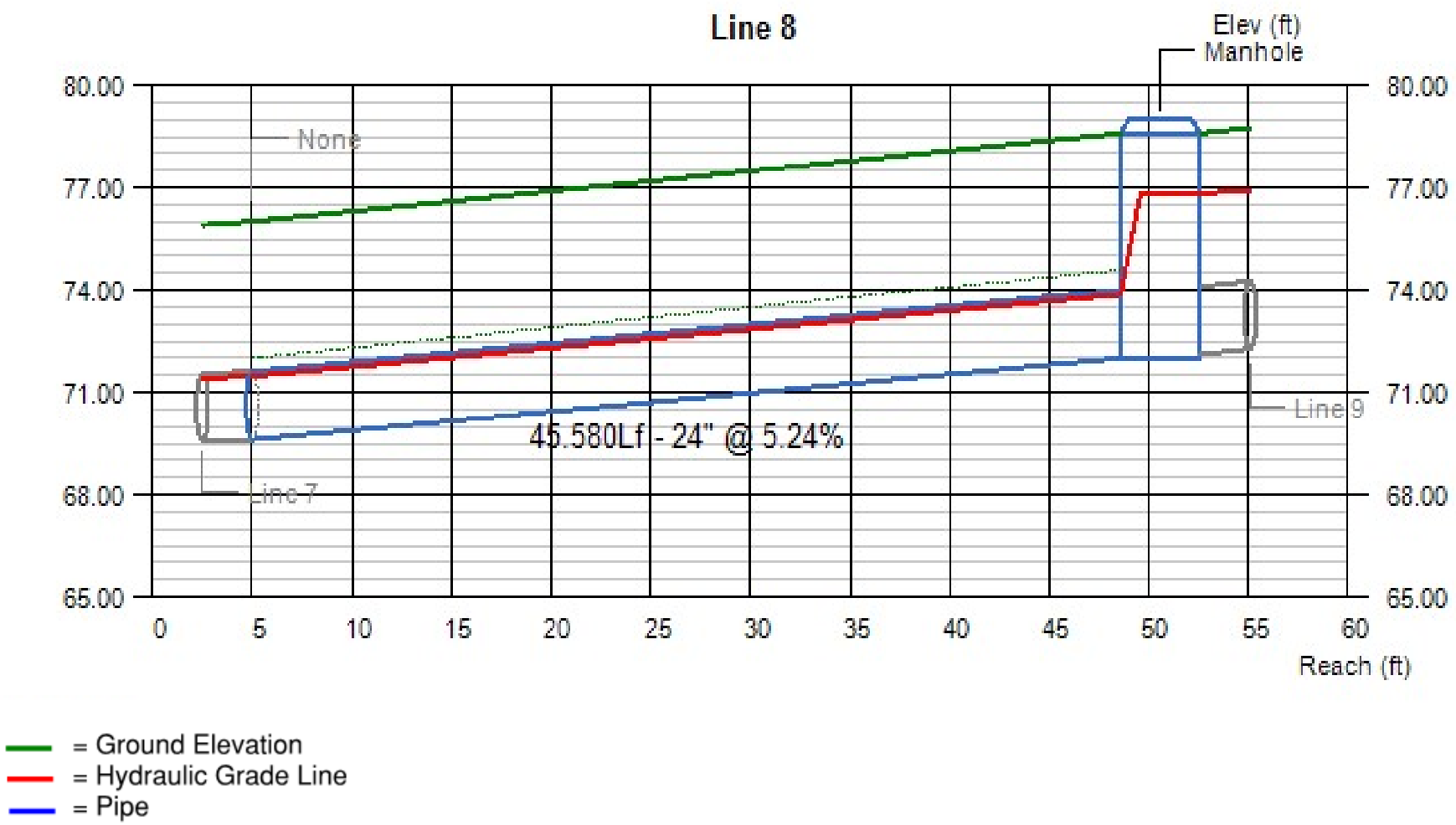


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
7	29.91	67.94	69.61	1.86	1.86	1.86	69.80	71.47	71.47	9.82	9.82	3.06	4.39

Project File:	No. Lines: 20	Run Date: 1/13/2020

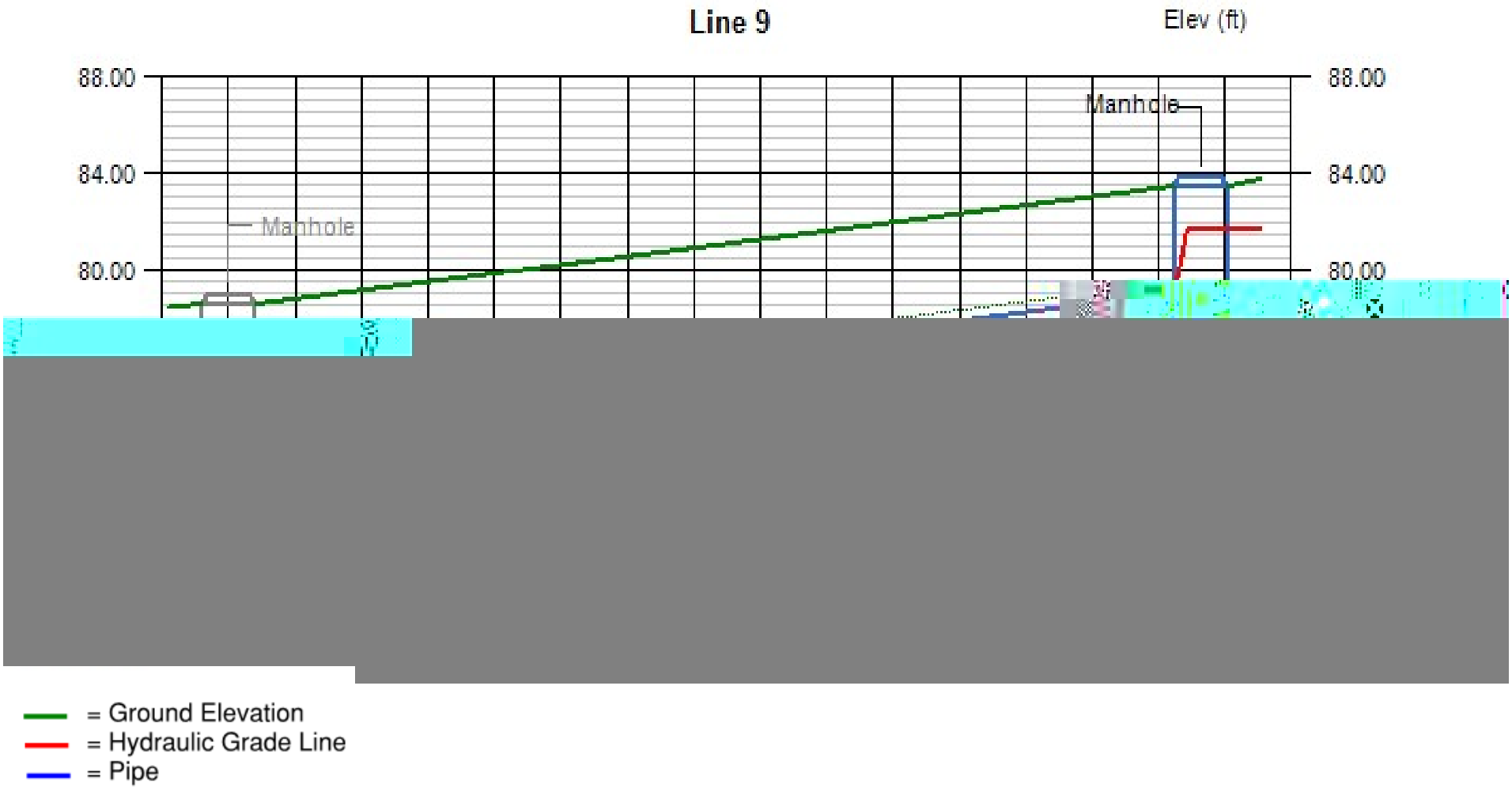
Line Profile (Line 8)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
8	29.91	69.61	72.00	1.86	1.86	4.83	71.47	73.86	76.83 i	9.82	9.82	4.39	4.59

Project File:	No. Lines: 20	Run Date: 1/13/2020

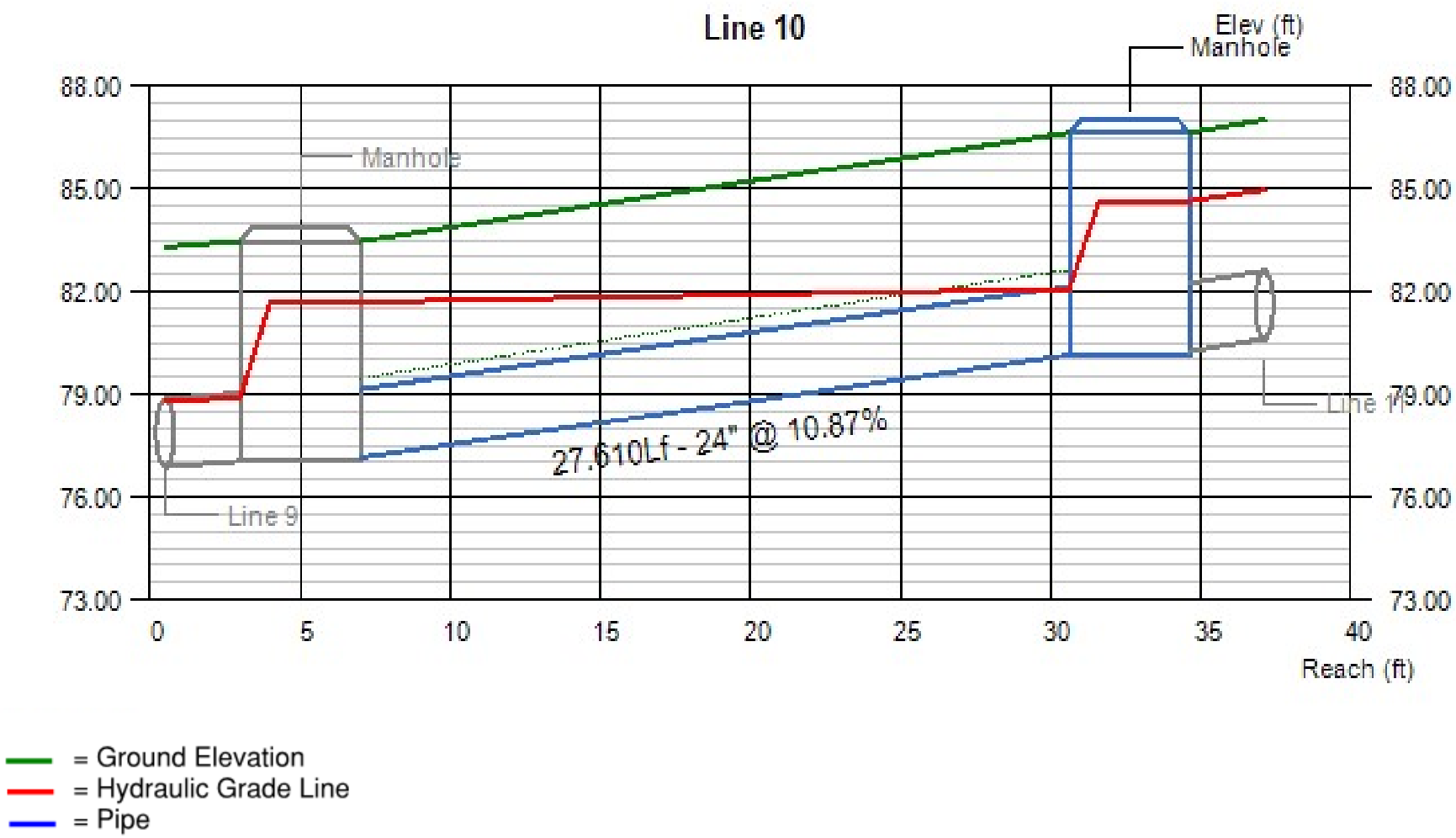
Line Profile (Line 9)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
9	29.03	72.10	77.04	2.00	1.85	4.63	76.83	78.89 j	81.67 i	9.24	9.58	4.49	4.42

Project File:	No. Lines: 20	Run Date: 1/13/2020

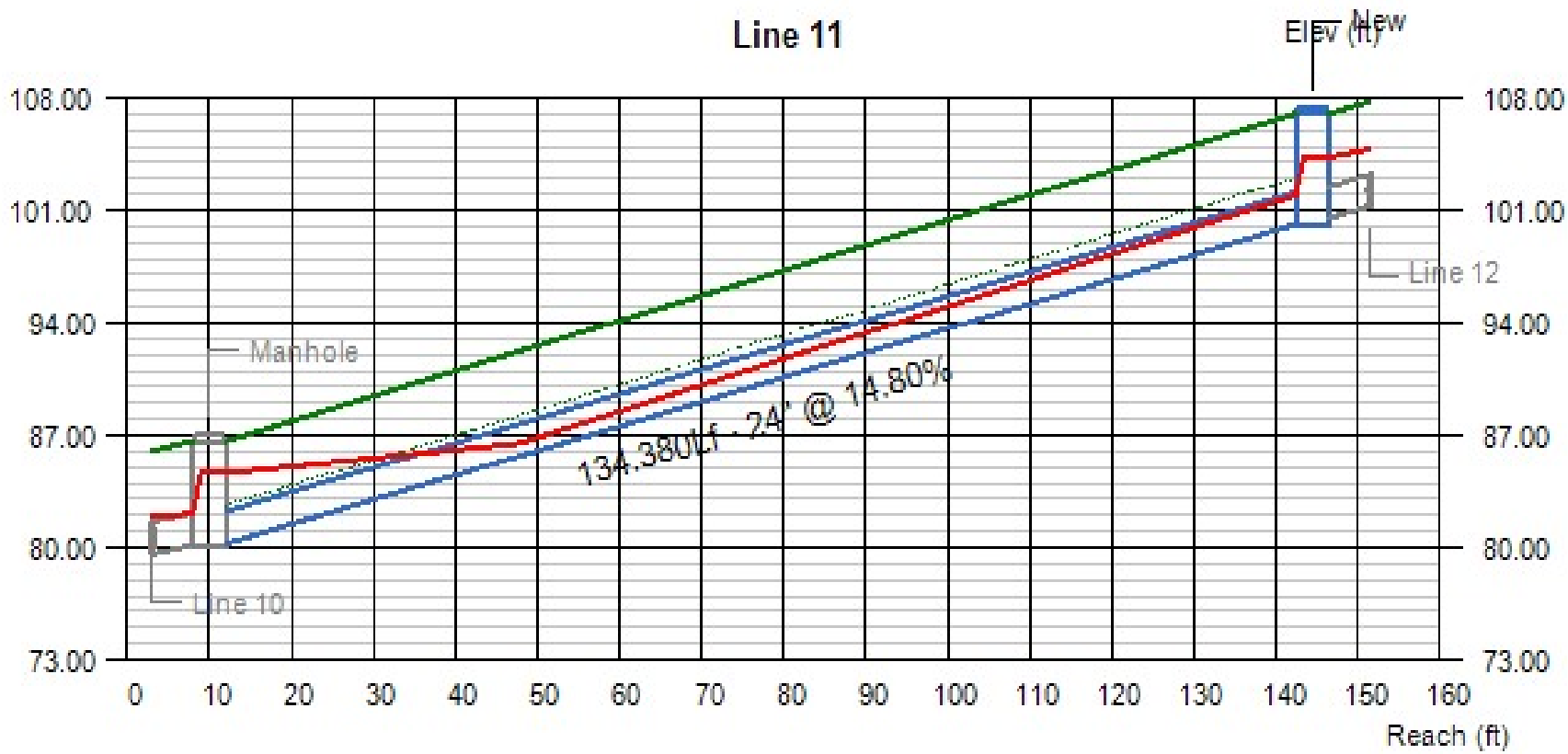
Line Profile (Line 10)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
10	29.03	77.14	80.14	2.00	1.94	4.49	81.67	82.08	84.63 i	9.24	9.32	4.32	4.49

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 11)

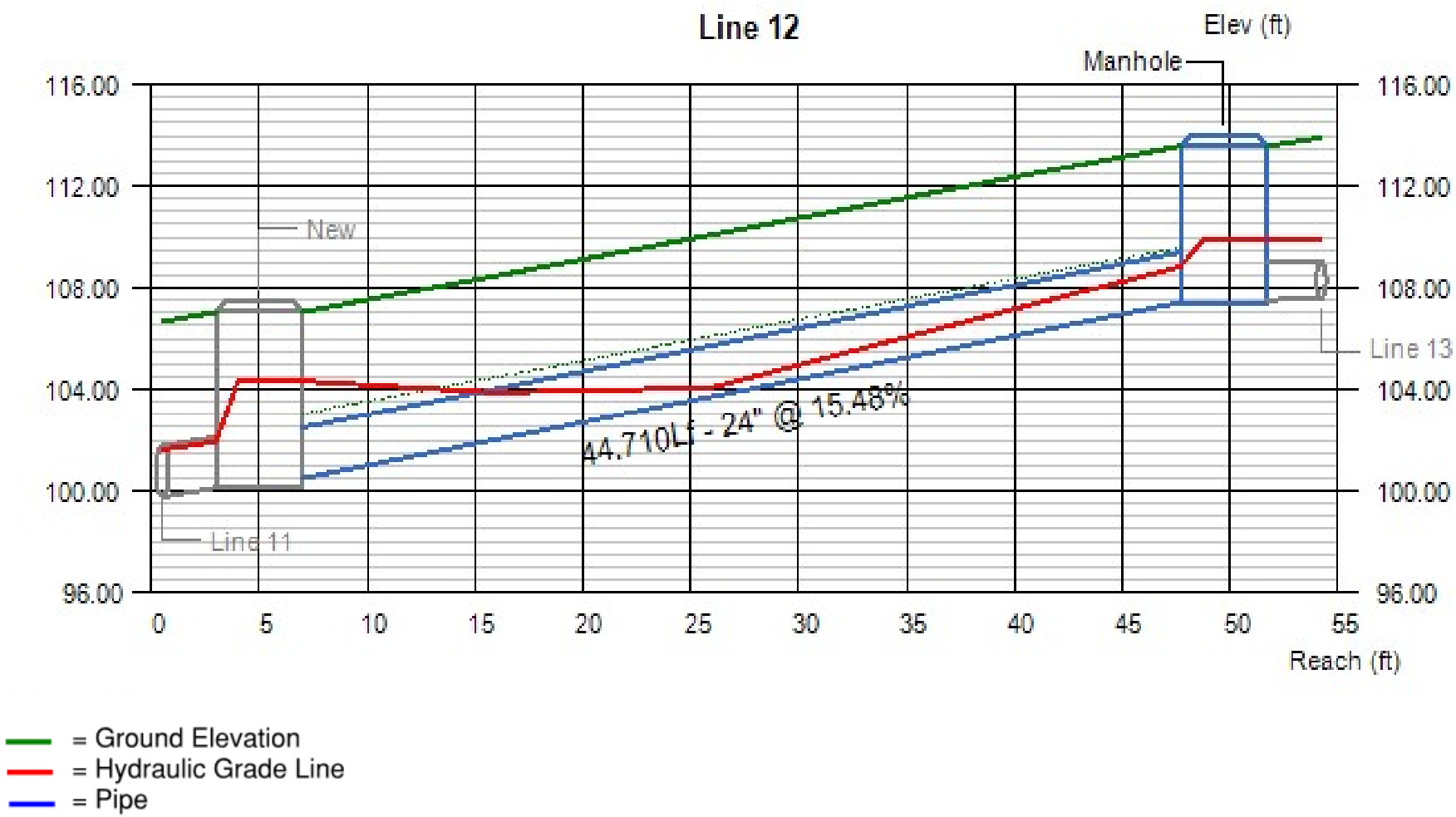


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
11	26.95	80.24	100.13	2.00	1.81	4.20	84.63	101.94 j	104.33 i	8.58	9.03	4.39	4.90

Project File:	No. Lines: 20	Run Date: 1/13/2020

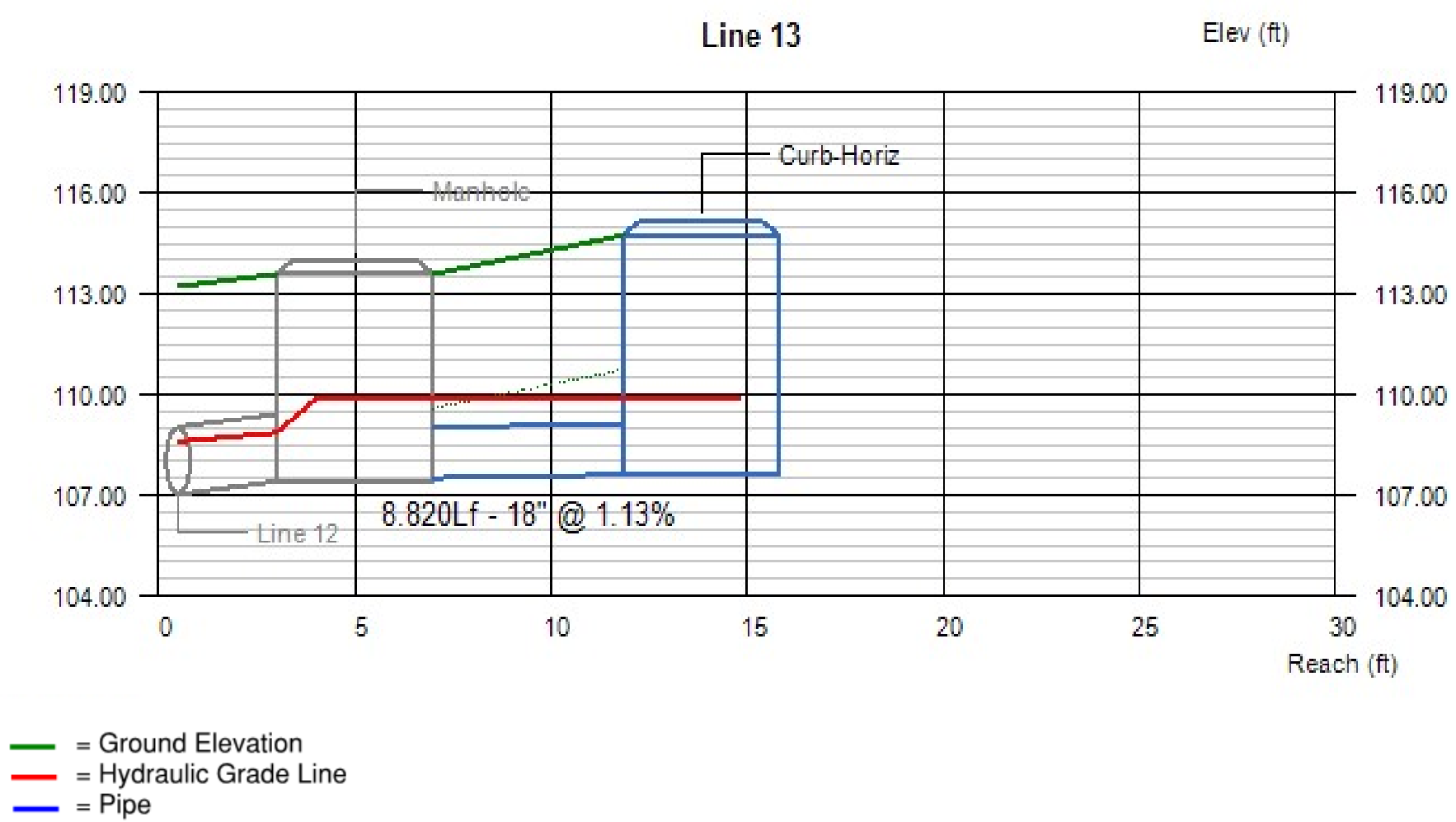
Line Profile (Line 12)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
12	15.80	100.49	107.41	2.00	1.43	2.46	104.33	108.84 j	109.87 i	5.03	6.56	4.54	4.18

Project File:	No. Lines: 20	Run Date: 1/13/2020

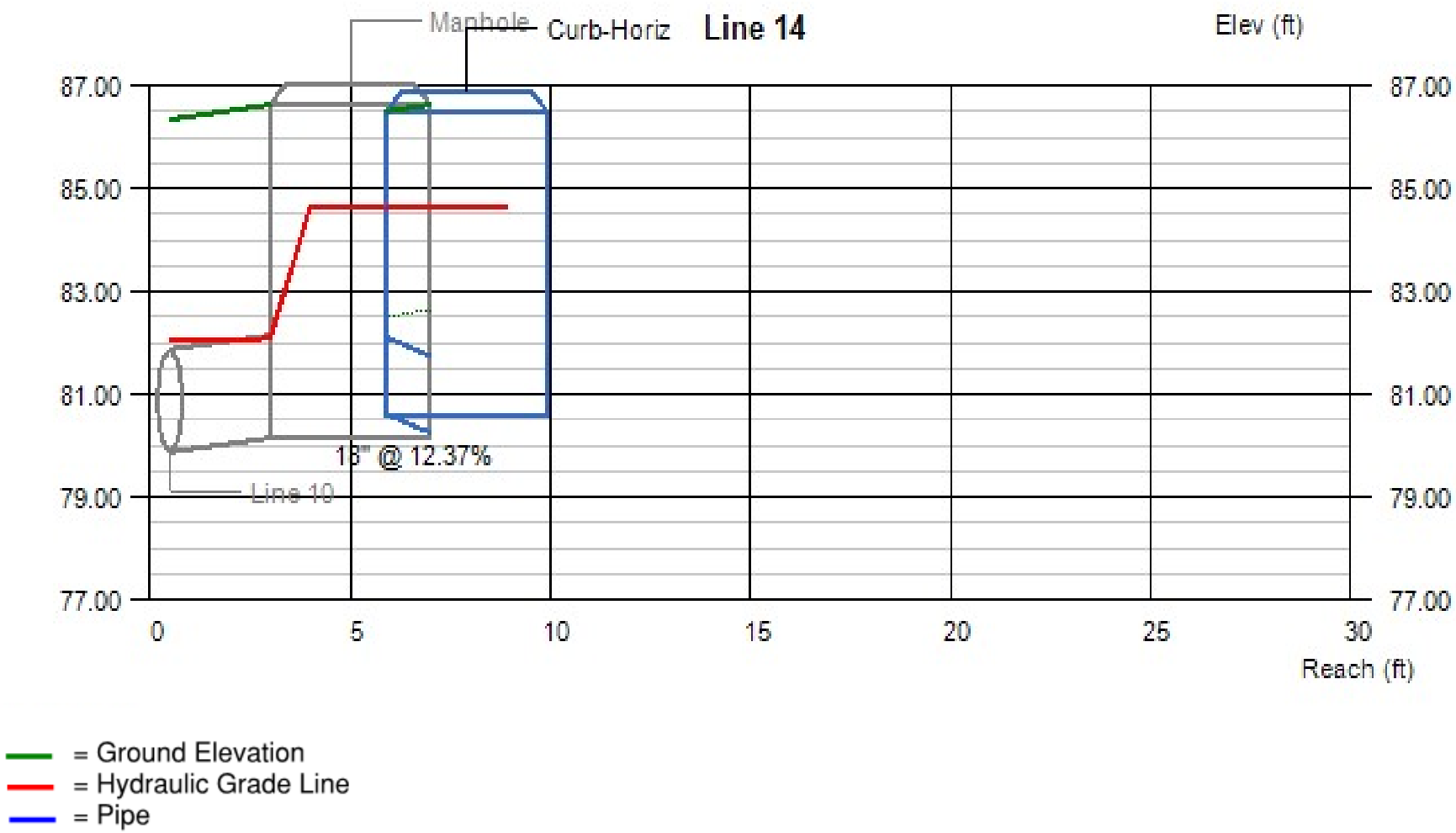
Line Profile (Line 13)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
13	4.77	107.51	107.61	1.50	1.50	2.28	109.87	109.89	109.89	2.70	2.70	4.58	5.62

Project File:	No. Lines: 20	Run Date: 1/13/2020

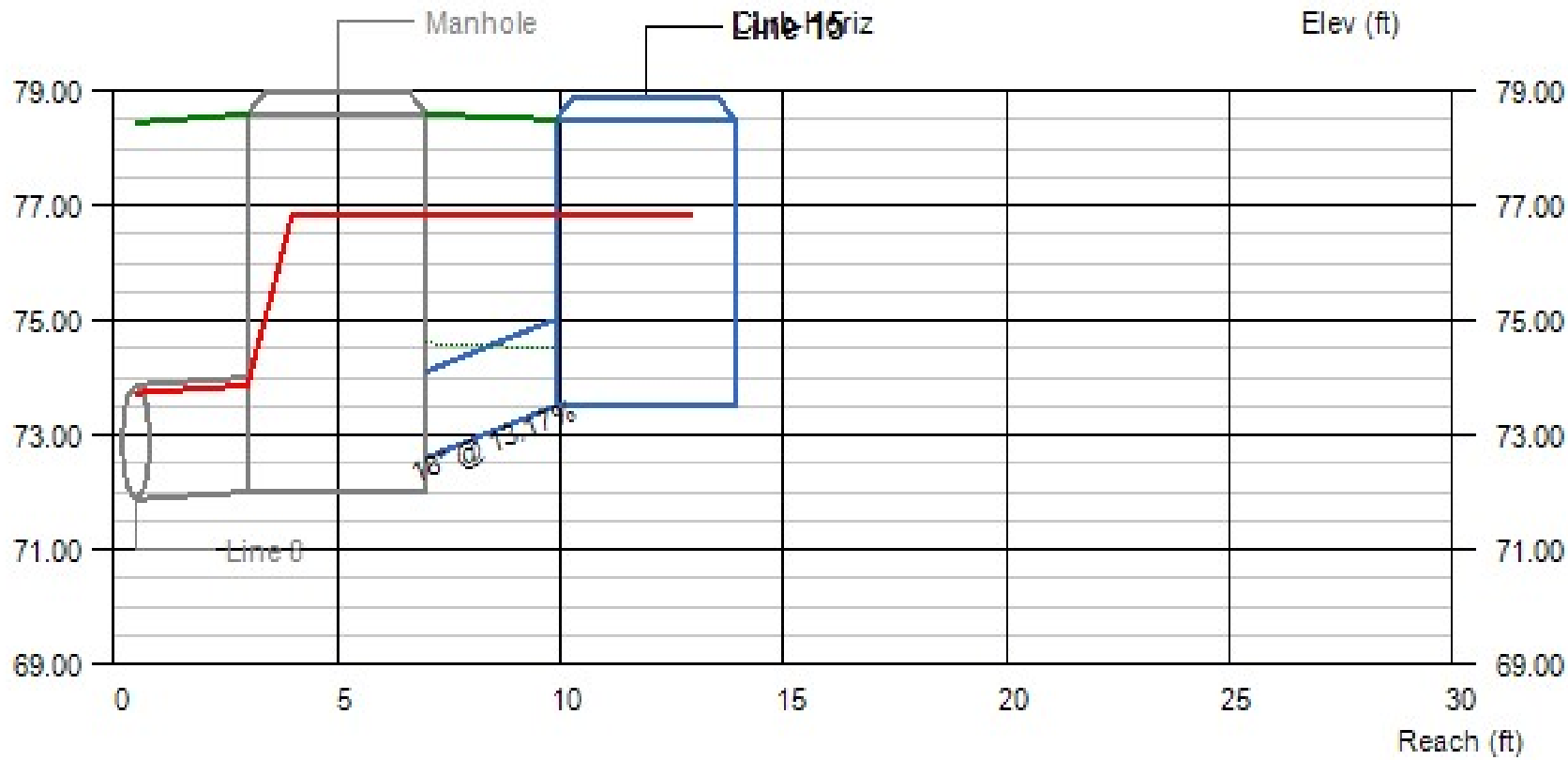
Line Profile (Line 14)



Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
14	3.03	80.24	80.60	1.50	1.50	4.03	84.63	84.63	84.63	1.71	1.71	4.89	4.40

Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 15)

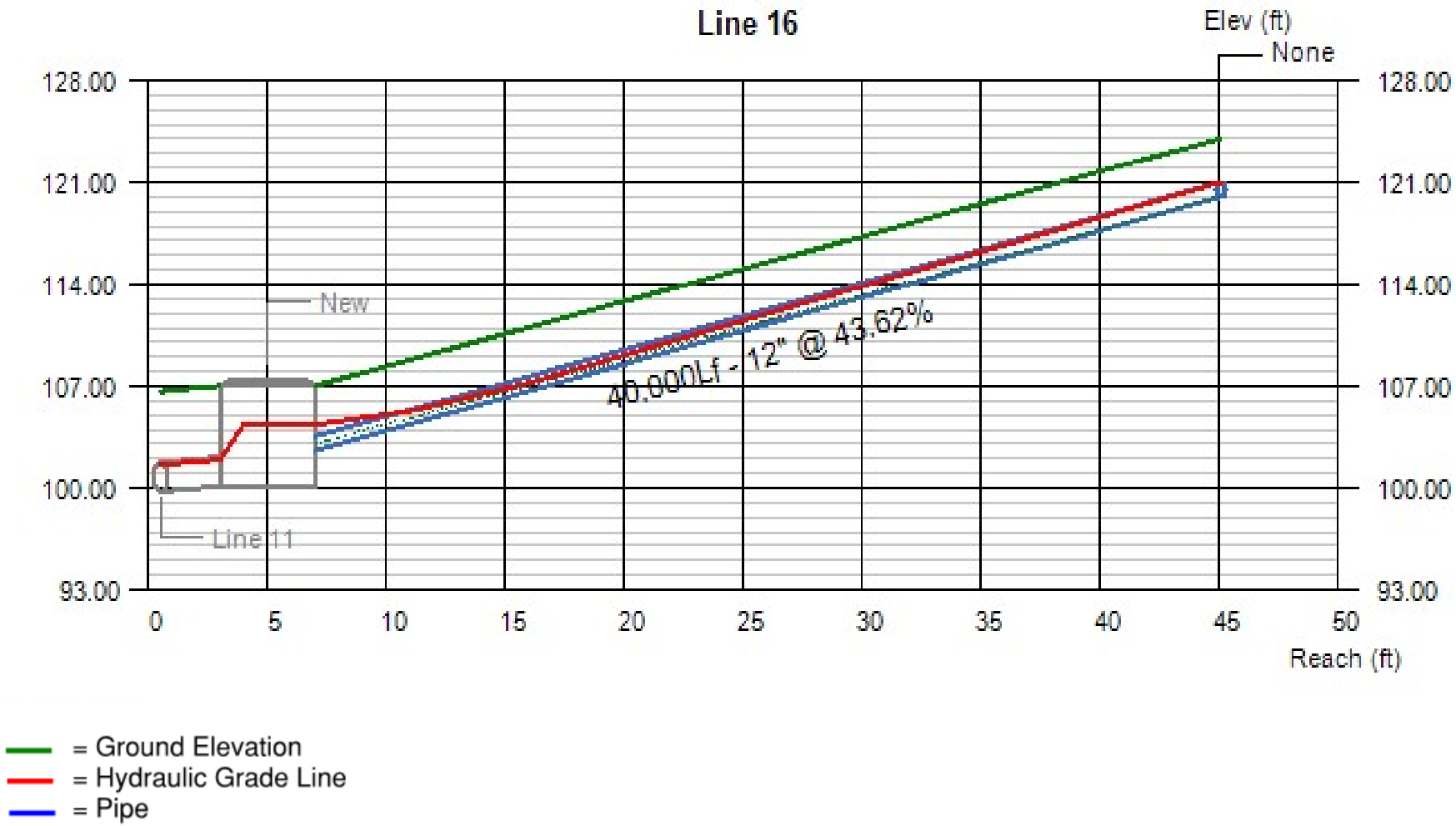


= Ground Elevation
= Hydraulic Grade Line
= Pipe

Line #	Q (cfs)	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
		Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
15	1.28	72.60	73.51	1.50	1.50	3.32	76.83	76.83	76.83	0.73	0.73	4.49	3.49

Project File:	No. Lines: 20	Run Date: 1/13/2020

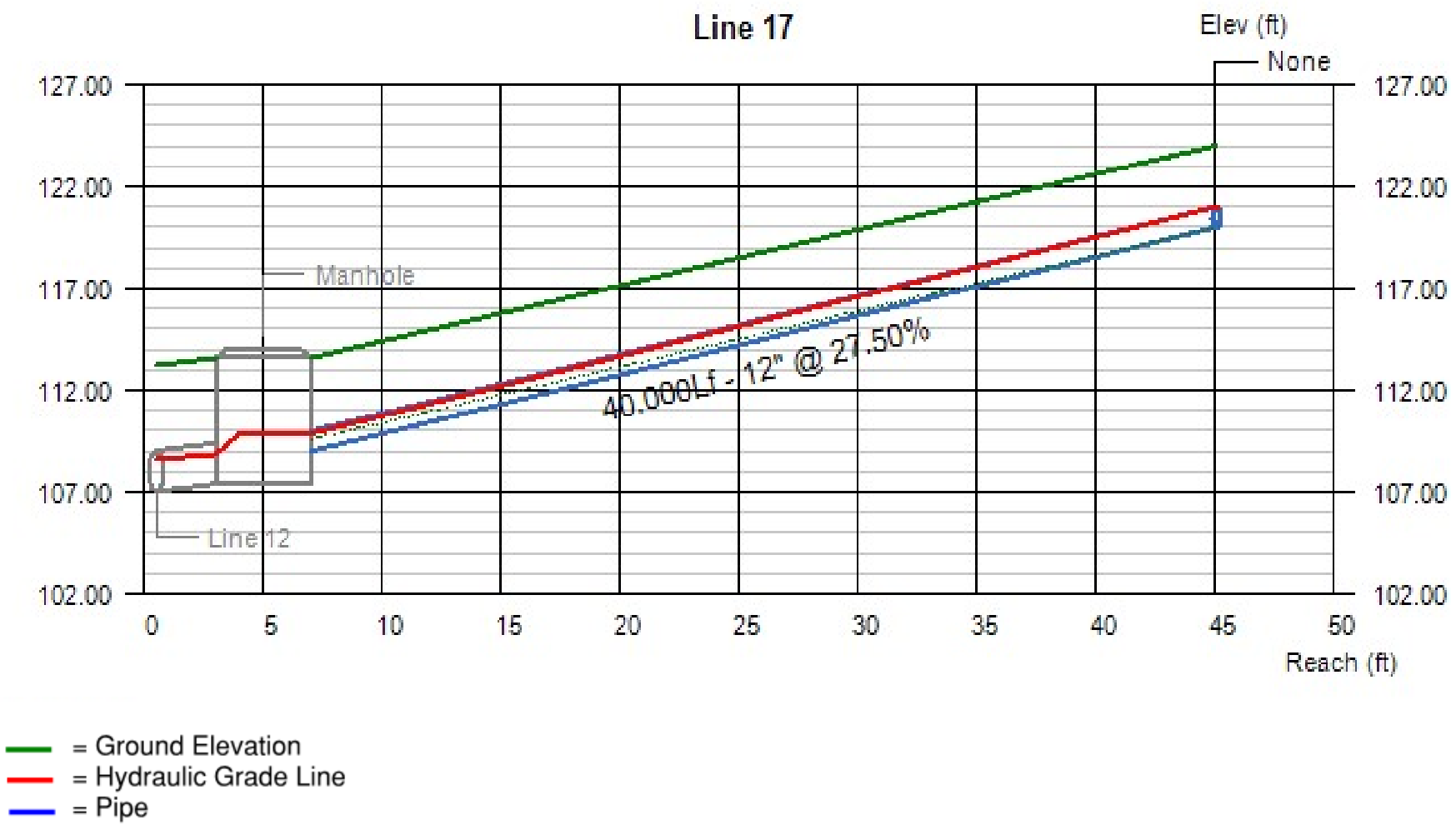
Line Profile (Line 16)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
16	11.15	102.55	120.00	1.00	1.00	1.00	104.33	121.00 j	121.00	14.19	14.20	3.48	3.00

Project File:	No. Lines: 20	Run Date: 1/13/2020

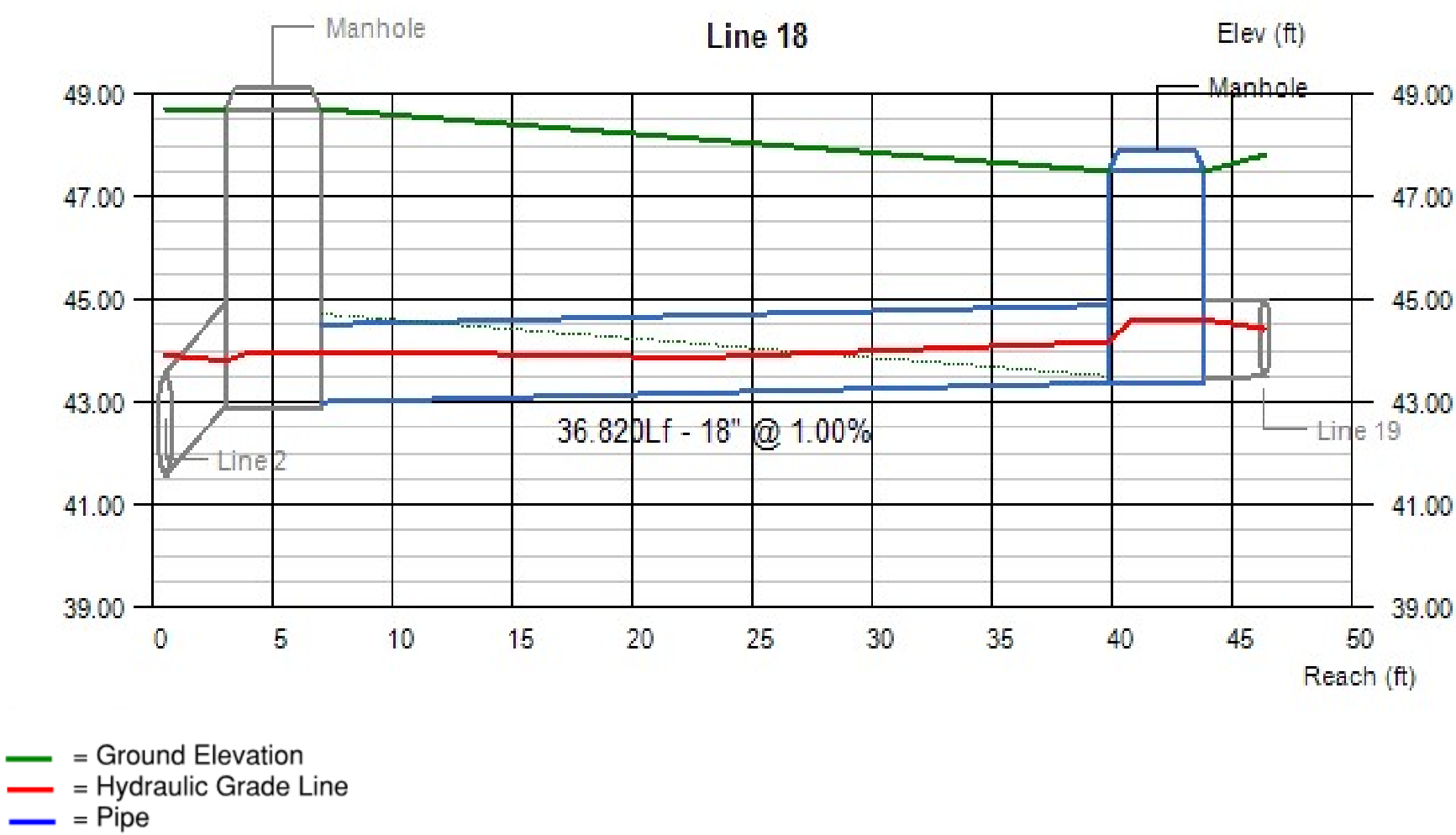
Line Profile (Line 17)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
17	11.15	109.00	120.00	0.87	1.00	1.00	109.87	121.00	121.00	15.38	14.20	3.59	3.00

Project File:	No. Lines: 20	Run Date: 1/13/2020

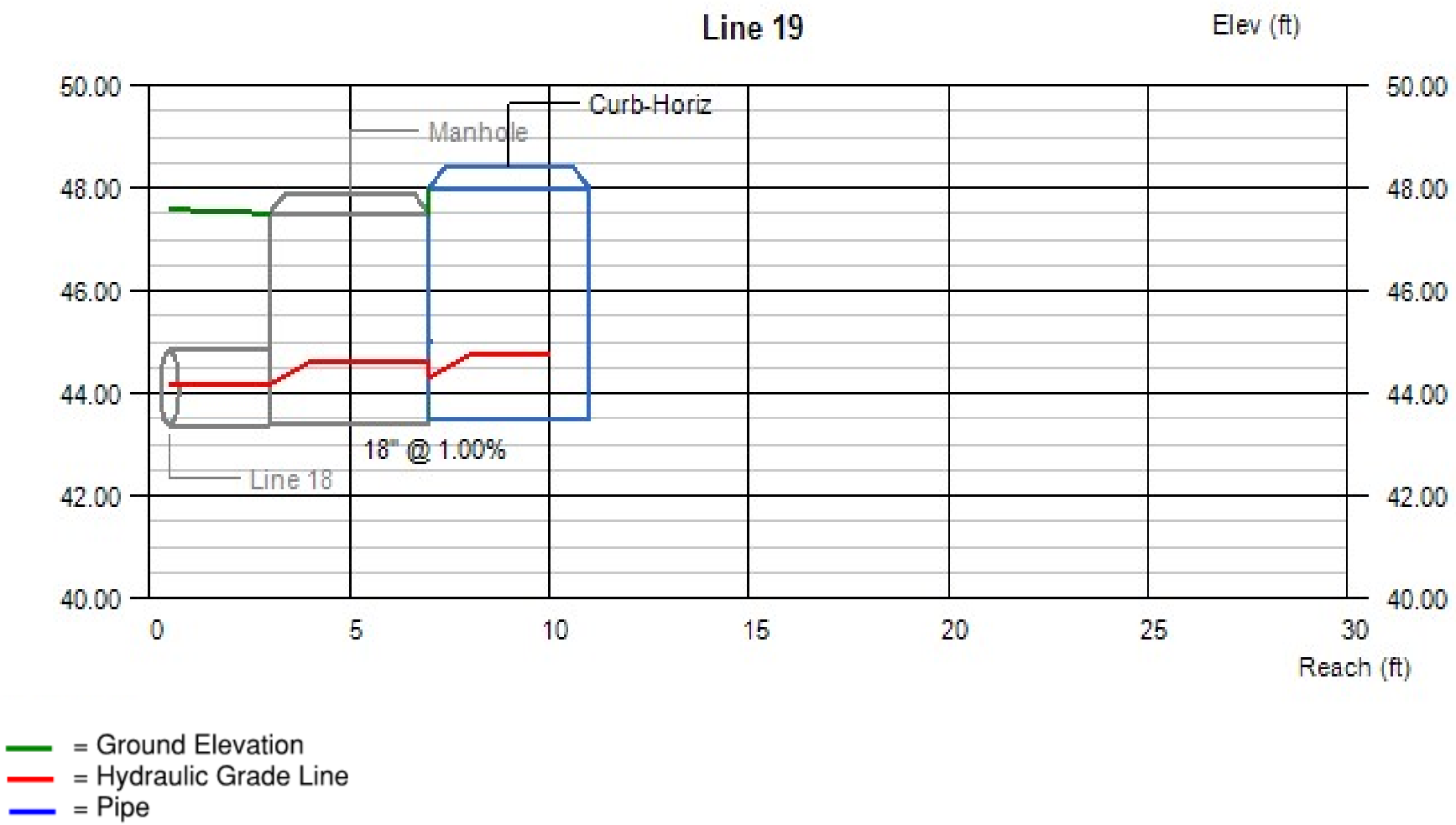
Line Profile (Line 18)



Line #	Q (cfs)	Invert Elevation Dn (ft)	Invert Elevation Up (ft)	Depth of Flow Dn (ft)	Depth of Flow Up (ft)	Depth of Flow Hw (ft)	Hydraulic Grade Line Dn (ft)	Hydraulic Grade Line Up (ft)	Hydraulic Grade Line Jnct (ft)	Velocity Dn (ft/s)	Velocity Up (ft/s)	Cover Dn (ft)	Cover Up (ft)
18	4.30	43.00	43.37	0.97	0.79	1.23	43.97	44.16 j	44.60 i	3.58	4.53	4.20	2.63

Project File:	No. Lines: 20	Run Date: 1/13/2020

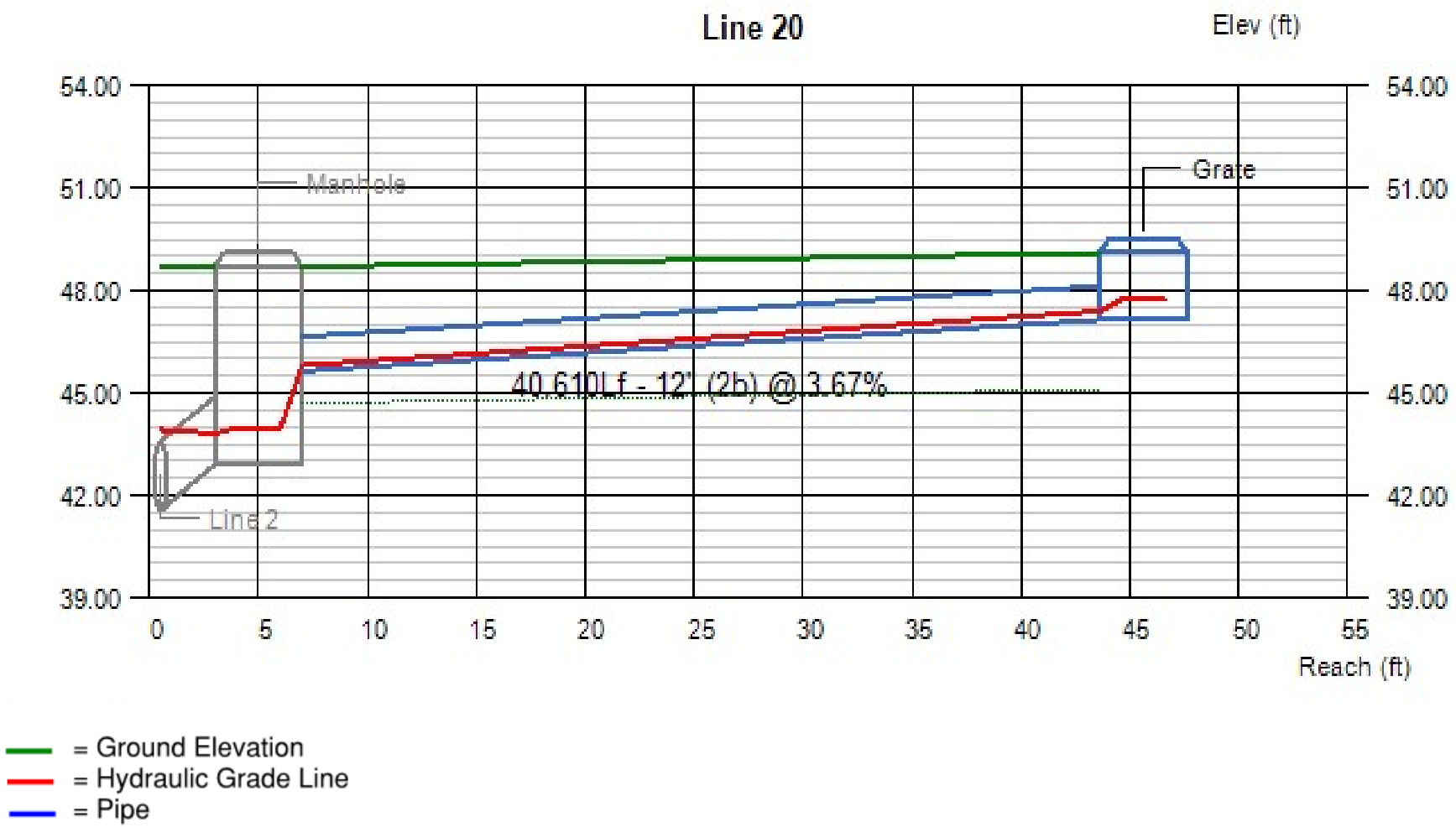
Line Profile (Line 19)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
19	4.30	43.47	43.51	1.13	0.79	1.23	44.60	44.30	44.74 i	3.02	4.53	2.53	2.99

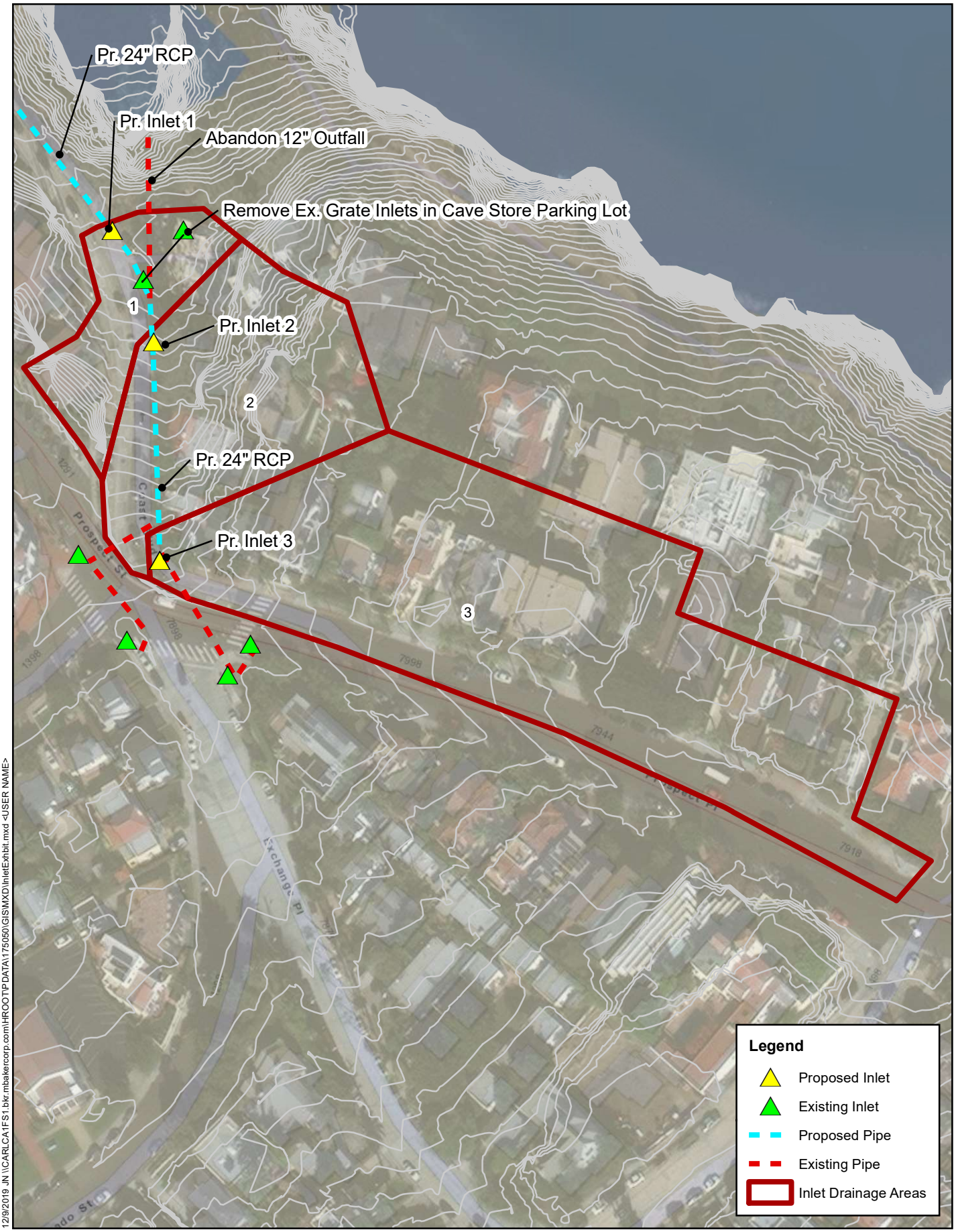
Project File:	No. Lines: 20	Run Date: 1/13/2020

Line Profile (Line 20)



Line #	Q	Invert Elevation		Depth of Flow			Hydraulic Grade Line			Velocity		Cover	
	(cfs)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Hw (ft)	Dn (ft)	Up (ft)	Jnct (ft)	Dn (ft/s)	Up (ft/s)	Dn (ft)	Up (ft)
20	1.04	45.64	47.13	0.16	0.25	0.59	45.80	47.38	47.72 i	6.16	3.38	2.06	0.97

Project File:	No. Lines: 20	Run Date: 1/13/2020



12/9/2019 JN \\CARLCA1FS1.bkr.mbakercorp.com\HROOT\PDATA\175050\GIS\MXD\InletExhibit.mxd <USER NAME>

Michael Baker INTERNATIONAL

0 75 150 300 Feet

Source:

LA JOLLA COAST BOULEVARD

Inlet Hydrology Map

MBI JN 175050

Proposed Inlet Sizes

Curb Inlet in Sag					
Inlet #	Q_{50} (cfs)	Effective Depth of Flow[1]		Required Inlet Opening Length[2] (ft)	Proposed Opening Length (ft)
		y+a	d_o		
PR 1 - Northwest Side of Parking Lot	1.30	0.73	0.47	1.3	4

Curb Inlet on Grade					
Inlet #	Q_{50} (cfs)	On-Grade Coefficient[3]		Required Inlet Opening Length[3] (ft)	Proposed Opening Length (ft)
		a	y		
PR 2 - Southeast Side of Parking Lot	3.00	0.33	0.4	6.9	7
PR 3 - Coast Blvd. Near Prospect	4.90	0.33	0.4	11.2	11.5

[1]Using Equation 3-5 from the City of SD DDM

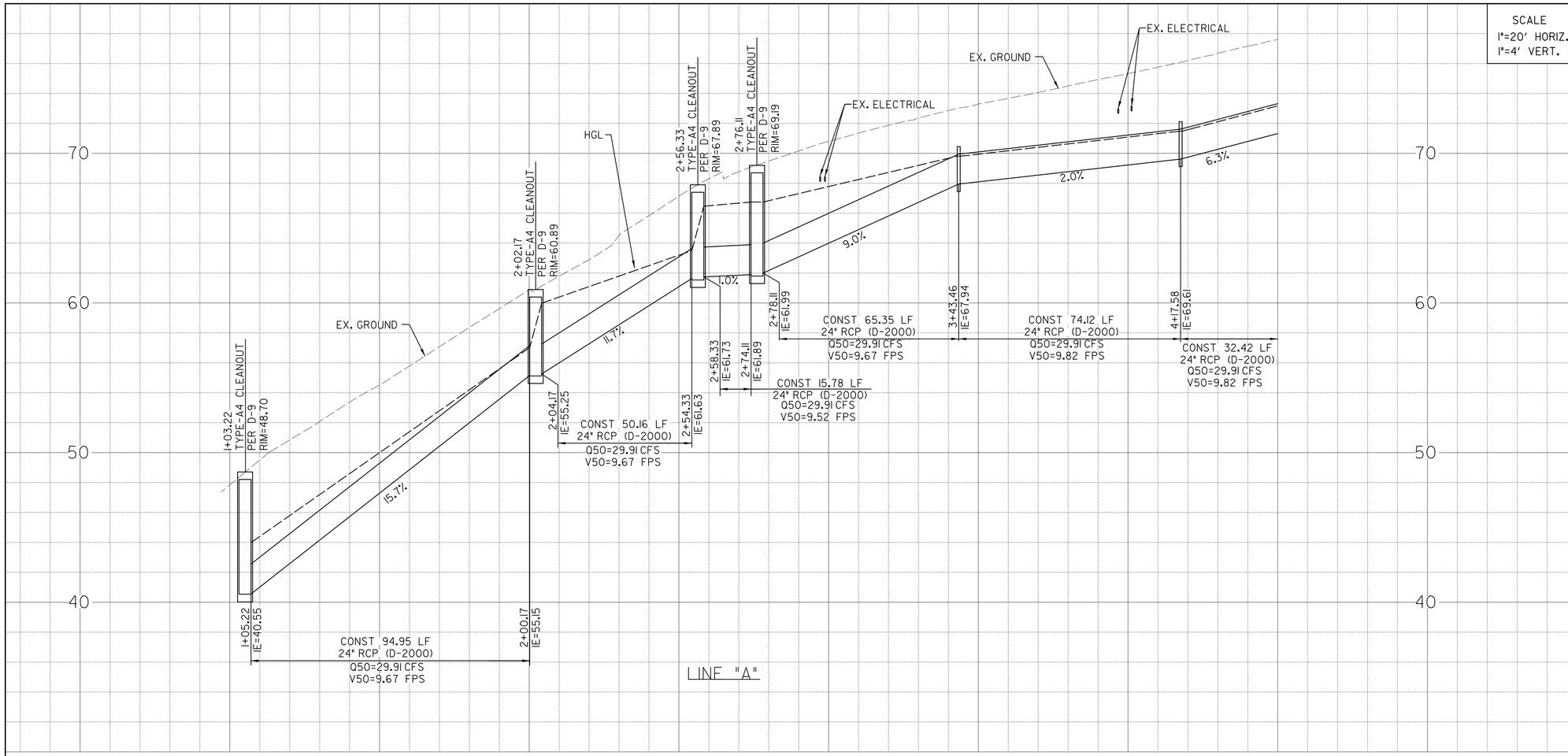
[2]Using Equation 3-3 from the City of SD DDM

[3]Using Equation 3-2 from the City of SD DDM

Sized per 50-year storm event as the storm frequeny for the pipes is to convey the 50-year. Section 3.1.2.2 of CSDDDM The basic criteria for storm drain inlet design shall be that any inlet will be sized to accept one hundred percent (100%) of the drainage received without bypass for the design storm frequency required for the system.

Michael Baker
INTERNATIONAL

Attachment E.
Plan Sheets



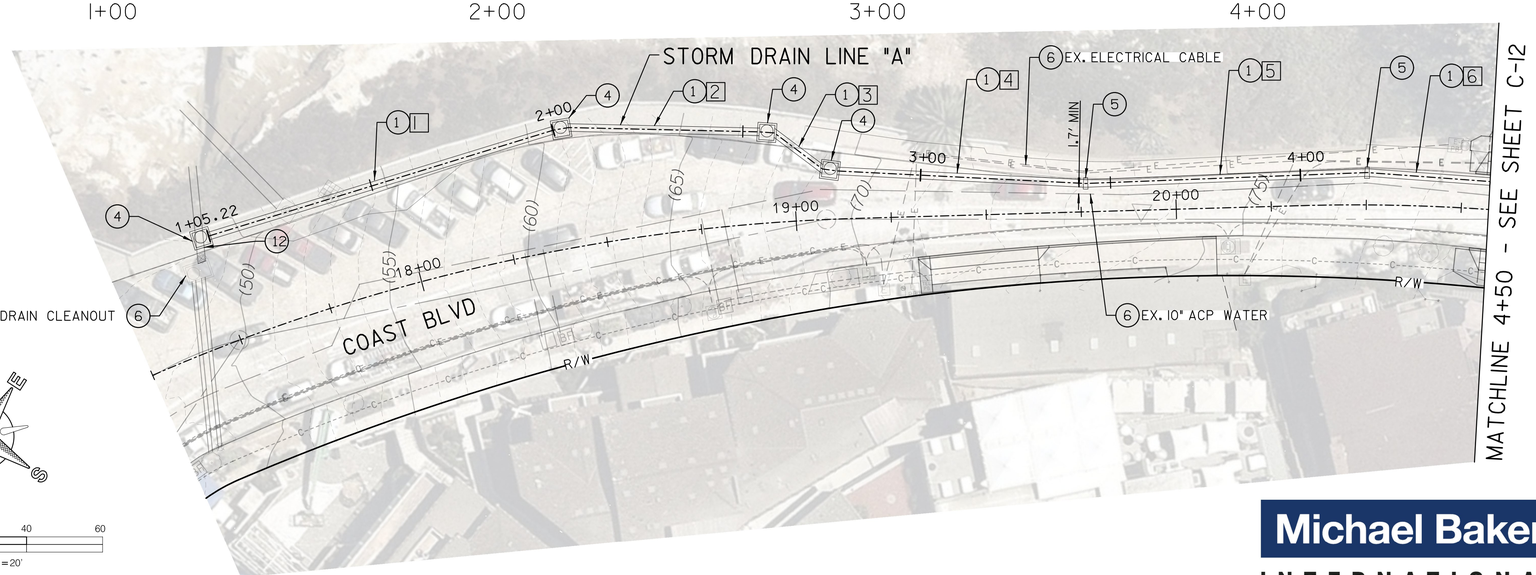
CONSTRUCTION NOTES:

1. INSTALL 24" RCP WITH WATER TIGHT JOINTS
4. CONSTRUCT TYPE-A4 STORM DRAIN CLEANOUT PER D-9
5. CONSTRUCT PIPE COLLAR PER D-62
6. PROTECT IN PLACE
7. CONNECT EXISTING STORM DRAIN PIPE TO PROPOSED TYPE A-4 STORM DRAIN CLEANOUT. EXTEND OR REMOVE CONFLICT PORTION WHEN NECESARY
12. CONNECT PROP. 24" RCP TO EX. STORM DRAIN CLEANOUT

EXISTING UTILITY LATERAL ELEVATIONS ARE PER AS-BUILT PLANS. CONTRACTOR TO FIELD VERIFY ELEVATION OF EXISTING LATERALS PRIOR TO PIPE INSTALLATION. THE ENGINEER SHALL BE NOTIFIED IF THERE ARE ANY DISCREPANCIES.

PROPOSED STORM DRAIN DATA TABLE

NO.	Δ/BEARING	LENGTH	D-LOAD	NOTE
1	S50° 09'14"E	94.95'	D-2000	24" RCP
2	S31° 46'38"E	50.16'	D-2000	24" RCP
3	S03° 51'35"W	15.78'	D-2000	24" RCP
4	S30° 11'04"E	65.35'	D-2000	24" RCP
5	S35° 17'53"E	74.12'	D-2000	24" RCP
6	S28° 53'05"E	32.42'	D-2000	24" RCP



95% DRAINAGE PLAN AND PROFILE

C-11

PLANS FOR THE CONSTRUCTION OF
CONCRETE PANEL REPLACEMENT-COAST BLVD

DRAINAGE PLAN AND PROFILE

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 13 OF 27 SHEETS

WBS B-20046

APPROVED:
FOR CITY ENGINEER DATE
PRINT DCE NAME RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED

REGISTERED PROFESSIONAL ENGINEER
JOSH C. STONE
No. 60755
Exp. 12/31/20
CIVIL
STATE OF CALIFORNIA

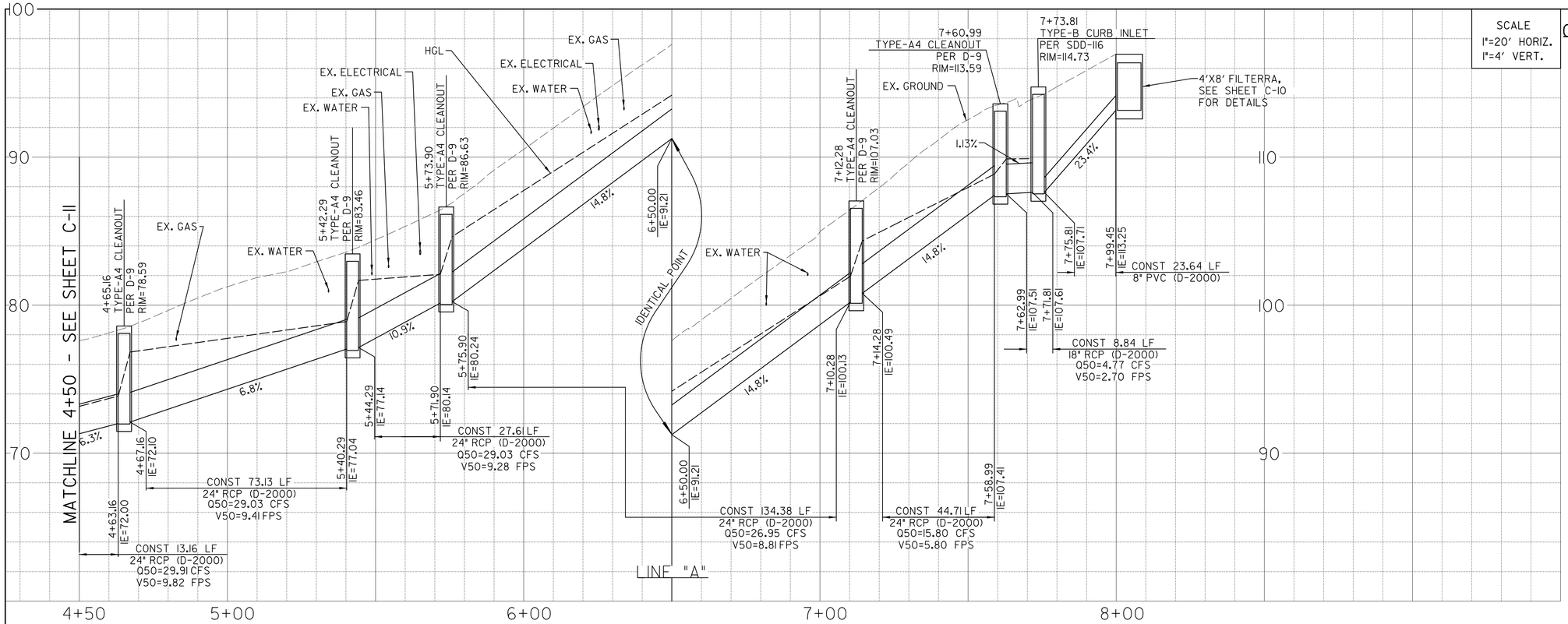
SUBMITTED BY: SHAWN KRAUSE
PROJECT MANAGER
CHECKED BY:
PROJECT ENGINEER
CCS27 COORDINATE
CCS83 COORDINATE

CONTRACTOR DATE STARTED
INSPECTOR DATE COMPLETED

XXXXX-13-X

Michael Baker INTERNATIONAL
5050 AVENIDA ENCINAS, SUITE 260
CARLSBAD, CA 92008
PHONE: (760)476-9193
MBAKERINTL.COM

H:\PDATA\175050\CADD\Land\Div\175050-PLANS.dgn



SCALE
1"=20' HORIZ.
1"=4' VERT.

CONSTRUCTION NOTES:

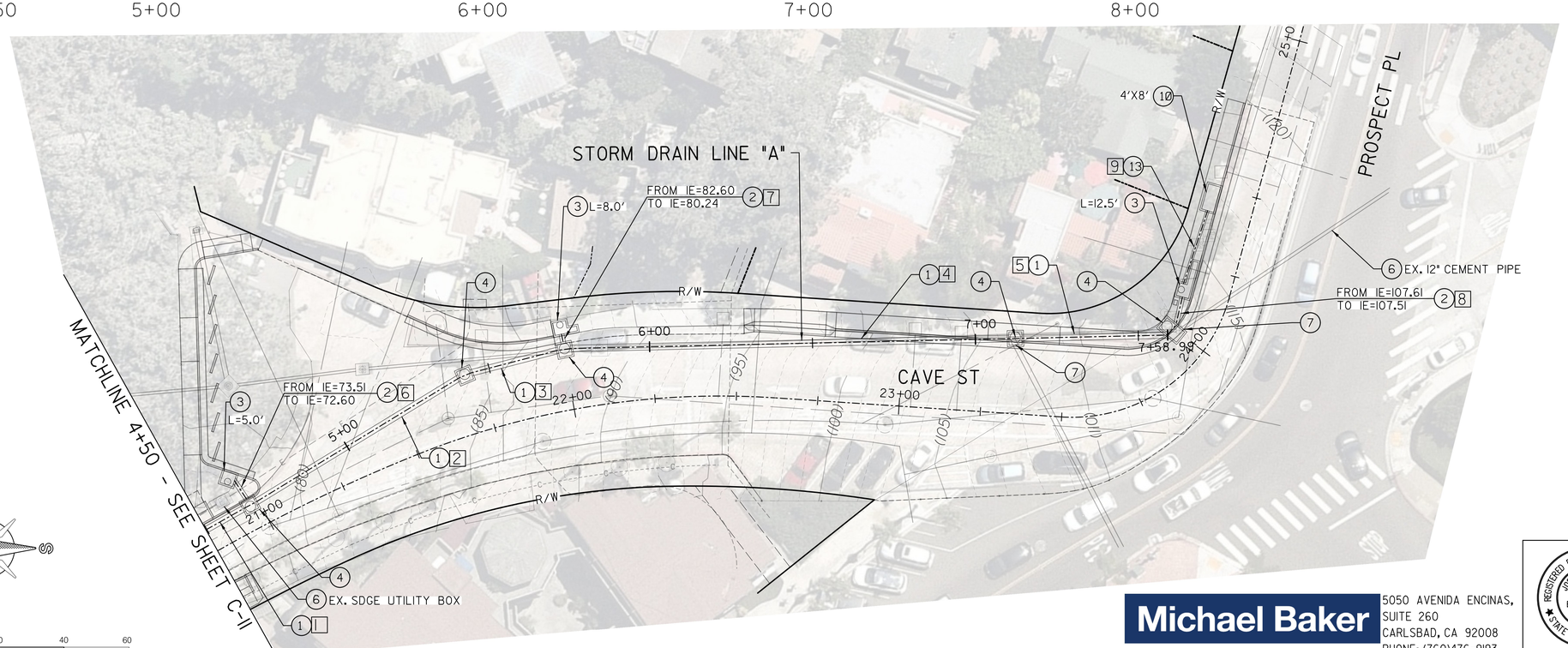
1. INSTALL 24" RCP WITH WATER TIGHT JOINTS
2. INSTALL 18" RCP WITH WATER TIGHT JOINTS
3. CONSTRUCT TYPE-B CURB INLET PER SDD-116
4. CONSTRUCT TYPE-A4 STORM DRAIN CLEANOUT PER D-9
6. PROTECT IN PLACE
7. CONNECT EXISTING STORM DRAIN PIPE TO PROPOSED TYPE A-4 STORM DRAIN CLEANOUT. EXTEND OR REMOVE CONFLICT PORTION WHEN NECESARY
10. INSTALL 4'X8' FILTERRA PLANTER BOX PER DETAIL F ON SHEET C-10
13. INSTALL 8" PVC

FOR EXISTING STORM DRAIN DEMOLITION NOTES, SEE DEMOLITION PLANS, SHEET C-2.

EXISTING UTILITY LATERAL ELEVATIONS ARE PER AS-BUILT PLANS. CONTRACTOR TO FIELD VERIFY ELEVATION OF EXISTING LATERALS PRIOR TO PIPE INSTALLATION. THE ENGINEER SHALL BE NOTIFIED IF THERE ARE ANY DISCREPANCIES.

PROPOSED STORM DRAIN DATA TABLE

NO.	Δ/BEARING	LENGTH	D-LOAD	NOTE
1	S28° 53'05"E	13.16'	D-2000	24" RCP
2	S30° 52'44"E	73.13'	D-2000	24" RCP
3	S13° 59'56"E	27.61'	D-2000	24" RCP
4	S00° 44'45"E	134.38'	D-2000	24" RCP
5	S00° 44'45"E	44.71'	D-2000	24" RCP
6	S57° 10'37"W	6.91'	D-2000	18" RCP
7	S78° 56'33"W	2.91'	D-2000	18" RCP
8	N76° 20'22"W	8.84'	D-2000	18" RCP
9	N71° 10'27"W	23.64'	D-2000	8" PVC



C-12

PLANS FOR THE CONSTRUCTION OF CONCRETE PANEL REPLACEMENT-COAST BLVD

DRAINAGE PLAN AND PROFILE

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 14 OF 27 SHEETS

WBS B-20046

APPROVED: FOR CITY ENGINEER — DATE
PRINT DCE NAME — RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED

REGISTERED PROFESSIONAL ENGINEER JOSH C. STONE No. 60755 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

SUBMITTED BY: SHAWN KRAUSE, PROJECT MANAGER
CHECKED BY: PROJECT ENGINEER
CCS27 COORDINATE
CCS83 COORDINATE

CONTRACTOR — DATE STARTED
INSPECTOR — DATE COMPLETED

XXXXX-14-X

Michael Baker INTERNATIONAL
5050 AVENIDA ENCINAS, SUITE 260
CARLSBAD, CA 92008
PHONE: (760)476-9193
MBAKERINTL.COM

95% DRAINAGE PLAN AND PROFILE

H:\PDATA\175050\CADD\Land\Dlv\175050-PLANS.dgn