

# **FINAL DRAINAGE REPORT MED-18-12.99**

**PID # 92953**

**Prepared By:**

**GPD Group**

**520 South Main Street**

**Akron, Ohio 44311**

June 14, 2018

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## 1. Introduction and Overview

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The MED-18-12.99 project is located within the West Branch Rocky River Watershed. Storm runoff is conveyed either by storm sewer, open channel or overland flow. Runoff is broken into several separate areas based on the eventual outlet from the site along SR-18 and adjacent side roads.

The first outlet is an 8'x10' box culvert (Culvert #1) carrying Broadway Creek which crosses S.R. 18 just east of Glenshire Lane. The contributing area for this outlet is from Alber Drive to west of Foote Road. Broadway Creek flows to the north and eventually contributes to the West Branch Rocky River.

The second outlet is a 36" culvert (Culvert #2) located just west of the Foote Road intersection which flows north and eventually contributes to Broadway Creek. The runoff contributing to this outlet comes from west of the Foote Road intersection.

The third outlet is a 4'x4' box culvert (Culvert #3) that crosses S.R. 18 between Waterford Drive and Retreat Drive. The runoff contributing to this outlet comes from the Foote Road intersection to Waterford Drive. The culvert outlets to a pond on the north side of S.R. 18 that drains to the West Branch Rocky River.

The fourth outlet is to the West Branch Rocky River, which crosses S.R. 18 between Summa Healthcare Driveway and Village Gate Drive. The runoff contributing to this outlet comes from Waterford Drive to Village Gate Drive. The West Branch Rocky River flows from south to north. Ditches and storm sewers from the east and west along S.R. 18 outlet at the West Branch Rocky River on both the north and south sides of S.R. 18 at this location.

The fifth outlet is an existing 48" storm sewer flowing to the north at Village Gate Drive. The runoff contributing to this outlet comes from Village Gate Drive to just west of Rustic Hills Drive. The existing 48" storm sewer outlets to the northwest and eventually contributes to the West Branch Rocky River.

The sixth outlet is an existing 48" culvert (Culvert #5) flowing to the south, just west of Rustic Hills Drive. The runoff contributing to this outlet comes from just west of Rustic Hills Drive to Eastpointe Drive. The existing 48" culvert outlets to the south and eventually contributes to the flow at the existing 60" culvert (Culvert #6) crossing under River Styx Road.

The seventh outlet is an existing 60" culvert (Culvert#6) that crosses River Styx Road just south of the Octagon Drive intersection. The contributing area for this culvert includes from culvert #5 and the area from just south of S.R. 18 to just south of the Octagon Drive intersection. The culvert flows to the south west and eventually contributes to the West Branch Rocky River.

For this report the existing culverts have been analyzed and where proposed improvements are recommended the proposed culverts have been sized. See [Appendix F](#) for culvert analysis calculations. For culvert inspection reports and video inspection survey see [Appendix I](#).

The MED-18-12.99 (PID 92953) project was scoped for all storm sewer and culverts under proposed pavement to be replaced and for consideration of providing dual trunk sewers along S.R. 18 to minimize crossings for maintenance of traffic. However upon visiting the site and completing visual and video inspections, three (3) of the existing culverts and various sections of reinforced concrete storm sewers have been recommended to remain, and be extended with modified or new headwalls. See discussion below and Appendix I for inspection results. The drainage conduits recommended to remain are:

- 30"/33" RCP Storm Sewer at the S.R. 18 & Glenshire Lane intersection
- 10'x8' Concrete Box Culvert east of Glenshire Lane on S.R. 18
- 4'x4' Concrete Box Culvert east of Waterford Drive on S.R. 18
- 42" RCP Storm Sewer east of Village Gate Drive on S.R. 18
- 36" RCP/5'x4' Concrete Box Storm Sewer at the S.R. 18 & River Styx Road intersection
- 12" RCP Storm Sewer on Foote Road north of S.R. 18

The Ohio Department of Transportation Location and Design Manual Volume 2, Drainage Design (ODOT L&D Vol. 2) regulations were adhered to for the hydraulic design of the MED-18-12.99 (PID 92953) project.

Plans showing the drainage areas along with structure numbers as they correspond to the calculations have been included in [Appendix K](#) to aid in review. Existing topographic mapping was obtained from project specific aerial mapping supplemented with field survey for contributing areas within the project limits. Offsite contributing areas were delineated using Lidar mapping and USGS StreamStats program. The proposed plan, profiles and cross sections were also considered when determining the drainage areas. Record drawings from previous construction projects have also been included for reference in [Appendix J](#).

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## 2. Floodplain

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This project does not lie within a FEMA designated floodplain. Please refer to [Appendix B](#) for the FEMA FIRM floodplain mapping.

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### 3. Existing Culvert and Storm Inspection

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As mentioned above, the project was scoped for all storm sewer and culverts under proposed pavement to be replaced and for consideration of providing dual trunk sewers along S.R. 18 to minimize crossings for maintenance of traffic. However upon visiting the site it became apparent that some of the existing reinforced concrete conduits were in satisfactory condition and may be able to be salvaged. Consideration for potential re-use was driven by a goal of lessening cost, maintenance of traffic at pipe crossings and avoidance of adjacent commercial parking lots.

To facilitate this evaluation, visual site inspections or remote video inspections were performed at the following culverts and storm sewers:

1. 30"/33" RCP Storm Sewer at the S.R. 18 & Glenshire Lane
2. 10'x8' Concrete Box Culvert east of Glenshire Lane on S.R. 18
3. 4'x4' Concrete Box Culvert east of Waterford Drive on S.R. 18
4. 48"/42" RCP & 36" CPP Storm Sewer east of Village Gate Drive on S.R. 18
5. 36" RCP/5'x4' & 6'x3' Concrete Box Storm Sewer at the S.R. 18 & River Styx Road
6. 60" Concrete Culvert south of Octagon Drive on River Styx Road

The results of those inspections, included in [Appendix J](#), revealed the following:

1. 30"/33" RCP Storm Sewer at the S.R. 18 & Glenshire Lane:  
Video inspection shows these conduits are in good condition and are acceptable for reuse.
2. 10'x8' Concrete Box Culvert east of Glenshire Lane on S.R. 18  
Visual site inspection recommends that this culvert be kept in place and extended with new full height headwalls.
3. 4'x4' Concrete Box Culvert east of Waterford Drive on S.R. 18  
Video inspection shows this culvert is in good condition and is acceptable for reuse.
4. 48"/42" RCP & 36" CPP Storm Sewer east of Village Gate Drive on S.R. 18  
Video inspection of the 48" RCP and 42" RCP show these conduits are in good condition and acceptable for reuse. The two 36" CPP conduits show several cracks, holes and deformations and therefore are proposed to be replaced.
5. 36" RCP/5'x4' & 6'x3' Concrete Box Storm Sewer at the S.R. 18 & River Styx Road  
This storm sewer system is comprised of two box culverts that have been connected with 36" storm sewer as a part of previous widening and commercial development. The system starts as a 6'x3' box culvert that collects drainage from an area north of S.R. 18 to the west of Shady Brooke Lane. This culvert flows south under S.R. 18 and has a blind connection to the 36" storm sewer the flows west along the south side of S.R. 18. The 36" storm sewer then ties into the 5'x4' box culvert the flows from south to north under the S.R. 18 & Shady Brooke Lane intersection. At the end of the box culvert, flow goes to the west along the north side of S.R. 18 in a 36" storm sewer. Video inspection shows for the most part that these conduits are acceptable for reuse, but two locations will need to be replaced. The 6'x3' culvert video inspection shows a

75% blockage of the conduit with an unknown material that appears to be concrete. Modeling of this condition shows that the blockage causes the culvert to operate unacceptably. Flow to this culvert will be diverted westward through new pipe and the 6'x3' box culvert under SR-18 will be plugged and filled. The other location of concern in this storm sewer system is an offset joint in the final stretch of 36" conduit near the outlet. This conduit will be replaced from the offset joint to the outlet of the system.

6. 60" Concrete Culvert south of Octagon Drive on River Styx Road  
Visual inspection of this culvert shows that it is in good condition and acceptable for reuse. However, due to lack of cover, this culvert will be replaced as recommended by the district.

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## 4. Ditch Analysis

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Ditch analysis calculations have been completed for all locations where the proposed improvements will require regrading of the existing ditches. Please refer to [Appendix C](#) for ditch calculations.

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## 5. Inlet Spacing Design

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The majority of the project is served by curb or curb and gutter. Please refer to [Appendix D](#) for inlet spacing calculations.

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## 6. Storm Sewer System

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Storm sewer sizing calculations were performed for all proposed and existing systems to remain. See [Appendix E](#) for calculations. As discussed in Section 1, the majority of the SR-18 will be drained by proposed dual storm sewers. Isolated areas of existing reinforced concrete storm sewers have been evaluated for potential re-use, see Existing Culvert and Storm Sewer Inspection discussion above and [Appendix I](#) for more information.

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## 7. Culvert Analysis

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Within the project limits are the following six (6) existing culverts:

- Culvert #1 – 10'x8' Concrete Box at Sta. 102+57.34 S.R. 18
- Culvert #2 – 36" RCP at Sta. 111+61.52 S.R. 18
- Culvert #3 – 4'x4' Concrete Box at Sta. 127+35.43 S.R. 18
- Culvert #4 – 6'x3' Concrete Box at Sta. 174+44.91 S.R. 18
- Culvert #5 – 48" RCP at Sta. 189+24.99 S.R. 18
- Culvert #6 – 60" RCP at Sta. 911+39.85 River Styx Road

The existing culverts were analyzed using ODOT's CDSS Design Software. It was determined that Culvert #2 was under-sized and in need of being replaced for capacity. Due to a 75% blockage from an unknown material Culvert #4 is also in need of being replaced. The other four (4) culverts provide adequate hydraulic capacity and can remain. See [Appendix F](#) for culvert details and calculations.

Per ODOT's request, lining options were investigated for Culvert #1. After review of the existing headwater conditions, future lining of this culvert is not recommend because two nearby existing structures are already within the existing 100 year headwater elevation.

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## 8. Post Construction Storm Water Management

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As per ODOT L&D Vol. 2, Section 1115.1, this project disturbs more than one acre of earth and therefore requires the use of Post Construction Storm Water Structural Best Management Practices (PCSWM BMP). This project also creates greater than one acre of new impervious area in new permanent right-of-way being acquired for this project. Therefore, BMPs are required to address water quality and water quantity. Calculations for the required treatment percentage and sizing of selected BMPs can be found in [Appendix G](#).

Given the developed nature of the project corridor and an urban roadway typical section, vegetated treatment facilities are not feasible. Therefore, the proposed BMPs addressing water quality are to be manufactured systems. Extended detention will be used to address water quantity and will be accomplished with underground detention. Underground detention has been chosen due to the limited right-of-way available. In order to meet the required treatment percentage for the project this area, there will be three locations utilizing a combination of manufactured systems/underground detention. Two locations are at the new frontage roads. The third location is just east of Burgundy Bay Road.

The three locations are as follows:

System No. 1

Burgundy Bay Road

Station 126+00

System No. 2  
System No. 3

South Frontage Road  
North Frontage Road

Station 175+25  
Station 178+00

#### Water Quality:

The calculations for water quality flow ( $WQ_f$ ) and the corresponding size the manufactured system required per the requirements of ODOT L&D Vol. 2, Section 1117.1 can be found in [Appendix G](#).

#### Water Quantity:

Per ODOT L&D Vol. 2, the water quality volume ( $WQ_v$ ) is used to determine the storage volume of the underground detention system. The  $WQ_v$  must be discharged over a minimum of 48 hours. No more than 50% of the  $WQ_v$  shall be released from the detention basin in less than one-third of the drain time (16 hours).

In addition, the overflow shall be designed for a 25-year hydraulic grade line design per Section 1104.4.2. For this project, the bypass pipe of the system at the diversion structure has been sized as part of the main storm sewer system, and is modeled in the CDSS calculations for the storm sewer design with the 10-year design storm and 25-year HGL. Therefore, the bypass pipe meets the design requirements of 1104.4.2. Each outlet control structure for the detention system is also equipped with an overflow weir set at the  $WQ_v$  elevation. Storm routing calculations have been provided for the 25-year storm. These storm routings all show that during the 25-year storm event, the systems function without causing a backup to the system.

For the underground detention system, the contractor will be provided with the options of vault storage, pipe storage or proprietary open bottom chambers (with the exception of System No.1, which exceeds the cover limitations for a proprietary system).

Vehicle access to both the manufactured systems and underground detention systems will be important for maintenance and cleaning. The plans identify the outlet control structures, manufactured systems, access manholes to the underground detention basins, and areas for vacuum trucks to park.

See [Appendix G](#) for modeling of the detention systems.

It should be noted that at the completion of the Feasibility Study this project was under the threshold for water quantity treatment. The addition of the frontage roads adds the requirement of water quantity treatment because of the additional pavement in new right-of-way.



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## 9. Impacts to Commercial Detention Basins

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One commercial site requires significant regrading of the existing detention pond and reconstruction of the overflow structure. The grading plan for the detention pond can be found in Appendix H. The pond has been sized to match or exceed the existing volume and the overflow structure designed to mimic the existing structure.

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## APPENDIX A – DRAINAGE CRITERIA (LD-35)

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**PROJECT INFORMATION:**

<b>COUNTY</b>	<b>ROUTE</b>	<b>SECTION</b>	<b>PID</b>

**PIPE POLICY:**

The Pipe Policy of \_\_\_\_\_ will be used for this project.

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(Attach a copy of the written pipe policy or furnish a link to the policy. In lieu of a written policy, documentation of locally funded construction practices may be provided)

**POST CONSTRUCTION BMP POLICY:**

The Post Construction BMP Policy of \_\_\_\_\_ will be used for this project.

If a policy other than ODOT's is being used, the following BMP's are permitted:

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**DRAINAGE WATERSHED(S):**

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**PROJECT SPECIFIC INFORMATION AFFECTING DRAINAGE:**

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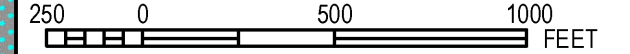
## APPENDIX B – FEMA FLOODPLAIN MAPPING

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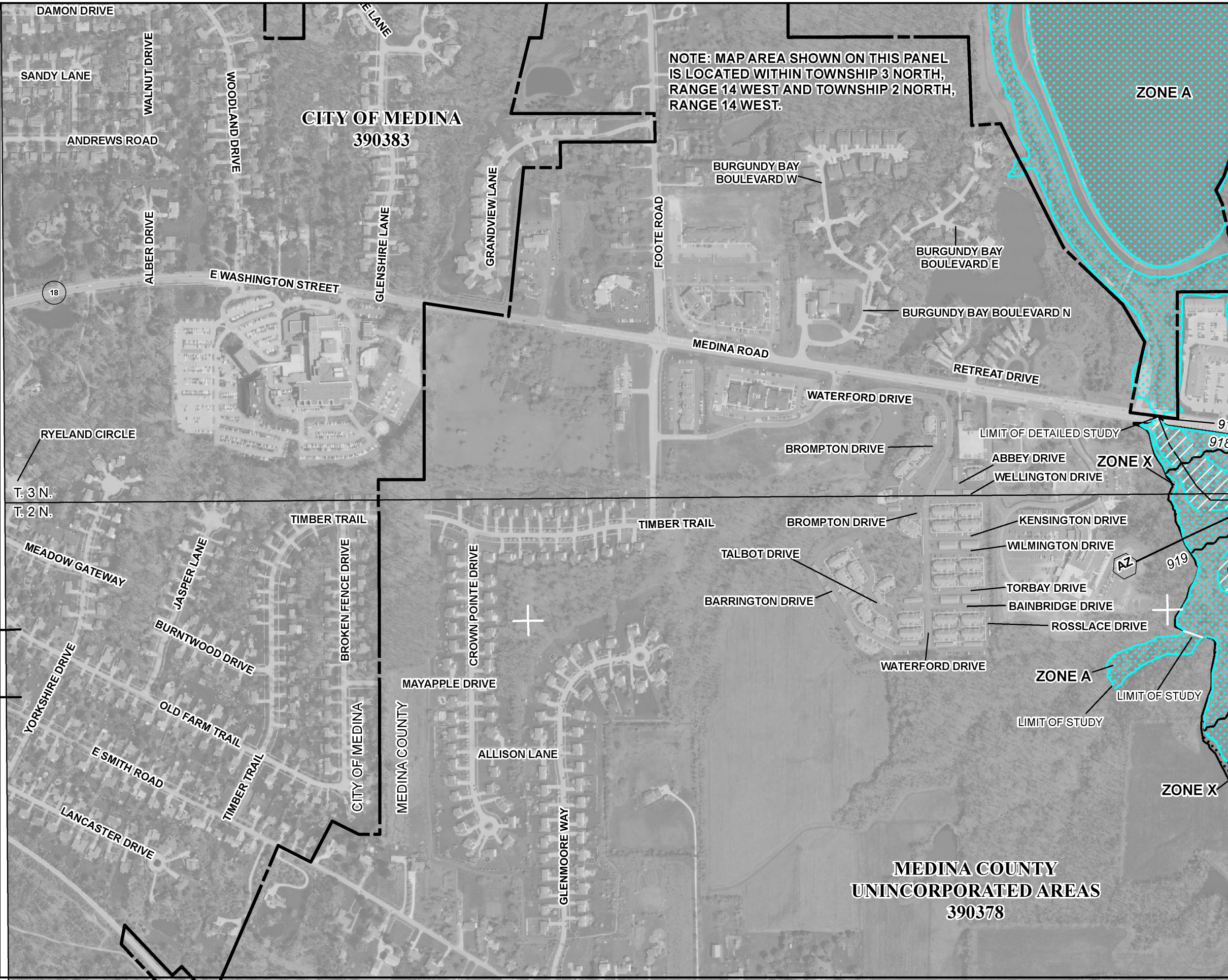




MAP SCALE 1" = 500'



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 3 NORTH, RANGE 14 WEST AND TOWNSHIP 2 NORTH, RANGE 14 WEST.



PANEL 0164E

### FIRM

FLOOD INSURANCE RATE MAP  
MEDINA COUNTY,  
OHIO  
AND INCORPORATED AREAS

PANEL 164 OF 450

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
MEDINA, CITY OF	390383	0164	E
MEDINA COUNTY	390378	0164	E

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.



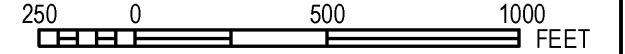
MAP NUMBER  
39103C0164E

MAP REVISED  
AUGUST 19, 2013

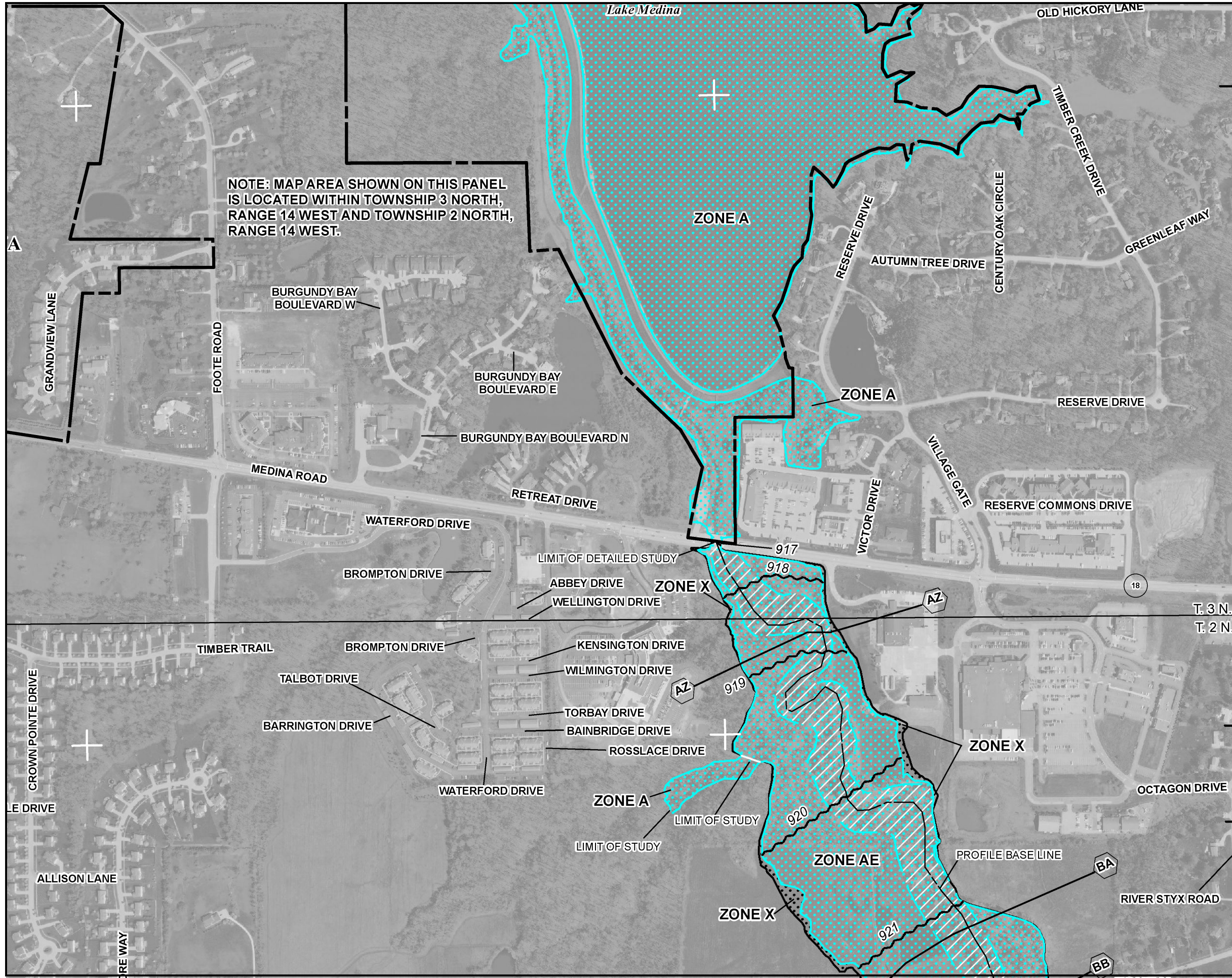
Federal Emergency Management Agency



MAP SCALE 1" = 500'



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 3 NORTH, RANGE 14 WEST AND TOWNSHIP 2 NORTH, RANGE 14 WEST.



PANEL 0164E

**FIRM**  
FLOOD INSURANCE RATE MAP  
MEDINA COUNTY,  
OHIO  
AND INCORPORATED AREAS

PANEL 164 OF 450

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MEDINA, CITY OF	390383	0164	E
MEDINA COUNTY	390378	0164	E

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.

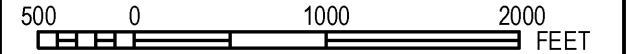


MAP NUMBER  
39103C0164E  
MAP REVISED  
AUGUST 19, 2013

Federal Emergency Management Agency



MAP SCALE 1" = 1000'



ME  
UNINCO

JOINS PANEL U104

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0170E

**FIRM**  
FLOOD INSURANCE RATE MAP  
MEDINA COUNTY,  
OHIO  
AND INCORPORATED AREAS

PANEL 170 OF 450

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MEDINA COUNTY	390378	0170	E

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  
39103C0170E

MAP REVISED  
AUGUST 19, 2013

Federal Emergency Management Agency

T. 3 N.  
T. 2 N.

MEDGAR

MEDINA ROAD

R. 14 W.  
R. 13 W.

RIVER STYX ROAD

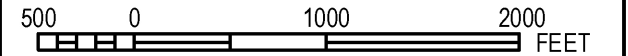
COUNTRY CLUB DRIVE

ZONE X  
ZONE AE  
927

B1  
B2



MAP SCALE 1" = 1000'



**MEDINA COUNTY  
UNINCORPORATED AREAS  
390378**

NFP

PANEL 0170E

**FIRM**

FLOOD INSURANCE RATE MAP

MEDINA COUNTY,  
OHIO

AND INCORPORATED AREAS

PANEL 170 OF 450

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MEDINA COUNTY	390378	0170	E

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  
39103C0170E

MAP REVISED  
AUGUST 19, 2013

Federal Emergency Management Agency



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## APPENDIX C – DITCH ANALYSIS

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# DITCH ANALYSIS

PID : 92953      Date : 10/23/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : Ditch Left side 103+50 to 102+89

Designer : AJE

Rainfall Area : A

Allowable Shears

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
103+50	102+89	L	70.96	2.00	2.00	2.00	0.1266 *	0.91	0.91	0.70	0.64	Seed	3.62	5	0.030	15.23	5.15	1.49	2.31	0.19	2.75
												Jute Mat	3.62	5	0.040	15.28	4.23	1.76	2.30	0.22	2.89
												Temp. Mat	3.62	5	0.040	15.28	4.23	1.76	2.30	0.22	2.89
												Perm, Type 1	3.62	5	0.040	15.28	4.23	1.76	2.30	0.22	2.89
												Perm, Type 1	4.09	10	0.040	15.27	4.40	1.89	2.61	0.24	2.96



# DITCH ANALYSIS

**PID :** 92953      **Date :** 10/23/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch Right side 110+50 to 112+00

**Designer :** AJE

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
110+50	112+00	R	150.00	2.00	4.00	3.00	0.0273	0.18	0.18	0.70	0.13	Seed	3.48	5	0.030	16.44	1.70	0.19	0.45	0.11	2.77
												Seed	3.92	10	0.040	16.68	1.45	0.24	0.50	0.14	2.98



# DITCH ANALYSIS

**PID :** 92953      **Date :** 10/23/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch Right side 114+00 to 112+00

**Designer :** AJE

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
114+00	112+00	R	200.00	2.00	4.00	3.00	0.0170	0.17	0.17	0.70	0.12	Seed	3.39	5	0.030	17.29	1.39	0.13	0.41	0.12	2.85
												Seed	3.80	10	0.040	17.72	1.20	0.16	0.46	0.15	3.05



# DITCH ANALYSIS

PID : 92953      Date : 10/23/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : Ditch Left side 136+88 to 139+00

Designer : AJE

Rainfall Area : A

### Allowable Shears

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
136+88	139+00	L	212.00	2.00	3.00	2.00	0.0533	1.11	1.11	0.60	0.67	Seed	3.54	5	0.030	15.93	3.77	0.80	2.36	0.24	3.20
												Jute Mat	3.52	5	0.040	16.14	3.09	0.93	2.34	0.28	3.40
												Temp. Mat	3.52	5	0.040	16.14	3.09	0.93	2.34	0.28	3.40
												Temp. Mat	3.99	10	0.040	16.09	3.21	1.00	2.66	0.30	3.50



# DITCH ANALYSIS

**PID :** 92953      **Date :** 10/23/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch right side 139+50 to 138+50

**Designer :** AJE

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
139+50	138+50	R	100.00	2.00	2.00	2.00	0.0730	0.46	0.46	0.70	0.32	Seed	3.59	5	0.030	15.49	3.41	0.67	1.16	0.15	2.59
												Jute Mat	3.58	5	0.040	15.59	2.81	0.80	1.15	0.17	2.70
												Temp. Mat	3.58	5	0.040	15.59	2.81	0.80	1.15	0.17	2.70
												Temp. Mat	4.05	10	0.040	15.57	2.92	0.86	1.31	0.19	2.75



# DITCH ANALYSIS

**PID :** 92953      **Date :** 10/23/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch right side 139+50 to 141+00

**Designer :** AJE

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
139+50	141+00	R	150.00	2.00	3.00	2.00	0.1040*	0.31	0.31	0.70	0.22	Seed	3.56	5	0.030	15.76	3.26	0.68	0.77	0.10	2.52
												Jute Mat	3.54	5	0.040	15.92	2.69	0.80	0.77	0.12	2.62
												Temp. Mat	3.54	5	0.040	15.92	2.69	0.80	0.77	0.12	2.62
												Temp. Mat	4.02	10	0.040	15.87	2.81	0.86	0.87	0.13	2.66



# DITCH ANALYSIS

**PID :** 92953      **Date :** 10/23/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch right side 146+64 to 141+41

**Designer :** AJE

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
146+64	144+00	R	264.00	2.00	3.00	3.00	0.0055	9.75	9.75	0.56	5.46	Seed	1.87	5	0.030	45.23	2.45	0.31	10.20	0.89	7.35
												Jute Mat	1.86	5	0.040	45.66	1.98	0.35	10.14	1.02	8.09
												Jute Mat	2.15	10	0.040	45.58	2.05	0.37	11.72	1.09	8.51
144+00	142+00	R	200.00	2.00	2.00	3.00	0.0085	0.39	10.14	0.70	5.73	Seed	1.83	5	0.030	46.76	3.00	0.45	10.47	0.85	6.24
												Jute Mat	1.82	5	0.040	47.03	2.42	0.52	10.43	0.97	6.86
												Temp. Mat	1.82	5	0.040	47.03	2.42	0.52	10.43	0.97	6.86
												Temp. Mat	2.10	10	0.040	46.89	2.51	0.55	12.07	1.04	7.21
142+00	141+41	R	59.00	2.00	2.00	2.00	0.0085	0.08	10.22	0.70	5.79	Seed	1.81	5	0.030	47.34	3.11	0.47	10.48	0.89	5.56
												Jute Mat	1.81	5	0.040	47.41	2.52	0.54	10.47	1.03	6.10
												Temp. Mat	1.81	5	0.040	47.41	2.52	0.54	10.47	1.03	6.10
												Temp. Mat	2.09	10	0.040	47.27	2.62	0.58	12.12	1.10	6.40





# DITCH ANALYSIS

PID : 92953      Date : 02/16/2017      Project : MED-18-12.99

Location : Medina, Ohio

Description : Ditch Left side 126+50 to 127+00

Designer : AJE

Rainfall Area : A

Allowable Shears

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
126+50	127+00	L	50.00	2.00	3.00	2.00	0.1180*	7.10	7.10	0.80	5.68	Seed	3.26	5	0.030	18.59	9.13	4.31	18.52	0.59	4.93
												Jute Mat	3.26	5	0.040	18.61	7.41	4.98	18.51	0.68	5.38
												Temp. Mat	3.26	5	0.040	18.61	7.41	4.98	18.51	0.68	5.38
												Perm, Type 1	3.26	5	0.040	18.61	7.41	4.98	18.51	0.68	5.38
												Perm, Type 2	3.26	5	0.040	18.61	7.41	4.98	18.51	0.68	5.38
												Perm, Type 3	3.26	5	0.040	18.61	7.41	4.98	18.51	0.68	5.38
												Perm, Type 3	3.70	10	0.040	18.61	7.66	5.31	21.02	0.72	5.61



# DITCH ANALYSIS

**PID :** 92953      **Date :** 02/01/2017      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch Left side N. Frontage Rd. 40+93 to 40+06

**Designer :** AJE

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
40+93	40+06	L	87.00	2.00	2.00	2.00	0.1391 *	1.87	1.87	0.66	1.23	Seed	3.62	5	0.030	15.22	6.59	2.32	4.47	0.27	3.07
												Jute Mat	3.62	5	0.040	15.27	5.39	2.73	4.47	0.31	3.26
												Temp. Mat	3.62	5	0.040	15.27	5.39	2.73	4.47	0.31	3.26
												Perm, Type 1	3.62	5	0.040	15.27	5.39	2.73	4.47	0.31	3.26
												Perm, Type 2	3.62	5	0.040	15.27	5.39	2.73	4.47	0.31	3.26
												Perm, Type 2	4.10	10	0.040	15.26	5.61	2.93	5.05	0.34	3.35



# DITCH ANALYSIS

**PID :** 92953      **Date :** 02/27/2018      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Ditch right side Goodwill Drive to SR 18 161+60

**Designer :** TMT

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
3+00	2+25	R	75.00	0.00	3.00	3.00	0.1090 *	0.09	0.09	0.70	0.06	Seed	3.60	5	0.030	15.42	2.91	1.10	0.23	0.16	0.97
												Jute Mat	3.59	5	0.040	15.51	2.40	1.21	0.23	0.18	1.06
												Temp. Mat	3.59	5	0.040	15.51	2.40	1.21	0.23	0.18	1.06
												Perm, Type 1	3.59	5	0.040	15.51	2.40	1.21	0.23	0.18	1.06
												Perm, Type 1	4.06	10	0.040	15.51	2.41	1.28	0.26	0.19	1.13
2+25	166+61	R	28.40	0.00	4.00	4.00	0.0640	0.01	0.10	0.70	0.07	Seed	3.56	5	0.030	15.72	2.32	0.65	0.25	0.16	1.31
												Jute Mat	3.56	5	0.040	15.76	1.87	0.73	0.25	0.18	1.46
												Temp. Mat	3.56	5	0.040	15.76	1.87	0.73	0.25	0.18	1.46
												Temp. Mat	4.03	10	0.040	15.76	1.89	0.77	0.28	0.19	1.55



# DITCH ANALYSIS

**PID :** 92953      **Date :** 05/13/2018      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Paved Gutter 921+32 to 920+50

**Designer :** TMT

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
921+32	920+62	L	68.34	2.00	2.00	2.00	0.0345	0.08	0.08	0.70	0.06	Seed	3.59	5	0.015	15.50	2.24	0.09	0.20	0.04	2.17
												Seed	4.06	10	0.015	15.50	2.31	0.10	0.23	0.05	2.19



# DITCH ANALYSIS

**PID :** 92953      **Date :** 05/13/2018      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** Paved Gutter 921+32 to 167+39

**Designer :** TMT

**Rainfall Area :** A

**Allowable Shears**

	<b>Seed:</b>	0.30	<b>Jute Mat:</b>	0.45	<b>Temporary Mat:</b>	1.00
<b>Permanent Mat</b>	<b>Type 1:</b>	2.00	<b>Type 2:</b>	3.00	<b>Type 3:</b>	5.00
<b>RCP</b>	<b>Type B:</b>	6.00				

(\*) Warning: Grade is steeper than allowable.

If value is parantheses, design parameters have been exceeded. - See user manual.

STATION BEGIN	STATION END	SIDE	LENGTH (ft.)	RADIUS WIDTH (ft.)	IN SLOPE (ft./ft.)	BACK SLOPE (ft./ft.)	GRADE (ft./ft.)	AREA (acres)	AREA SUM (acres)	RUNOFF COEFF.	CA (Sum)	PROTECT TYPE	RAIN INT. (in./hr.)	STORM FREQ. (yrs.)	MANN. COEFF.	TIME FLOW (min.)	VEL. FLOW (fps.)	SHEAR (lbs./ sq.ft.)	DESIGN FLOW (cfs.)	DEPTH FLOW (ft.)	WIDTH FLOW (ft.)
921+32	167+42	R	270.00	2.00	2.00	2.00	0.0476	0.30	0.30	0.70	0.21	Seed	3.52	5	0.015	16.11	3.96	0.26	0.74	0.09	2.34
												Seed	3.99	10	0.015	16.07	4.14	0.27	0.84	0.09	2.37

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## APPENDIX D – INLET SPACING DESIGN

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# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 88+75 to 86+72 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
88+75	Begin																	
86+72	CB-3A	203.00	0.73	0.19	2.31	0.99	10.00	0.0371	0.0830	0.0200	2.00	0.0000	4.41	0.61	0.00	0.61	0.156	1.88



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 89+27 to 92+56 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
89+27	Begin																	
92+49	CB-3	322.00	0.82	0.27	2.86	2.85	10.00	0.0142	0.0830	0.0073	2.00	0.0000	4.41	0.91	0.05	0.96	0.210	8.00





# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 93+19 to 99+98 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
93+19	Begin																	
99+98	CB-3A	679.00	0.82	0.41	2.22	2.75	10.00	0.0520	0.0830	0.0200	2.00	0.0000	4.41	1.39	0.10	1.49	0.202	3.80



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** :99+98 to 108+85 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
99+98	Begin																	
103+74	CB-3A	376.00	0.82	0.26	2.31	3.54	10.00	0.0090	0.0830	0.0200	2.00	0.0000	4.41	0.85	0.09	0.94	0.230	5.22
104+19	CB-3	45.00	0.80	0.03	5.85	0.69	10.00	0.0045	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.19	0.151	1.81 Sag
108+85	Begin																	
104+64	CB-3A	421.00	0.78	0.48	2.39	3.71	10.00	0.0090	0.0830	0.0200	2.00	0.0000	4.41	1.25	0.39	1.65	0.271	7.27
104+19	CB-3	45.00	0.81	0.03	6.10	0.61	10.00	0.0045	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.50	0.211	4.26 End

## SUMP DATA

**Total Flow (cfs) :** 0.70

**Ponded Depth (ft.) :** 0.060

**Spread on Pavement (ft.) :** 2.51



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 115+07 to 121+88 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
115+49	Begin																	
118+46	CB-3A	297.00	0.86	0.35	3.03	1.42	10.00	0.0370	0.0830	0.0200	2.00	0.0000	4.41	1.23	0.09	1.33	0.206	3.99
121+88	CB-3A	342.00	0.78	0.36	4.45	1.56	10.00	0.0406	0.0830	0.0200	2.00	0.0000	4.41	1.24	0.08	1.33	0.203	3.84



# INLET SPACING DESIGN

PID : 92953      Date : 09/02/2015      Project : MED-18-12.99

Location : S.R. 18

Description : 121+88 to 130+78 (left side)

Designer : AJE

Rainfall Area: A

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
121+88	Begin																	
124+97	CB-3A	309.00	0.64	0.46	2.68	3.22	10.00	0.0066	0.0830	0.0200	2.00	0.0000	4.41	1.04	0.25	1.30	0.265	6.94
125+58	CB-3	61.00	0.51	0.20	5.90	0.93	10.00	0.0033	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.70	0.245	5.97 Sag
130+78	Begin																	
126+18	CB-3A	460.00	0.76	0.48	2.68	4.65	10.00	0.0066	0.0830	0.0200	2.00	0.0000	4.41	1.20	0.41	1.61	0.282	7.78
125+58	CB-3	60.00	0.58	0.15	7.33	0.90	10.00	0.0033	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.79	0.254	6.39 End

## SUMP DATA

Total Flow (cfs) : 1.50

Ponded Depth (ft.) : 0.126

Spread on Pavement (ft.) : 5.83



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 130+78 to 148+20 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
130+78	Begin																	
138+93	CB-3A	815.00	0.78	1.06	2.68	3.22	10.00	0.0451	0.0830	0.0200	2.00	0.0000	4.41	2.51	1.13	3.64	0.270	7.22
140+31	CB-3A	138.00	0.75	0.16	5.90	0.89	10.00	0.0185	0.0830	0.0200	2.00	0.0000	4.41	1.35	0.30	1.66	0.245	5.95
143+90	CB-3A	359.00	0.86	0.32	6.79	3.35	10.14	0.0081	0.0830	0.0200	2.00	0.0000	4.38	1.17	0.34	1.51	0.268	7.12
145+75	CB-3	185.00	0.84	0.19	10.14	2.46	12.60	0.0041	0.0830	0.0200	2.00	0.0000	3.97	*****	*****	0.97	0.261	6.75 Sag
148+00	Begin																	
146+64	CB-3A	136.00	0.76	0.17	2.68	1.96	10.00	0.0039	0.0830	0.0200	2.00	0.0000	4.41	0.55	0.02	0.57	0.225	4.93
145+75	CB-3	89.00	0.78	0.11	4.64	1.79	10.00	0.0020	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.40	0.223	4.85 End

### SUMP DATA

**Total Flow (cfs) :** 1.37

**Ponded Depth (ft.) :** 0.117

**Spread on Pavement (ft.) :** 5.35



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 149+73 to 154+78 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF (ft.)	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
154+78	Begin																	
149+73	CB-3A	505.00	0.78	0.64	2.74	3.62	10.00	0.0132	0.0830	0.0200	2.00	0.0000	4.41	1.57	0.63	2.20	0.279	7.64



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 155+77 to 172+14 (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
172+14	Begin																	
162+80	CB-3A	934.00	0.86	0.90	2.89	4.15	10.00	0.0349	0.0830	0.0200	2.00	0.0000	4.41	2.33	1.08	3.41	0.275	7.46
158+89	CB-3A	391.00	0.72	0.65	7.04	2.32	10.00	0.0181	0.0830	0.0200	2.00	0.0000	4.41	2.03	1.12	3.14	0.295	8.45
155+77	CB-3A	312.00	0.70	0.54	9.36	2.17	11.53	0.0132	0.0830	0.0200	2.00	0.0000	4.14	1.77	0.91	2.68	0.295	8.45



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** North Frontage rt 44+92 to SR 18 lt 197+71

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
197+71	Begin																	
194+06	CB-3A	365.00	0.88	0.60	3.23	1.87	10.00	0.0284	0.0830	0.0200	2.00	0.0000	4.41	1.78	0.54	2.33	0.254	6.40
190+57	CB-3A	349.00	0.83	0.46	5.10	1.80	10.00	0.0284	0.0830	0.0200	2.00	0.0000	4.41	1.73	0.50	2.23	0.251	6.24
186+67	CB-3A	390.00	0.77	0.67	6.90	1.95	10.00	0.0284	0.0830	0.0200	2.00	0.0000	4.41	1.99	0.78	2.77	0.267	7.05
184+35	CB-3A	232.00	0.73	0.45	8.85	1.19	10.04	0.0288	0.0830	0.0200	2.00	0.0000	4.40	1.73	0.49	2.22	0.250	6.21
181+50	CB-3A	285.00	0.73	0.59	10.04	1.35	11.39	0.0340	0.0830	0.0200	2.00	0.0000	4.16	1.80	0.48	2.28	0.246	6.01
180+45	CB-3A	105.00	0.73	0.17	11.39	0.53	11.93	0.0340	0.0830	0.0200	2.00	0.0000	4.08	0.96	0.03	0.99	0.189	3.16
180+18	CB-3A	42.00	0.80	0.02	11.93	0.51	12.44	0.0170	0.0830	0.0022	2.00	0.0000	4.00	*****	*****	0.07	0.082	0.99 Sag
44+92	Begin																	
43+40	CB-3A	152.00	0.85	0.31	3.23	0.76	10.00	0.0340	0.0830	0.0200	2.00	0.0000	4.41	1.10	0.06	1.16	0.200	3.69
180+18	CB-3A	38.00	0.80	0.02	3.99	0.40	10.00	0.0170	0.0830	0.0022	2.00	0.0000	4.41	*****	*****	0.11	0.095	1.15 End

## SUMP DATA

**Total Flow (cfs) :** 0.19

**Ponded Depth (ft.) :** 0.000

**Spread on Pavement (ft.) :** 0.00





# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 86+72 to 89+27 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
89+27	Begin																	
86+72	CB-3A	255.00	0.59	0.45	2.31	1.23	10.00	0.0371	0.0830	0.0200	2.00	0.0000	4.41	1.12	0.05	1.17	0.197	3.57



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 89+27 to 92+49 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 20.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
89+27	Begin																	
92+49	CB-3	322.00	0.85	0.29	3.16	2.71	10.00	0.0142	0.0830	0.0100	2.00	0.0000	4.41	1.01	0.07	1.09	0.219	7.29



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 92+49 to 98+20 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
92+49	Begin																	
98+20	CB-3A	571.00	0.82	0.51	2.31	2.33	10.00	0.0495	0.0830	0.0200	2.00	0.0000	4.41	1.62	0.22	1.84	0.218	4.60



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 98+20 to 108+85 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
98+20	Begin																	
103+74	CB-3A	554.00	0.80	0.56	2.31	4.75	10.00	0.0090	0.0830	0.0200	2.00	0.0000	4.41	1.41	0.57	1.97	0.286	7.98
104+19	CB-3	45.00	0.85	0.04	7.06	0.59	10.00	0.0045	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.72	0.236	5.50 Sag
108+85	Begin																	
104+64	CB-3A	421.00	0.70	0.63	2.39	3.62	10.00	0.0090	0.0830	0.0200	2.00	0.0000	4.41	1.39	0.55	1.94	0.284	7.91
104+19	CB-3	45.00	0.83	0.04	6.01	0.60	10.00	0.0045	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.70	0.234	5.41 End

## SUMP DATA

**Total Flow (cfs) :** 1.42

**Ponded Depth (ft.) :** 0.121

**Spread on Pavement (ft.) :** 5.56



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 116+00 to 123+66 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
115+63	Begin																	
123+66	CB-3	803.00	0.75	1.34	2.68	4.23	10.00	0.0210	0.0830	0.0200	2.00	0.0000	4.41	2.87	1.56	4.43	0.318	9.61



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 123+66 to 130+78 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
123+66	Begin																	
124+97	CB-3A	131.00	0.77	0.39	2.68	1.36	10.00	0.0066	0.0830	0.0200	2.00	0.0000	4.41	1.06	0.27	1.32	0.266	7.02
125+58	CB-3	61.00	0.82	0.09	4.04	0.95	10.00	0.0033	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.59	0.233	5.36 Sag
130+78	Begin																	
126+18	CB-3A	460.00	0.76	0.68	2.74	4.39	10.00	0.0066	0.0830	0.0200	2.00	0.0000	4.41	1.49	0.79	2.28	0.311	9.23
125+58	CB-3	60.00	0.82	0.07	7.13	1.18	10.00	0.0016	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	1.04	0.304	8.90 End

## SUMP DATA

**Total Flow (cfs) :** 1.63

**Ponded Depth (ft.) :** 0.136

**Spread on Pavement (ft.) :** 6.31



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 130+78 to 135+79 (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
130+78	Begin																	
135+79	CB-3A	501.00	0.73	1.12	2.74	1.75	10.00	0.0596	0.0830	0.0200	2.00	0.0417	4.41	2.63	0.97	3.60	0.259	6.65



# INLET SPACING DESIGN

PID : 92953      Date : 09/02/2015      Project : MED-18-12.99

Location : S.R. 18

Description : 135+79 to 155+71 (right side)

Designer : AJE

Rainfall Area: A

Storm Frequency (yr.) : 5

Total Allow. Spread (ft.) : 10.00

Allowable Depth (ft.) 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
135+79	Begin																	
140+31	CB-3A	452.00	0.82	0.53	2.68	2.60	10.00	0.0246	0.0830	0.0167	2.00	0.0000	4.41	1.51	0.40	1.91	0.243	6.60
144+79	CB-3A	448.00	0.75	0.54	5.28	5.19	10.47	0.0042	0.0830	0.0200	2.00	0.0000	4.32	1.39	0.77	2.15	0.326	9.99
145+75	CB-3	96.00	0.80	0.12	10.47	1.65	12.12	0.0021	0.0830	0.0200	2.00	0.0000	4.05	*****	*****	1.16	0.301	8.77 Sag
155+77	Begin																	
151+38	CB-3A	439.00	0.79	0.88	2.68	2.99	10.00	0.0132	0.0830	0.0200	2.00	0.0000	4.41	1.92	1.14	3.06	0.306	9.01
148+70	CB-3A	268.00	0.64	0.67	5.68	1.83	10.00	0.0132	0.0830	0.0200	2.00	0.0000	4.41	1.91	1.12	3.03	0.305	8.97
147+70	CB-3	100.00	0.72	0.40	7.51	0.85	10.00	0.0086	0.0830	0.0200	2.00	0.0000	4.41	1.84	0.56	2.39	0.303	8.87
146+64	CB-3	106.00	0.70	0.47	8.36	1.28	10.00	0.0039	0.0830	0.0200	2.00	0.0000	4.41	1.60	0.41	2.01	0.323	9.83
145+75	CB-3	89.00	0.82	0.11	9.65	1.66	11.31	0.0020	0.0830	0.0200	2.00	0.0000	4.18	*****	*****	0.79	0.272	7.31 End

## SUMP DATA

Total Flow (cfs) : 1.94

Ponded Depth (ft.) : 0.157

Spread on Pavement (ft.) : 7.37





# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 180+45 to 192+89

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
192+89	Begin																	
187+06	CB-3A	583.00	0.79	0.83	3.08	2.90	10.00	0.0284	0.0830	0.0200	2.00	0.0000	4.41	2.04	0.85	2.89	0.270	7.21
180+45	CB-3A	661.00	0.84	0.95	5.98	2.86	10.00	0.0340	0.0830	0.0200	2.00	0.0000	4.41	2.69	1.67	4.36	0.296	8.50
180+19	CB-3	43.00	0.80	0.02	8.84	0.31	10.00	0.0170	0.0830	0.0125	2.00	0.0000	4.41	*****	*****	1.73	0.244	8.23 Sag
32+73	Begin																	
26+40	CB-3A	633.00	0.75	0.33	1.91	2.86	10.00	0.0429	0.0830	0.0200	2.00	0.0000	4.41	1.06	0.03	1.09	0.188	3.10
180+19	CB-3	40.00	0.76	0.01	1.91	0.43	10.00	0.0215	0.0830	0.0125	2.00	0.0000	4.41	*****	*****	0.06	0.074	0.90 End

## SUMP DATA

**Total Flow (cfs) :** 1.79

**Ponded Depth (ft.) :** 0.147

**Spread on Pavement (ft.) :** 9.78



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** 192+89 to 198+30

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
198+30	Begin																	
194+50	CB-3A	380.00	0.80	0.80	3.23	1.90	10.00	0.0284	0.0830	0.0200	2.00	0.0000	4.41	2.01	0.81	2.82	0.268	7.12
192+89	CB-3A	161.00	0.85	0.26	5.13	0.85	10.00	0.0284	0.0830	0.0200	2.00	0.0000	4.41	1.49	0.29	1.78	0.235	5.44



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** SR 18 Rt 155+71 to River Styx Lt 919+44

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
919+44	Begin																	
921+71	CB-3A	227.00	0.81	0.45	2.47	1.92	10.00	0.0100	0.0830	0.0200	2.00	0.0000	4.41	1.25	0.36	1.61	0.265	6.96
166+61	CB-3A	478.00	0.68	1.05	4.39	2.17	10.00	0.0328	0.0830	0.0200	2.00	0.0000	4.41	2.35	1.16	3.51	0.280	7.69
163+15	CB-3A	346.00	0.72	0.77	6.56	1.53	10.00	0.0349	0.0830	0.0200	2.00	0.0000	4.41	2.41	1.19	3.60	0.279	7.67
158+89	CB-3A	426.00	0.72	0.77	8.09	2.48	10.57	0.0181	0.0830	0.0200	2.00	0.0000	4.30	2.19	1.39	3.58	0.306	9.00
155+77	CB-3A	312.00	0.79	0.42	10.57	2.17	12.74	0.0132	0.0830	0.0200	2.00	0.0000	3.95	1.78	0.92	2.70	0.296	8.48



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18

**Description :** SR 18 Rt 180+45 to River Styx Rt 919+44

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
180+45	Begin																	
179+12	CB-3A	133.00	0.42	0.27	3.03	0.71	10.00	0.0340	0.0830	0.0200	2.00	0.0000	4.41	0.50	0.00	0.50	0.147	1.77
176+12	CB-3A	300.00	0.84	0.44	3.74	1.47	10.00	0.0340	0.0830	0.0200	2.00	0.0000	4.41	1.43	0.20	1.63	0.222	4.82
171+38	CB-3A	474.00	0.82	0.74	5.21	2.41	10.00	0.0340	0.0830	0.0122	2.00	0.0000	4.41	1.93	0.94	2.87	0.254	9.20
921+48	CB-3	100.00	0.71	0.09	7.62	0.78	10.00	0.0170	0.0830	0.0090	2.00	0.0000	4.41	*****	*****	1.22	0.219	7.94 Sag
919+44	Begin																	
920+91	CB-3A	147.00	0.75	0.17	2.47	1.08	10.00	0.0173	0.0830	0.0100	2.00	0.0000	4.41	0.56	0.00	0.56	0.174	2.83
921+49	CB-3	58.00	0.71	0.05	3.55	0.68	10.00	0.0087	0.0830	0.0090	2.00	0.0000	4.41	*****	*****	0.17	0.127	1.53 End

## SUMP DATA

**Total Flow (cfs) :** 1.39

**Ponded Depth (ft.) :** 0.119

**Spread on Pavement (ft.) :** 9.65



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18 and Foote Road

**Description :** Foote Rd left 10+31 to SR 18 right 108+85

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
10+31	Begin																	
11+70	CB-3A	139.00	0.65	0.20	1.91	0.76	10.00	0.0285	0.0830	0.0200	2.00	0.0000	4.41	0.57	0.00	0.57	0.160	1.93
14+20	CB-3A	250.00	0.65	0.40	2.67	1.42	10.00	0.0259	0.0830	0.0200	2.00	0.0000	4.41	1.07	0.07	1.15	0.208	4.10
15+45	CB-3A	125.00	0.70	0.25	4.09	1.27	10.00	0.0078	0.0830	0.0200	2.00	0.0000	4.41	0.78	0.07	0.85	0.228	5.10
15+80	CB-3	35.00	0.75	0.04	5.36	0.55	10.00	0.0039	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.21	0.159	1.92 Sag
108+85	Begin																	
111+00	CB-3A	215.00	0.77	0.58	2.71	2.36	10.00	0.0050	0.0830	0.0200	2.00	0.0000	4.41	1.33	0.64	1.97	0.310	9.20
113+82	CB-3A	282.00	0.84	0.34	5.07	3.12	10.00	0.0050	0.0830	0.0200	2.00	0.0000	4.41	1.29	0.59	1.88	0.306	9.01
15+80	CB-3	172.55	0.75	0.26	8.19	2.67	10.86	0.0025	0.0830	0.0200	2.00	0.0417	4.25	*****	*****	1.42	0.312	9.28 End

## SUMP DATA

**Total Flow (cfs) :** 1.63

**Ponded Depth (ft.) :** 0.136

**Spread on Pavement (ft.) :** 4.21



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18 and Foote Road

**Description :** Foote Rd right 10+31 to SR 18 intersection

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
10+31	Begin																	
11+70	CB-3A	139.00	0.65	0.19	2.12	0.77	10.00	0.0287	0.0830	0.0200	2.00	0.0000	4.41	0.54	0.00	0.54	0.157	1.89
14+20	CB-3A	250.00	0.70	0.32	2.89	1.44	10.00	0.0259	0.0830	0.0200	2.00	0.0000	4.41	0.95	0.04	0.99	0.198	3.60
15+48	CB-3A	128.00	0.70	0.20	4.33	1.35	10.00	0.0075	0.0830	0.0200	2.00	0.0000	4.41	0.63	0.02	0.65	0.212	4.30
16+00	CB-3	52.00	0.75	0.08	5.68	0.80	10.00	0.0038	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.30	0.183	2.85 Sag
17+21	Begin																	
16+00	CB-3	121.00	0.75	0.23	2.68	1.71	10.00	0.0038	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.77	0.247	6.04 End

## SUMP DATA

**Total Flow (cfs) :** 1.07

**Ponded Depth (ft.) :** 0.094

**Spread on Pavement (ft.) :** 4.19



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** Foote Road

**Description :** Foote Rd left 20+81 to 25+88

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
20+81	Begin																	
23+72	CB-3A	291.00	0.70	0.38	2.39	1.60	10.00	0.0280	0.0830	0.0200	2.00	0.0000	4.41	1.10	0.08	1.17	0.207	4.04
25+88	CB-3A	216.00	0.70	0.29	3.99	1.62	10.00	0.0250	0.0200	0.0200	2.00	0.0000	4.41	0.61	0.36	0.97	0.117	5.86



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18 and Foote Road

**Description :** Foote Rd left north 20+81 to SR 18 left 108+85

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
108+85	Begin																	
113+45	CB-3A	460.00	0.78	0.49	2.74	5.18	10.00	0.0050	0.0830	0.0200	2.00	0.0000	4.41	1.21	0.48	1.68	0.297	8.53
18+61	CB-3	190.00	0.75	0.26	7.92	2.92	10.84	0.0030	0.0830	0.0155	2.00	0.0000	4.26	*****	*****	1.31	0.289	9.96 Sag
20+81	Begin																	
18+98	CB-3A	183.00	0.75	0.20	2.47	1.60	10.00	0.0112	0.0830	0.0200	2.00	0.0000	4.41	0.65	0.01	0.66	0.199	3.66
18+61	CB-3	37.00	0.75	0.04	4.07	0.54	10.00	0.0056	0.0830	0.0155	2.00	0.0000	4.41	*****	*****	0.15	0.131	1.57 End

## SUMP DATA

**Total Flow (cfs) :** 1.46

**Ponded Depth (ft.) :** 0.123

**Spread on Pavement (ft.) :** 6.74





# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** Foote Road

**Description :** Foote Rd right 20+81 to 25+88

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
20+81	Begin																	
23+72	CB-3A	291.00	0.85	0.27	2.39	1.61	10.00	0.0280	0.0830	0.0200	2.00	0.0000	4.41	0.97	0.04	1.01	0.197	3.55
25+88	CB-3A	216.00	0.80	0.20	4.00	1.73	10.00	0.0250	0.0200	0.0200	2.00	0.0000	4.41	0.50	0.24	0.74	0.106	5.30



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** S.R. 18 and Foote Road

**Description :** Foote Rd right north 20+81 to SR 18 intersection

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
20+81	Begin																	
18+67	CB-3A	214.00	0.75	0.21	2.47	2.42	10.00	0.0064	0.0830	0.0200	2.00	0.0000	4.41	0.66	0.03	0.69	0.221	4.76
18+27	CB-3	40.00	0.75	0.07	4.89	0.68	10.00	0.0032	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.25	0.176	2.51 Sag
17+15	Begin																	
18+27	CB-3	190.00	0.75	0.21	2.68	3.33	10.00	0.0024	0.0830	0.0200	2.00	0.0417	4.41	*****	*****	0.69	0.256	6.49 End

## SUMP DATA

**Total Flow (cfs) :** 0.94

**Ponded Depth (ft.) :** 0.083

**Spread on Pavement (ft.) :** 2.17



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** North Frontage Road

**Description :** North Frontage (left side) west end

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF (ft.)	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
41+76	Begin																	
40+69	CB-3A	107.00	0.74	0.10	1.91	0.65	10.00	0.0340	0.0830	0.0200	2.00	0.0000	3.68	0.27	0.00	0.27	0.117	1.41



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** North Frontage Road

**Description :** North Frontage (left side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
44+92	Begin																	
41+69	CB-3A	429.00	0.83	0.20	1.91	2.18	10.00	0.0340	0.0830	0.0200	2.00	0.0000	3.68	0.61	0.00	0.61	0.159	1.91
41+40	CB-3	40.27	0.85	0.02	4.09	0.51	10.00	0.0170	0.0830	0.0100	2.00	0.0000	3.68	*****	*****	0.05	0.069	0.83 Sag
41+37	Begin																	
41+40	CB-3	14.00	0.80	0.01	1.32	0.19	10.00	0.0170	0.0830	0.0100	2.00	0.0000	3.68	*****	*****	0.03	0.058	0.70 End

## SUMP DATA

**Total Flow (cfs) :** 0.08

**Ponded Depth (ft.) :** 0.000

**Spread on Pavement (ft.) :** 0.00



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** North Frontage Road

**Description :** North Frontage (right side) west end

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
42+60	Begin																	
40+68	CB-3A	192.00	0.79	0.09	1.91	1.19	10.00	0.0340	0.0830	0.0200	2.00	0.0000	3.68	0.26	0.00	0.26	0.115	1.38



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** South Frontage Road

**Description :** South Frontage (left side) west end

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
25+86	Begin																	
21+21	CB-3A	465.00	0.65	0.42	2.17	2.59	10.00	0.0305	0.0830	0.0108	2.00	0.0000	3.68	0.96	0.04	1.01	0.193	4.47



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** South Frontage Road

**Description :** Frontage south (right side) east end T intersection

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
31+97	Begin																	
30+68	CB-3A	112.00	0.88	0.07	1.91	0.76	10.00	0.0284	0.0830	0.0200	2.00	0.0417	3.68	0.23	0.00	0.23	0.113	1.36



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** South Frontage Road

**Description :** South Frontage (right side) west end at T intersection

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
22+33	Begin																	
21+21	CB-3A	50.00	0.83	0.08	1.91	0.32	10.00	0.0305	0.0830	0.0200	2.00	0.0000	3.68	0.24	0.00	0.24	0.115	1.38





# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** South Frontage Road

**Description :** South Frontage (right side)

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 2

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
30+94	Begin																	
22+12	CB-3A	882.00	0.83	0.45	1.91	4.98	10.00	0.0256	0.0830	0.0200	2.00	0.0000	3.68	1.23	0.15	1.38	0.221	4.73
21+88	CB-3	30.27	0.57	0.01	6.89	0.33	10.00	0.0128	0.0830	0.0100	2.00	0.0000	3.68	*****	*****	0.17	0.117	1.41 Sag
21+80	Begin																	
21+88	CB-3	34.00	0.56	0.01	1.14	0.87	10.00	0.0040	0.0830	0.0100	2.00	0.0000	3.68	*****	*****	0.02	0.066	0.80 End

### SUMP DATA

**Total Flow (cfs) :** 0.19

**Ponded Depth (ft.) :** 0.000

**Spread on Pavement (ft.) :** 0.00



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** Victor Drive

**Description :** Victor Dr.

**Designer :** AJE

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 6.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
149+73	Begin																	
10+48	CB-3	200.00	0.74	0.44	2.31	1.74	10.00	0.0088	0.0830	0.0250	2.00	0.0000	4.41	1.32	0.12	1.43	0.265	5.98



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 11/12/2015      **Project :** MED-18-12.99

**Location :** Octagon Dr.

**Description :** Octagon Dr. 8+05 to 8+99 left

**Designer :** TMT

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
8+05	Begin																	
8+99	CB-3A	94.00	0.70	0.48	2.50	0.38	10.00	0.0574	0.0830	0.0115	2.00	0.0000	4.41	1.37	0.11	1.48	0.197	4.70



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 11/12/2015      **Project :** MED-18-12.99

**Location :** Octagon Dr.

**Description :** Octagon Dr. 8+05 to 9+09 right

**Designer :** TMT

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
8+05	Begin																	
9+09	CB-3A	104.00	0.80	0.29	3.14	0.39	10.00	0.0689	0.0830	0.0570	2.00	0.0000	4.41	1.01	0.01	1.02	0.168	2.04



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 907+79 to 911+47 left

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
907+79	Begin																	
909+34	CB-3A	155.00	0.83	0.12	2.58	1.17	10.00	0.0150	0.0830	0.0160	2.00	0.0000	4.41	0.44	0.00	0.44	0.163	1.97
910+23	CB-3A	89.00	0.80	0.06	3.75	0.85	10.00	0.0130	0.0830	0.0160	2.00	0.0000	4.41	0.22	0.00	0.22	0.130	1.57
910+99	CB-3	76.00	0.83	0.06	4.60	0.63	10.00	0.0200	0.0830	0.0160	2.00	0.0000	4.41	*****	*****	0.21	0.117	1.41 Sag
911+47	Begin																	
910+99	CB-3	48.00	0.83	0.04	2.58	0.43	10.00	0.0200	0.0830	0.0160	2.00	0.0000	4.41	*****	*****	0.13	0.099	1.20 End

## SUMP DATA

**Total Flow (cfs) :** 0.34

**Ponded Depth (ft.) :** 0.020

**Spread on Pavement (ft.) :** 1.64



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 11/03/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 907+79 to Begin of Proposed Work left

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
907+79	Begin																	
904+15	CB-3A	364.00	0.83	0.27	2.47	1.78	10.00	0.0367	0.0830	0.0200	2.00	0.0000	4.41	0.96	0.02	0.99	0.187	3.03



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 919+14 to Octagon Drive

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
919+44	Begin																	
917+30	CB-3A	214.00	0.60	0.44	2.58	0.91	10.00	0.0500	0.0830	0.0160	2.00	0.0000	4.41	1.13	0.04	1.16	0.187	3.31
915+38	CB-3A	192.00	0.65	0.31	3.49	0.83	10.00	0.0500	0.0830	0.0160	2.00	0.0000	4.41	0.92	0.01	0.92	0.172	2.39
914+12	CB-3A	126.00	0.82	0.10	4.32	0.64	10.00	0.0500	0.0830	0.0160	2.00	0.0000	4.41	0.37	0.00	0.37	0.122	1.47
10+03	CB-3A	421.00	0.81	0.27	4.96	2.80	10.00	0.0200	0.0830	0.0160	2.00	0.0000	4.41	*****	*****	0.96	0.204	4.39 End



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 11/11/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 923+00 to 924+08 left

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)	
923+00	Begin																		
923+59	CB-3	59.00	0.80	0.15	2.05	0.85	10.00	0.0040	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.53	0.219	4.64	Sag
924+08	Begin																		
923+59	CB-3	49.00	0.80	0.06	2.05	0.71	10.00	0.0040	0.0830	0.0200	2.00	0.0000	4.41	*****	*****	0.21	0.159	1.92	End

## SUMP DATA

**Total Flow (cfs) :** 0.74

**Ponded Depth (ft.) :** 0.064

**Spread on Pavement (ft.) :** 2.72





# INLET SPACING DESIGN

**PID :** 92953      **Date :** 09/02/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 907+79 to 919+44 right

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
907+79	Begin																	
909+39	CB-3A	160.00	0.51	0.87	2.58	1.16	10.00	0.0150	0.0830	0.0160	2.00	0.0000	4.41	1.43	0.53	1.95	0.261	7.91
910+43	CB-3A	104.00	0.56	0.38	3.74	0.83	10.00	0.0130	0.0830	0.0160	2.00	0.0000	4.41	1.17	0.29	1.46	0.246	6.98
910+99	CB-3	56.00	0.68	0.11	4.57	0.65	10.00	0.0065	0.0830	0.0160	2.00	0.0000	4.41	*****	*****	0.62	0.212	4.89 Sag
919+44	Begin																	
917+31	CB-3A	213.00	0.60	0.44	3.16	0.90	10.00	0.0500	0.0830	0.0160	2.00	0.0000	4.41	1.13	0.04	1.16	0.187	3.31
915+36	CB-3A	195.00	0.57	0.73	4.06	0.81	10.00	0.0500	0.0830	0.0160	2.00	0.0000	4.41	1.62	0.25	1.87	0.217	5.21
914+14	CB-3A	122.00	0.60	0.31	4.87	0.52	10.00	0.0500	0.0830	0.0160	2.00	0.0000	4.41	1.05	0.02	1.07	0.182	2.98
911+27	CB-3A	287.00	0.75	0.30	5.39	1.90	10.00	0.0200	0.0830	0.0160	2.00	0.0000	4.41	0.95	0.07	1.01	0.207	4.59
910+99	CB-3	28.00	0.68	0.11	7.29	0.27	10.00	0.0100	0.0830	0.0160	2.00	0.0000	4.41	*****	*****	0.40	0.170	2.22 End

## SUMP DATA

**Total Flow (cfs) :** 1.02

**Ponded Depth (ft.) :** 0.089

**Spread on Pavement (ft.) :** 4.46



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 11/03/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 907+79 to Begin of Proposed Work right

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 8.00

**Allowable Depth (ft.)** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
907+79	Begin																	
903+96	CB-3A	383.00	0.53	1.42	1.91	1.67	10.00	0.0367	0.0830	0.0200	2.00	0.0000	4.41	2.30	1.01	3.32	0.271	7.25
903+62	CB-3	34.00	0.53	0.13	3.58	0.22	10.00	0.0184	0.0830	0.0200	2.00	0.0000	4.41	1.24	0.07	1.31	0.229	5.14



# INLET SPACING DESIGN

**PID :** 92953      **Date :** 11/11/2015      **Project :** MED-18-12.99

**Location :** River Styx Road

**Description :** River Styx 924+08 right to SR 18 180+45 left

**Designer :** SWS

**Rainfall Area:** A

**Storm Frequency (yr.) :** 5

**Total Allow. Spread (ft.) :** 10.00

**Allowable Depth (ft.) :** 0.42

STATION	C.B. Type	GUTTER LENGTH (ft.)	RUNOFF COEF	AREA (acres)	CONC. TIME (min.)	GUTTER TIME (min.)	TIME USED (min.)	LONG. SLOPE (ft./ft.)	GUTT. SLOPE (ft./ft.)	PAVT. SLOPE (ft./ft.)	GUTT. WIDTH (ft.)	LOCAL DEPRESS. (ft.)	RAIN FALL (in./hrs.)	INTERCPTD FLOW (cfs.)	BYPASS FLOW (cfs.)	TOTAL FLOW (cfs.)	DEPTH FLOW (ft.)	PAVT. SPREAD (ft.)
180+45	Begin																	
176+75	CB-3A	370.00	0.75	0.73	3.03	1.74	10.00	0.0340	0.0830	0.0200	2.00	0.0000	4.41	1.87	0.55	2.41	0.250	6.20
172+15	CB-3A	460.00	0.85	0.85	4.77	0.87	10.00	0.0340	0.8300	0.0200	2.00	0.0000	4.41	3.73	0.00	3.73	0.741	0.89
924+00	CB-3	222.00	0.80	0.21	5.64	2.67	10.00	0.0055	0.0830	0.0200	2.00	0.0417	4.41	*****	*****	0.74	0.231	5.24 Sag
924+08	Begin																	
924+00	CB-3	8.00	0.80	0.01	2.05	0.27	10.00	0.0014	0.0830	0.0200	2.00	0.0417	4.41	*****	*****	0.04	0.099	1.19 End

## SUMP DATA

**Total Flow (cfs) :** 0.78

**Ponded Depth (ft.) :** 0.068

**Spread on Pavement (ft.) :** 2.03

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## APPENDIX E – STORM SEWER SYSTEM

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Ohio Department of Transportation - District 3  
Final Drainage Design Report  
MED-18-12.99





# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : 86+70 to DJ-202 west end

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'		
D19	D18	0.19	0.14	10.00	4.94	5.59	0.7	0.8	12	39.3	0.0102	1012.33	3.17	3.35	0.0006	1012.67	1017.33	4.66	4.00	CB 3A
	begin	0.19	0.14									1011.93				1012.61	1017.33			0.015
D18	D202	0.45	0.27	10.21	4.90	5.53	2.0	2.2	12	107.3	0.0276	1011.93	6.12	5.52	0.0052	1012.39	1017.33	4.94	4.40	CB 3A
	final	0.64	0.40									1008.97				1009.79	1012.59			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : storm system to 30" near Glenshire

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'		
D20	D21	0.27	0.22	10.00	4.94	5.58	1.1	1.2	12	51.3	0.0101	1013.41	3.62	3.35	0.0016	1013.85	1018.42	4.57	4.01	CB 3
	begin	0.27	0.22								1012.89				1013.62	1018.33			0.015	
D21	D22	0.29	0.25	10.24	4.90	5.36	2.3	2.5	12	299.7	0.0115	1012.89	4.55	3.56	0.0066	1013.54	1018.33	4.79	4.44	CB 3
	95+50	0.56	0.47								1009.45				1010.29	1014.45			0.015	
D22	D23	0.00	0.00	11.33	4.69	5.23	2.2	2.4	12	268.7	0.0310	1009.45	6.55	5.85	0.0063	1009.92	1014.45	4.53	4.00	MH 3
	98+20	0.56	0.47								1001.12				1001.95	1006.12			0.015	
D23	D180	0.51	0.42	12.02	4.58	5.20	4.1	4.6	12	98.8	0.0570	1001.12	9.63	7.93	0.0222	1001.69	1006.12	4.43	4.00	CB 3A
	99+18	1.07	0.89								995.49				996.44	1001.34			0.015	
EX10	D180	0.31	0.28	10.00	4.94	5.62	1.4	1.6	12	32.9	0.0983	998.91	8.74	10.42	0.0026	999.18	1003.08	3.90	3.17	CB 3A
	begin	1.38	1.17								995.68				996.45	1001.37			0.015	
D180	EX2	0.00	0.00	12.19	4.55	5.18	5.3	6.0	15	54.3	0.0452	995.24	9.42	12.80	0.0116	995.87	1001.37	5.50	4.88	MH 3
	99+70	1.38	1.17								992.79				993.91	998.79			0.015	
EX2	EX3	0.69	0.48	15.00	4.13	4.71	6.8	7.8	30	88.1	0.0378	991.12	8.95	74.35	0.0005	991.69	998.79	7.10	5.17	CB 2-2B
	99+99	2.07	1.65								987.79				989.50	996.13			0.015	
D42	EX3	0.41	0.33	10.00	4.94	5.62	1.6	1.9	12	15.4	0.0479	991.87	7.12	7.27	0.0037	992.23	996.87	4.64	4.00	CB 3A
	begin	2.48	1.98								991.13				991.92	996.13			0.015	



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	From	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
		To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
EX3	EX4	99+99	0.27	0.14	15.16	4.11	4.70	8.7	9.9	33	64.0	0.0614	986.31	11.30	122.13	0.0005	986.86	996.13	9.27	7.07	CB 2-2B
	final	100+26	2.75	2.12									982.38				984.27	992.71			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : 104+19 sump system outlet (left)

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D29	D26	104+64 begin	0.48 0.48	0.37 0.37	10.00	4.94	5.50	1.9	2.1	12	45.1	0.0051	976.89 976.66	3.14	2.37	0.0044	977.74 977.54	981.89 981.73	4.15	4.00	CB 3A 0.015
D26	D25	104+19 103+74	0.06 0.54	0.05 0.42	10.24	4.90	5.50	2.1	2.3	12	45.1	0.0051	976.66 976.43	3.20	2.37	0.0057	977.54 977.26	981.73 981.93	4.19	4.07	CB 3 0.015
D25	HW25	103+74 final	0.26 0.80	0.21 0.64	10.47	4.85	5.50	3.1	3.5	15	30.7	0.0036	976.18 976.07	3.10	3.60	0.0039	977.26 977.07	981.93 977.32	4.67	4.50	CB 3A 0.015





# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : 104+19 sump system outlet rt.

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D30	D28	104+64	0.63	0.44	10.00	4.94	5.58	2.2	2.5	12	44.5	0.0047	976.89	3.07	2.28	0.0063	977.89	981.89	4.00	4.00	CB 3A
	begin	104+19	0.63	0.44									976.68				977.52	981.73			0.015
D27	D28	103+74	0.56	0.45	10.00	4.94	5.58	2.2	2.5	12	44.4	0.0056	976.93	3.36	2.49	0.0066	977.93	981.93	4.00	4.00	CB 3A
	begin	104+19	1.19	0.89									976.68				977.52	981.73			0.015
D28	HW28	104+19	0.08	0.07	10.24	4.90	5.56	4.7	5.3	12	59.2	0.1050	976.68	12.51	10.76	0.0296	977.20	981.73	4.53	4.05	CB 3
	final	104+19	1.27	0.96									970.46				971.43	971.96			0.015



# STORM SEWER SYSTEM

**PID :** 92953      **Date :** 09/25/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** outlet to culvert @ 111+60 lt

**Designer :** AJE

**Rainfall Area:** A

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 0.00

JUNCTION		STATION		ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MINUS	MANNING'S
				(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D34	D127	113+45		0.49	0.38	10.00	4.94	5.41	1.9	2.1	12	204.3	0.0050	982.71	3.13	2.35	0.0045	983.49	986.71	3.22	3.00	CB 3A
	begin	111+43		0.49	0.38									981.69				982.50	988.28			0.015



# STORM SEWER SYSTEM

**PID :** 92953      **Date :** 09/25/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** outlet to culvert @ 111+60 RT east

**Designer :** AJE

**Rainfall Area:** A

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D35	D126	113+82	0.34	0.29	10.00	4.94	5.40	1.4	1.5	12	199.7	0.0053	982.54	3.02	2.41	0.0025	983.15	986.54	3.39	3.00	CB 3A
	begin	111+80	0.34	0.29									981.49				982.25	988.29			0.015



# STORM SEWER SYSTEM

**PID :** 92953      **Date :** 09/25/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** outlet to culvert @ 111+60 RT west

**Designer :** AJE

**Rainfall Area:** A

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D32	D126	111+00	0.58	0.45	10.00	4.94	5.55	2.2	2.5	12	82.4	0.0069	983.95	3.68	2.76	0.0064	984.75	987.95	3.20	3.00	CB 3A
	begin	111+80	0.58	0.45									983.38				984.22	988.29			0.015



# STORM SEWER SYSTEM

PID : 92953 Date : 09/25/2015 Project : MED-18-12.99

Location : Medina, Ohio

Description : 125+58 sump system outlet (includes Foote intersection)

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'		
D111	D112	0.20	0.13	10.00	4.94	5.59	0.6	0.7	12	37.0	0.0092	991.79	3.00	3.18	0.0006	992.15	996.79	4.64	4.00	CB 3A
	begin	0.20	0.13									991.45				992.13	996.77			0.015
D112	D198	0.19	0.12	10.21	4.90	5.58	1.2	1.4	12	13.1	0.0091	991.45	3.60	3.18	0.0021	992.11	996.77	4.66	4.32	CB 3A
	11+70	0.39	0.25									991.33				992.08	997.50			0.015
D198	D199	0.00	0.00	10.27	4.89	5.43	1.2	1.4	12	249.4	0.0380	991.33	6.04	6.47	0.0020	991.66	997.50	5.84	5.17	MH 3
	14+20	0.39	0.25									981.86				982.61	987.86			0.015
EX4	D119	1.58	0.79	15.00	4.13	4.71	3.3	3.7	12	49.2	0.0100	989.52	4.43	3.32	0.0145	990.65	991.27	0.62	0.75	CB 2-2B
	begin	1.97	1.04									989.03				989.94	994.16			0.015
D119	D115	0.00	0.00	15.18	4.11	4.71	3.2	3.7	12	25.2	0.2309	989.03	15.14	15.96	0.0145	989.37	994.16	4.79	4.13	MH 3
	14+20	1.97	1.04									983.21				984.12	987.21			0.015
D115	D116	0.40	0.26	15.21	4.10	4.67	4.3	4.9	15	51.3	0.0057	981.96	3.91	4.53	0.0077	983.21	987.21	4.00	4.00	CB 3A
	14+20	2.37	1.30									981.67				982.80	987.21			0.015
D116	D199	0.32	0.22	15.43	4.07	4.67	5.2	6.0	15	6.0	0.0100	981.67	5.18	6.02	0.0113	982.80	987.21	4.41	4.29	CB 3A
	14+20	2.69	1.53									981.61				982.73	987.86			0.015
D199	D200	0.00	0.00	15.45	4.07	4.45	6.2	6.8	15	177.7	0.0298	981.61	8.36	10.40	0.0147	982.38	987.86	5.48	5.00	MH 3
	16+00	2.69	1.53									976.31				978.30	985.63			0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D117	D36	15+45 begin	0.25 2.94	0.18 1.70	10.00	4.94	5.59	0.9	1.0	12	35.0	0.0074	981.10 980.84	3.03	2.86	0.0010	981.58 981.55	985.10 984.90	3.52	3.00	CB 3A 0.015
D36	D37	15+80 16+00	0.30 3.24	0.23 1.93	10.19	4.91	5.55	2.0	2.2	12	55.8	0.0170	980.84 979.89	5.09	4.34	0.0052	981.37 980.89	984.90 984.88	3.53	3.06	CB 3 0.015
D118	D37	15+48 begin	0.20 3.44	0.14 2.07	10.00	4.94	5.56	0.7	0.8	12	52.4	0.0050	981.08 980.82	2.46	2.34	0.0006	981.54 981.50	985.08 984.88	3.54	3.00	CB 3A 0.015
D37	D200	16+00 16+00	0.31 3.75	0.23 2.30	10.38	4.87	5.55	3.8	4.3	12	6.0	0.0150	979.89 979.80	5.49	4.07	0.0192	980.89 980.74	984.88 985.63	3.99	3.99	CB 3 0.015
D200	D124	16+00 17+49	0.00 3.75	0.00 2.30	15.80	4.02	4.45	9.3	10.2	18	153.7	0.0101	976.12 974.57	5.89	9.84	0.0126	978.30 976.36	985.63 985.74	7.33	8.01	MH 3 0.015
D120	D121	18+98 begin	0.20 3.95	0.15 2.45	10.00	4.94	5.51	0.7	0.8	12	36.3	0.0085	980.44 980.13	3.04	3.07	0.0007	980.93 980.91	985.44 985.24	4.51	4.00	CB 3A 0.015
D121	D123	18+61 18+27	0.30 4.25	0.23 2.68	10.20	4.90	5.51	1.8	2.1	12	66.2	0.0050	980.13 979.80	3.11	2.34	0.0045	980.91 980.61	985.24 984.96	4.33	4.11	CB 3 0.015
D122	D123	18+67 begin	0.21 4.46	0.16 2.83	10.00	4.94	5.59	0.8	0.9	12	41.0	0.0168	980.65 979.96	3.93	4.31	0.0008	980.97 980.66	985.65 984.96	4.68	4.00	CB 3A 0.015
D123	D124	18+27 115+61	0.28 4.74	0.21 3.04	10.55	4.84	5.42	3.6	4.0	18	86.4	0.0035	979.30 979.00	3.26	5.77	0.0020	980.30 980.13	984.96 985.74	4.66	4.16	CB 3 0.015
D124	D194	115+61 117+50	0.00 4.74	0.00 3.04	16.24	3.97	4.45	12.1	13.6	21	188.8	0.0082	974.32 972.77	5.90	13.39	0.0097	976.36 974.52	985.74 982.74	9.38	9.67	MH 3 0.015
D194	D125	117+50 118+46	0.00 4.74	0.00 3.04	16.77	3.91	4.45	11.9	13.6	21	96.7	0.0080	972.77 972.00	5.80	13.18	0.0097	974.52 973.56	982.74 979.45	8.22	8.22	MH 3 0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D125	D41	118+46 122+09	0.35 5.09	0.30 3.34	17.05	3.87	4.38	13.0	14.7	21	362.6	0.0356	972.00 959.08	10.78	27.88	0.0114	972.94 960.66	979.45 964.83	6.51	5.70	CB 3A 0.015
D6	D41	121+88 begin 122+09	0.36 5.45	0.28 3.62	10.00	4.94	5.61	1.4	1.6	12	22.5	0.0169	961.71 961.33	4.65	4.32	0.0026	962.15 962.10	965.71 964.83	3.56	3.00	CB 3A 0.015
D40	D41	122+28 begin 122+09	0.20 5.65	0.16 3.78	10.00	4.94	5.58	0.8	0.9	12	47.2	0.0087	961.74 961.33	3.13	3.09	0.0008	962.12 962.03	965.24 964.83	3.12	2.50	CB 3A 0.015
D41	D51	122+09 125+38	0.00 5.65	0.00 3.78	17.61	3.81	4.28	14.4	16.2	21	288.5	0.0248	959.08 951.93	9.62	23.26	0.0139	960.21 954.50	964.83 958.40	4.62	4.00	MH 3 0.015
D56	D47	123+66 begin 124+97	1.34 6.99	1.01 4.79	10.00	4.94	4.28	5.0	4.3	15	131.2	0.0101	955.97 954.64	5.18	6.06	0.0059	956.79 956.01	960.22 958.39	3.43	3.00	CB 3 0.015
D47	D48	124+97 125+58	0.39 7.38	0.30 5.09	10.42	4.86	4.28	6.3	5.6	15	60.5	0.0114	954.64 953.95	5.49	6.43	0.0100	956.01 955.40	958.39 958.20	2.38	2.50	CB 3A 0.015
D49	D48	126+18 begin 125+58	0.68 8.06	0.52 5.61	10.00	4.94	4.28	2.6	2.2	12	60.4	0.0074	954.65 954.20	3.87	2.87	0.0053	955.72 955.40	958.40 958.20	2.68	2.75	CB 3A 0.015
D48	D52	125+58 125+58	0.16 8.22	0.13 5.74	10.61	4.83	4.28	9.5	8.4	18	63.3	0.0120	953.70 952.94	6.42	10.73	0.0085	955.40 954.87	958.20 958.20	2.80	3.00	CB 3 0.015
D53	D52	126+18 begin 125+58	0.48 8.70	0.36 6.11	10.00	4.94	4.28	1.8	1.6	12	60.4	0.0050	954.40 954.10	3.10	2.34	0.0026	955.03 954.87	958.40 958.20	3.37	3.00	CB 3A 0.015
D52	D51	125+58 124+97	0.35 9.05	0.19 6.30	10.77	4.80	4.28	12.1	10.8	21	60.4	0.0126	952.69 951.93	7.08	16.56	0.0061	954.87 954.50	958.20 958.40	3.33	3.76	CB 3 0.015
D51	D201	124+97 124+97	0.46 9.51	0.29 6.59	18.11	3.75	4.28	24.8	28.2	24	8.0	0.0150	951.68 951.56	8.69	25.82	0.0207	954.50 954.33	958.40 959.70	3.90	4.72	CB 3A 0.015



# STORM SEWER SYSTEM

JUNCTION		STATION		ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
				(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D201	D201	124+97		0.00	0.00	18.13	3.75	4.28	24.7	28.2	24	22.2	0.0153	951.56	8.79	26.09	0.0207	954.33	959.70	5.37	6.14	MH 3
		125+19		9.51	6.59									951.22				953.87	958.98			0.015
D201	D201	125+19		0.00	0.00	18.17	3.75	4.28	24.7	28.2	24	124.5	0.0155	951.22	8.85	26.26	0.0207	953.87	958.98	5.11	5.76	MH 3
		126+44		9.51	6.59									949.29				951.29	959.31			0.015
D201	D201	126+44		0.00	0.00	18.40	3.72	4.28	24.5	28.2	24	16.6	0.0156	949.29	8.90	26.37	0.0207	951.29	959.31	8.02	8.02	MH 3
		126+47		9.51	6.59									949.03				950.95	955.71			0.015
D201	HW20	126+50		0.00	0.00	18.43	3.72	4.28	24.5	28.2	24	36.2	0.0807	944.40	17.17	59.90	0.0207	945.41	955.71	10.30	9.31	MH 3
	final	126+75		9.51	6.59									941.48				943.40	945.84			0.015





# STORM SEWER SYSTEM

PID : 92953      Date : 11/13/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : Summa Dr @ 10+80

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D58	D54	10+80	0.16	0.14	10.00	4.94	5.59	0.7	0.8	12	34.5	0.0087	940.41	3.04	3.10	0.0007	940.82	943.30	2.48	1.89	CB 3A
	begin	10+80	0.16	0.14									940.11				940.80	944.11			0.015
D54	OUT	10+80	0.04	0.04	10.19	4.91	5.57	0.9	1.0	12	18.4	0.0092	940.11	3.29	3.19	0.0011	940.67	944.11	3.44	3.00	CB 3
	final	10+80	0.20	0.18									939.94				940.65	925.19			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 11/13/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : Summa out to wetland

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION		ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MINUS	MANNING'S
				(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D55	D57	11+37		1.12	0.82	10.00	4.94	5.60	4.0	4.6	12	105.5	0.0737	944.55	10.58	9.02	0.0219	945.08	949.55	4.47	4.00	CB 3A
	begin	11+12		1.12	0.82									936.78				937.73	942.20			0.015
D57	DJ61	11+12		0.09	0.08	10.17	4.91	5.59	4.4	5.0	12	34.4	0.1046	936.78	12.31	10.74	0.0264	937.28	942.20	4.92	4.42	CB 3A
		10+67		1.21	0.90									933.18				934.14	942.46			0.015
EXA	DJ61	10+67		1.00	0.50	15.00	4.13	4.72	2.1	2.4	18	58.4	0.1253	935.80	10.24	34.66	0.0007	936.07	942.42	6.35	5.12	CB 3A
	begin	10+74		2.21	1.40									928.49				929.53	942.46			0.015
DJ61	OUT	10+80		0.00	0.00	15.09	4.12	4.71	5.8	6.6	18	47.5	0.0866	927.80	12.07	28.81	0.0052	928.31	942.18	13.87	12.88	CB 3A
	final	10+39		2.21	1.40									923.69				924.94	925.19			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : 138+92.50 left side

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D59	D60	138+93 begin	1.06 1.06	0.83 0.83	10.00	4.94	5.62	4.1	4.6	12	25.7	0.0226	926.55 925.97	6.66	4.99	0.0226	927.50 926.92	931.55 930.97	4.05	4.00	CB 3A 0.015
D60	HW60	139+00 final	1.13 2.19	0.68 1.50	15.00	4.13	4.70	6.2	7.1	15	125.9	0.0316	925.72 921.74	8.55	10.71	0.0159	926.50 922.90	930.97 922.74	4.47	4.00	CB 2-2B 0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : 140+31 left side before bridge

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION		ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
		To		(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D61	HW61	140+31		0.16	0.12	10.00	4.94	5.62	0.6	0.7	12	19.8	0.1118	921.18	7.11	11.11	0.0005	921.35	926.75	5.40	4.57	CB 3A
	begin	140+41		0.16	0.12									918.97				919.64	919.97			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : 140+31 right side before bridge

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION		Δ AREA	Δ CA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
				(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
D62	D171	140+31	140+42	0.53	0.43	10.00	4.94	5.61	2.1	2.4	12	54.0	0.1295	922.70	10.92	11.95	0.0061	923.02	926.75	3.73	3.05	CB 3A
	begin	140+42		0.53	0.43									915.71				916.54	922.02			0.015
D170	D171	138+50	140+42	1.06	0.48	15.00	4.13	4.62	2.0	2.2	12	197.7	0.0094	917.10	4.06	3.21	0.0051	917.74	921.10	3.36	3.00	CB 2-2A
	begin	140+42		1.59	0.91									915.25				916.07	922.02			0.015
D171	HW17	140+42	140+89	0.00	0.00	15.81	4.02	4.59	3.6	4.2	15	48.1	0.0052	915.00	3.72	4.34	0.0055	916.06	922.02	5.96	5.77	MH 3
	final	140+89		1.59	0.91									914.75				915.79	916.00			0.015



# STORM SEWER SYSTEM

PID : 92953 Date : 09/25/2015 Project : MED-18-12.99

Location : Medina, Ohio

Description : Village Gate to Bridge

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE				PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
EXIN	EX18	4.14	1.24	40.00	2.34	2.69	2.9	3.3	15	114.7	0.0034	927.94	3.01	3.51	0.0036	929.07	929.19	0.12	0.00	HW Full He		
	begin	4.14	1.24									927.55				928.66	934.92					0.015
EX18	D172	0.20	0.08	40.64	2.32	2.69	3.1	3.6	15	90.9	0.0036	927.55	3.12	3.63	0.0041	928.66	934.92	6.26	6.12	CB 2-2B		
		4.34	1.32									927.22				928.23	931.74					0.015
D172	D72	0.00	0.00	41.12	2.30	2.66	3.0	3.5	15	277.5	0.0191	927.22	5.94	8.33	0.0040	927.81	931.74	3.93	3.27	MH 3		
		4.34	1.32									921.91				922.91	927.16					0.015
D72	D70	1.09	0.86	41.90	2.27	2.60	5.0	5.7	15	268.1	0.0132	921.91	5.79	6.92	0.0103	922.83	927.16	4.33	4.00	CB 3A		
		5.43	2.18									918.37				920.07	923.62					0.015
D70	D69	0.74	0.47	42.67	2.24	2.60	6.0	6.9	15	100.0	0.0108	918.37	5.40	6.26	0.0153	920.07	923.62	3.55	4.00	CB 3A		
		6.17	2.66									917.29				918.54	922.54					0.015
D69	D68	0.42	0.32	42.98	2.23	2.60	6.6	7.8	18	105.7	0.0060	917.04	4.52	7.56	0.0072	918.54	922.54	4.00	4.00	CB 3		
		6.59	2.98									916.41				917.70	921.88					0.015
D64	D65	0.57	0.46	10.00	4.94	5.42	2.3	2.5	12	95.4	0.0051	916.91	3.21	2.38	0.0066	917.91	921.91	4.00	4.00	CB 3A		
	begin	7.16	3.44									916.42				917.28	921.71					0.015
D65	D68	0.22	0.17	10.50	4.85	5.42	3.1	3.4	15	89.8	0.0033	916.17	3.00	3.48	0.0037	917.28	921.71	4.43	4.29	CB 3		
		7.38	3.61									915.87				916.87	921.88					0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	INTENSITY (10 yrs.)	INTENSITY (25 yrs.)	(cfs.) (10 yrs.)	(cfs.) (25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D71	D101	149+73 begin	0.64 8.02	0.51 4.11	10.00	4.94	5.30	2.5	2.7	12	140.9	0.0071	918.00 917.00	3.77	2.80	0.0075	919.10 918.04	924.98 922.12	5.88	5.98	CB 3A 0.015
D101	D67	148+34 146+64	0.44 8.46	0.33 4.44	10.62	4.82	5.30	4.0	4.4	15	171.9	0.0050	916.75 915.89	3.68	4.26	0.0062	918.04 916.97	922.12 921.88	4.08	4.12	CB 3 0.015
D63	D66	143+90 begin	0.40 8.86	0.34 4.78	10.00	4.94	5.43	1.7	1.9	12	184.5	0.0055	918.45 917.43	3.21	2.47	0.0037	919.13 918.22	922.45 921.71	3.32	3.00	CB 3A 0.015
D66	D67	145+75 146+64	0.22 9.08	0.18 4.96	10.96	4.76	5.34	2.5	2.8	15	89.8	0.0049	917.18 916.74	3.38	4.21	0.0025	917.96 917.70	921.71 921.88	3.75	3.28	CB 3 0.015
D67	D68	146+64 146+64	0.17 9.25	0.13 5.09	11.40	4.68	5.30	6.9	7.8	18	63.3	0.0068	915.64 915.21	4.82	8.07	0.0074	916.97 916.50	921.88 921.88	4.91	4.74	CB 3A 0.015
D68	HW68	146+64 final	0.50 9.75	0.37 5.46	43.37	2.22	2.60	12.1	14.2	18	45.5	0.0253	914.40 913.25	9.18	15.57	0.0243	915.80 914.69	921.88 914.75	6.08	5.98	CB 3 0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 11/12/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : Buehler Drive

Designer : TMT

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'		
D167	D168	0.43	0.30	10.00	4.94	5.56	1.5	1.7	12	61.0	0.0051	930.79	3.01	2.37	0.0029	931.44	933.15	1.71	1.36	CB 3
	begin	0.43	0.30									930.48				931.25	932.84			0.015
D168	D181	0.29	0.23	10.34	4.88	5.51	2.6	2.9	15	39.0	0.0036	930.23	3.02	3.61	0.0028	931.17	932.84	1.67	1.36	CB 3
	9+38	0.72	0.53									930.09				931.06	935.02			0.015
D181	HW18	0.05	0.03	10.55	4.84	5.47	2.7	3.1	15	37.0	0.0035	930.09	3.01	3.57	0.0030	931.05	935.02	3.97	3.68	CB 2-2B
	final	0.77	0.56									929.96				930.94	931.21			0.015





# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : River Styx to Village Gate

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MINUS	MANNING'S
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
HW20	D182	7.30	3.29	15.00	4.13	4.73	13.6	15.5	36	41.1	0.0270	940.35	9.54	102.21	0.0007	941.40	943.35	1.95	0.00	HW Half He
	begin	7.30	3.29									939.24				941.37	947.66			0.015
D79	D182	0.90	0.69	10.00	4.94	5.60	3.4	3.9	12	48.0	0.0125	944.35	5.01	3.71	0.0158	945.43	949.35	3.92	4.00	CB 3A
	begin	8.20	3.98									943.75				944.67	947.66			0.015
D182	EX95	0.76	0.34	15.07	4.12	4.64	17.8	20.0	36	360.3	0.0244	939.22	9.93	97.18	0.0012	940.18	947.66	7.48	5.44	CB 2-4
	158+89	8.96	4.32									930.42				932.64	942.41			0.015
D78	EX95	0.65	0.47	10.00	4.94	4.56	2.3	2.1	12	28.4	0.0053	931.08	3.25	2.41	0.0048	931.96	937.16	5.20	5.08	CB 3A
	begin	9.61	4.79									930.93				931.83	942.41			0.015
EX95	DJ76	1.64	1.48	15.68	4.04	4.56	25.3	28.5	42	275.2	0.0092	930.42	7.62	90.12	0.0011	931.83	942.41	10.58	8.49	MH 3
	156+13	11.25	6.26									927.88				930.45	936.15			0.015
D113	D206	0.30	0.21	16.07	3.99	4.55	0.8	1.0	12	83.9	0.0641	962.72	6.47	8.41	0.0010	962.96	967.72	4.76	4.00	CB 2-2B
	begin	11.55	6.47									957.34				958.05	962.47			0.015
D206	D50	0.10	0.07	16.29	3.97	4.54	1.1	1.3	12	23.9	0.0101	957.34	3.63	3.33	0.0017	957.88	962.47	4.59	4.13	CB 2-2B
	166+61	11.65	6.54									957.10				957.84	962.10			0.015
D50	D38	0.65	0.52	16.40	3.95	4.49	3.2	3.6	12	161.9	0.0306	957.10	7.15	5.81	0.0135	957.70	962.10	4.40	4.00	CB 3A
	165+00	12.30	7.06									952.15				953.05	957.15			0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D38	D44	165+00 163+15	0.00 12.30	0.00 7.06	16.77	3.91	4.43	3.1	3.5	12	188.2	0.0297	952.15 946.57	7.03	5.72	0.0132	952.75 947.47	957.15 950.57	4.40	4.00	MH 3 0.015
D44	D173	162+80 160+80	0.77 13.07	0.55 7.62	17.22	3.85	4.37	5.2	5.9	15	231.4	0.0317	946.32 938.98	8.21	10.73	0.0112	947.01 940.10	950.57 943.48	3.56	3.00	CB 3A 0.015
D173	D77	160+80 158+89	0.00 13.07	0.00 7.62	17.69	3.80	4.32	5.1	5.9	15	190.5	0.0273	938.98 933.78	7.75	9.95	0.0109	939.70 934.89	943.48 938.08	3.78	3.25	MH 3 0.015
D75	D77	158+89 begin 158+89	0.77 13.84	0.55 8.17	10.00	4.94	5.62	2.7	3.1	12	10.0	0.0070	933.16 933.09	3.72	2.79	0.0102	934.16 933.97	937.16 938.08	3.00	3.00	CB 3A 0.015
D77	D74	158+89 155+77	0.00 13.84	0.00 8.17	18.10	3.76	4.06	7.2	7.8	18	313.7	0.0127	932.59 928.60	6.28	11.04	0.0072	933.56 930.23	938.08 932.96	4.52	3.99	MH 3 0.015
D74	D73	155+77 155+77	0.42 14.26	0.33 8.50	18.93	3.67	4.06	8.2	9.1	21	63.3	0.0051	928.55 928.23	4.55	10.51	0.0044	930.23 929.95	932.96 932.96	2.73	2.66	CB 3A 0.015
D73	DJ76	155+70 156+13	0.53 14.79	0.37 8.88	19.16	3.64	4.06	9.5	10.6	21	48.5	0.0072	928.23 927.88	5.41	12.55	0.0060	929.95 929.66	932.96 936.15	3.01	2.98	CB 3A 0.015
DJ76	EXOT	156+13 final 14+42	0.00 14.79	0.00 8.88	19.31	3.63	4.06	32.2	36.0	48	436.2	0.0050	927.88 925.70	6.46	94.69	0.0008	929.66 928.59	936.15 926.80	6.49	4.27	MH 3 0.015



# STORM SEWER SYSTEM

PID : 92953 Date : 09/25/2015 Project : MED-18-12.99

Location : Medina, Ohio

Description : From 181+47 Rt to 36" OUTLET

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(10 yrs.)	(25 yrs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
	From To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D16	D90	0.33	0.25	10.00	4.94	5.60	1.2	1.4	12	31.8	0.0098	1004.01	3.67	3.28	0.0020	1004.51	1008.01	3.50	3.00	CB 3A
	begin	0.33	0.25									1003.70				1004.45	1006.22			0.015
D91	D90	0.95	0.80	10.00	4.94	5.61	3.9	4.5	12	35.9	0.0181	1004.35	6.01	4.47	0.0210	1005.40	1008.35	2.95	3.00	CB 3A
	begin	1.28	1.05									1003.70				1004.64	1006.22			0.015
D90	D176	0.03	0.02	10.14	4.91	5.55	5.3	5.9	15	110.5	0.0242	1002.26	7.43	9.38	0.0112	1003.02	1006.22	3.20	2.71	CB 3
		1.31	1.07									999.58				1000.70	1003.83			0.015
D176	D81	0.27	0.11	10.39	4.87	5.43	5.8	6.4	15	300.0	0.0365	999.58	8.88	11.51	0.0131	1000.28	1003.83	3.55	3.00	CB 3A
		1.58	1.18									988.63				989.88	993.63			0.015
D81	D88	0.44	0.37	10.96	4.76	5.43	7.4	8.4	15	5.3	0.0151	988.63	6.02	7.40	0.0226	989.88	993.63	3.75	3.75	CB 3A
		2.02	1.55									988.55				989.74	994.35			0.015
D82	D13	0.97	0.78	10.00	4.94	5.61	3.8	4.4	15	27.3	0.0099	985.79	4.89	5.99	0.0060	986.73	991.04	4.31	4.00	CB 3A
	begin	2.99	2.33									985.52				986.57	990.14			0.015
D13	D14	0.08	0.06	10.09	4.92	5.56	4.1	4.6	15	67.2	0.0095	985.52	4.89	5.88	0.0068	986.40	990.14	3.74	3.37	CB 3A
		3.07	2.38									984.88				985.94	993.21			0.015
D14	D15	0.02	0.01	10.32	4.88	5.54	4.1	4.7	15	27.7	0.0072	984.88	4.37	5.12	0.0070	985.94	993.21	7.27	7.08	CB 3
		3.09	2.40									984.68				985.74	993.60			0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D15	D88	22+12 22+12	0.45 3.54	0.37 2.77	10.43	4.86	5.42	5.9	6.6	21	71.7	0.0025	984.18 984.00	3.22	7.40	0.0023	985.55 985.38	993.60 994.35	8.05	7.67	CB 3A 0.015
D88	D88A	176+12 175+96	0.00 3.54	0.00 2.77	10.97	4.76	5.42	13.2	15.0	24	16.0	0.0100	983.75 983.59	6.69	21.09	0.0059	985.38 985.29	994.35 993.81	8.97	8.60	MH 3 0.015
D88A	D88C	175+96 174+85	0.00 3.54	0.00 2.77	11.01	4.75	5.37	13.2	14.9	24	111.1	0.0100	983.59 982.48	6.68	21.09	0.0057	984.89 984.17	993.81 990.02	8.92	8.22	MH 3 0.015
D88C	D174	174+85 174+18	0.00 3.54	0.00 2.77	11.29	4.70	5.34	13.0	14.8	24	66.9	0.0184	976.41 975.18	8.42	28.59	0.0057	977.48 976.87	990.02 987.98	12.54	11.61	MH 3 0.015
D174	DJ85	174+18 171+37	0.00 3.54	0.00 2.77	11.42	4.68	5.23	13.0	14.5	36	292.1	0.0185	966.69 961.29	8.21	84.54	0.0006	967.56 963.40	987.98 970.40	20.42	18.29	MH 3 0.015
D5	D193	921+71 begin 170+77	0.45 3.99	0.36 3.13	15.50	4.06	4.61	1.5	1.7	12	83.6	0.0071	968.17 967.58	3.41	2.79	0.0030	968.75 968.35	973.17 976.86	4.42	4.00	CB 3A 0.015
D2	D3	920+91 begin 921+19	0.17 4.16	0.13 3.26	10.00	4.94	5.56	0.6	0.7	12	59.3	0.0099	969.77 969.18	3.07	3.31	0.0005	970.10 969.86	975.77 975.34	5.67	5.00	CB 3A 0.015
D3	D193	921+49 171+77	0.14 4.30	0.10 3.36	10.32	4.88	5.53	1.1	1.3	12	34.8	0.0072	969.18 968.93	3.20	2.81	0.0017	969.73 969.67	975.34 976.86	5.61	5.16	CB 3 0.015
D193	DJ85	170+77 171+37	0.00 4.30	0.00 3.36	15.91	4.01	4.57	2.4	2.7	12	61.1	0.0100	966.75 966.14	4.34	3.32	0.0077	967.48 966.99	976.86 977.90	9.38	9.11	MH 3 0.015
DJ85	DJ83	171+37 170+74	0.74 5.04	0.61 3.97	16.14	3.98	4.49	15.8	17.8	36	118.0	0.0468	961.29 955.77	12.12	134.47	0.0009	962.06 958.05	970.90 975.93	8.84	6.61	CB 3A 0.015
C04	D80	174+41 begin 174+41	15.75 20.79	9.45 13.42	15.00	4.13	4.72	39.0	44.6	36	36.4	0.0052	975.13 974.94	6.71	44.91	0.0060	978.13 977.53	978.13 988.36	0.00	0.00	HW Half He 0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D89	D80	176+75	0.73	0.55	10.00	4.94	5.52	2.7	3.0	12	234.0	0.0332	990.77	7.09	6.05	0.0096	991.29	995.77	4.48	4.00	CB 3A
	begin	174+41	21.52	13.97									983.00				983.87	988.36			0.015
D80	D84	174+41	0.00	0.00	15.09	4.12	4.66	41.2	46.6	36	224.9	0.0100	974.94	8.88	62.19	0.0065	976.98	988.36	11.38	10.42	MH 3
		172+15	21.52	13.97									972.69				975.30	980.13			0.015
D84	D4	172+15	0.85	0.72	15.51	4.06	4.64	43.5	49.8	36	89.0	0.0212	972.69	12.02	90.64	0.0074	974.35	980.13	5.78	4.44	CB 3A
		171+26	22.37	14.69									970.80				973.45	977.26			0.015
EX	D4	171+75	1.47	0.66	15.00	4.13	4.70	2.7	3.1	12	70.7	0.0100	975.43	4.44	3.33	0.0101	976.31	983.42	7.11	6.99	CB 6
	begin	171+26	23.84	15.35									974.72				975.60	977.26			0.015
D4	DJ83	171+26	0.00	0.00	15.64	4.05	4.64	46.1	52.8	36	48.3	0.0414	969.00	15.64	126.54	0.0083	970.41	977.26	6.85	5.26	MH 3
		170+74	23.84	15.35									967.00				969.68	975.93			0.015
D166	D165	924+08	0.22	0.18	10.00	4.94	5.60	0.9	1.0	12	37.7	0.0156	969.09	3.96	4.15	0.0010	969.43	974.09	4.66	4.00	CB 3
	begin	923+58	24.06	15.53									968.50				969.21	974.45			0.015
D164	D165	923+58	0.21	0.17	10.00	4.94	5.61	0.8	0.9	12	28.4	0.0169	968.98	4.01	4.32	0.0009	969.31	973.98	4.67	4.00	CB 3
	begin	923+58	24.27	15.69									968.50				969.20	974.45			0.015
D165	DJ83	923+58	0.00	0.00	10.16	4.91	5.53	1.7	1.9	12	71.7	0.0070	968.50	3.50	2.77	0.0038	969.14	974.45	5.31	4.95	MH 3
		170+74	24.27	15.69									968.00				968.79	975.93			0.015
DJ83	EXOT	170+74	0.00	0.00	16.31	3.96	4.49	62.2	70.4	36	353.3	0.0173	955.77	12.00	81.77	0.0148	958.05	975.93	17.88	17.16	MH 3
	final	167+35	24.27	15.69									949.66				952.49	952.66			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : From 187+00 to North Frontage outlet

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(10 yrs.)	(25 yrs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
	From To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D97	D103	0.83	0.66	10.00	4.94	5.59	3.2	3.7	12	43.4	0.0097	1025.82	4.13	3.27	0.0141	1026.92	1029.08	2.16	2.26	CB 3A
	begin	0.83	0.66									1025.40				1026.31	1028.19			0.015
D103	D96	0.00	0.00	10.18	4.91	5.56	3.2	3.6	12	78.4	0.0316	1025.40	7.28	5.91	0.0139	1025.99	1028.19	2.20	1.79	MH 3
	186+64	0.83	0.66									1022.92				1023.83	1027.92			0.015
	186+67																			
D96	D94	0.66	0.51	10.35	4.87	5.36	5.7	6.2	15	231.9	0.0285	1022.67	8.04	10.16	0.0124	1023.41	1027.92	4.51	4.00	CB 3A
	184+35	1.49	1.16									1016.07				1018.19	1021.32			0.015
D94	D197	1.44	0.82	10.84	4.78	5.36	9.5	10.6	15	285.1	0.0330	1016.07	9.41	10.94	0.0361	1018.19	1021.32	3.13	4.00	CB 3A
	181+50	2.93	1.99									1006.67				1007.89	1011.92			0.015
D197	D93	0.59	0.43	11.34	4.69	5.32	11.3	12.9	18	105.0	0.0245	1006.42	8.95	15.32	0.0199	1007.54	1011.92	4.38	4.00	CB 3A
	180+45	3.52	2.42									1003.85				1005.27	1008.35			0.015
D93	D92	0.17	0.12	11.54	4.66	5.31	11.8	13.5	18	35.4	0.0537	1003.85	12.29	22.70	0.0220	1004.72	1008.35	3.63	3.00	CB 3A
	180+18	3.69	2.54									1001.95				1003.38	1007.09			0.015
D17	D92	0.31	0.26	10.00	4.94	5.62	1.3	1.5	12	31.8	0.1068	1005.85	8.82	10.86	0.0023	1006.11	1009.85	3.74	3.00	CB 3A
	begin	4.00	2.81									1002.45				1003.21	1007.09			0.015
D92	D195	0.04	0.03	11.58	4.65	5.25	13.2	14.9	21	152.4	0.0163	1001.70	8.00	18.85	0.0118	1002.94	1007.09	4.15	3.64	CB 3
	41+69	4.04	2.84									999.22				1000.81	1004.74			0.015



# STORM SEWER SYSTEM

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From To	Σ AREA (acres)	Σ CA	TIME (min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM. (in.)	LENGTH (ft.)	SLOPE (ft./ft.)	IN / OUT (ft.)	VEL (fps.)	CAPACITY (cfs.)	SLOPE (ft./ft.)	IN / OUT (ft.)	IN / OUT (ft.)	MINUS HY GR	MINUS CROWN	MANNING'S 'n'
D107	D106	40+69	0.09	0.07	10.00	4.94	5.60	0.4	0.4	12	27.3	0.0154	996.65	3.05	4.12	0.0002	996.87	1000.65	3.78	3.00	CB 3A
	begin	40+67	4.13	2.91									996.23				996.86	1000.65			0.015
D106	D108	40+69	0.10	0.07	10.15	4.91	5.51	0.7	0.8	12	73.6	0.0080	996.23	2.95	2.97	0.0007	996.60	1000.65	4.05	3.42	CB 3A
		41+40	4.23	2.98									995.64				996.33	1001.52			0.015
D108	D110	41+40	0.02	0.01	10.56	4.83	5.21	0.8	0.8	12	35.3	0.0074	995.64	2.92	2.85	0.0007	996.31	1001.52	5.21	4.88	CB 3
		41+69	4.25	3.00									995.38				996.28	1004.02			0.015
D110	D195	41+69	0.21	0.17	10.77	4.80	5.21	1.6	1.7	12	34.6	0.0075	995.38	3.56	2.88	0.0032	996.28	1004.02	7.74	7.64	CB 3A
		41+69	4.46	3.17									995.12				996.17	1004.74			0.015
D195	D195	41+69	0.00	0.00	11.90	4.60	5.21	14.6	16.5	24	122.3	0.0240	995.12	9.55	32.65	0.0071	996.17	1004.74	8.57	7.62	MH 3
		40+46	4.46	3.17									992.19				993.92	996.19			0.015
D195	HW19	40+46	0.00	0.00	12.11	4.56	5.21	14.5	16.5	24	9.5	0.0137	985.92	7.72	24.66	0.0071	987.59	996.19	8.60	8.27	MH 3
	final	40+39	4.46	3.17									985.79				987.52	987.79			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description :D-109

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D109	HW10	41+56	1.87	1.23	15.00	4.13	4.70	5.1	5.8	15	62.4	0.0075	997.98	4.49	5.23	0.0107	999.29	1001.73	2.44	2.50	CB 2-2B
	begin	41+00	1.87	1.23									997.51				998.62	998.25			0.015





# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : East end near Nettleton to outlet at Culvert 5 (D151)

Designer : TMT

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE				PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
EX99	D192	8.00	4.00	15.00	4.13	4.68	16.5	18.7	18	225.9	0.0299	1049.67	10.09	16.93	0.0423	1053.95	1056.00	2.05	4.83	CB 2-2B		
	begin	8.00	4.00									1042.92				1044.40	1048.84				0.015	
D104	D192	0.60	0.53	10.00	4.94	5.63	2.6	3.0	12	9.0	0.1239	1044.45	11.40	11.69	0.0093	1044.81	1048.76	3.95	3.31	CB 3A		
	begin	8.60	4.53									1043.34				1044.21	1048.84				0.015	
D192	D191	0.40	0.36	15.37	4.08	4.64	19.9	22.7	24	213.6	0.0308	1042.90	11.36	36.99	0.0133	1044.08	1048.84	4.76	3.94	CB 2-2B		
		9.00	4.89									1036.33				1038.18	1042.12				0.015	
D191	D190	0.00	0.00	15.69	4.04	4.59	19.7	22.4	24	135.6	0.0320	1036.33	11.50	37.73	0.0131	1037.49	1042.12	4.63	3.79	CB 2-2B		
		9.00	4.89									1031.99				1034.78	1036.99				0.015	
D98	D190	0.46	0.38	10.00	4.94	4.59	1.9	1.8	12	12.2	0.0821	1033.99	8.96	9.52	0.0032	1034.81	1038.99	4.18	4.00	CB 3A		
	begin	9.46	5.27									1032.99				1034.78	1036.99				0.015	
D190	D151	7.17	3.59	15.88	4.02	4.59	35.6	40.6	24	133.6	0.0368	1031.99	13.63	40.47	0.0429	1034.78	1036.99	2.21	3.00	CB 2-2B		
	final	16.63	8.85									1027.07				1029.05	1034.02				0.015	



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : East end near Nettleton to outlet at 189+39

Designer : TMT

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE				PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
	From To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
DJ50	D100	1.88	1.14	10.00	4.94	5.55	5.7	6.4	18	188.4	0.0333	1050.79	8.51	17.88	0.0049	1051.43	1056.18	4.75	3.89	MH 3		
	begin	1.88	1.14									1044.51				1045.75	1050.01				0.015	
D100	D99	0.81	0.69	10.37	4.87	5.49	8.9	10.1	18	160.7	0.0281	1044.51	8.98	16.41	0.0122	1045.40	1050.01	4.61	4.00	CB 3A		
	192+89	2.69	1.83									1040.00				1041.36	1045.50				0.015	
D99	D203	0.26	0.22	10.67	4.81	5.46	9.9	11.2	18	83.5	0.0299	1036.04	9.41	16.94	0.0152	1036.98	1045.50	8.52	7.96	CB 3A		
	192+08	2.95	2.05									1033.54				1034.93	1043.57				0.015	
D203	D205	0.00	0.00	10.82	4.79	5.38	9.8	11.1	18	247.9	0.0530	1033.54	11.66	22.55	0.0147	1034.31	1043.57	9.26	8.53	MH 3		
	189+60	2.95	2.05									1020.40				1021.90	1032.80				0.015	
D205	P205	0.00	0.00	11.17	4.72	5.38	9.7	11.1	18	10.0	0.0100	1020.40	5.49	9.79	0.0147	1021.90	1032.80	10.90	10.90	MH 3		
	189+56	2.95	2.05									1020.30				1021.69	1021.80				0.015	
P205	P205	0.00	0.00	11.20	4.72	5.37	9.7	11.0	18	38.1	0.3903	1020.30	24.06	61.18	0.0147	1020.75	1021.80	1.05	0.00	MH 3		
	189+43	2.95	2.05									1005.43				1006.93	1006.93				0.015	
P205	HW20	0.00	0.00	11.23	4.71	5.37	9.7	11.0	18	10.0	0.0100	1005.43	5.81	9.79	0.0147	1006.93	1006.93	0.00	0.00	MH 3		
	final	2.95	2.05									1005.33				1006.72	1006.83				0.015	



# STORM SEWER SYSTEM

PID : 92953      Date : 09/25/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : Foote rd 23+72

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)		DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
D129	D128	0.27	0.23	10.00	4.94	5.60	1.1	1.3	12	39.9	0.0153	980.36	4.23	4.11	0.0017	980.76	983.08	2.32	1.72	CB 3A
	begin	0.27	0.23									979.75				980.49	983.16			0.015
D128	EX5	0.38	0.27	10.16	4.91	5.59	2.4	2.8	12	9.4	0.0467	979.72	7.85	7.18	0.0080	980.21	983.16	2.95	2.44	CB 3A
	final	0.65	0.50									979.28				980.14	983.94			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 11/05/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : River Styx sump system north to 911+17

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
D147	D148	0.44	0.26	10.00	4.94	5.58	1.3	1.5	12	52.0	0.0100	968.05	3.76	3.32	0.0023	968.54	970.93	2.39	1.88	CB 3A
	begin	0.44	0.26									967.53				968.29	971.00			0.015
D148	D145	0.44	0.26	10.23	4.90	5.50	2.6	2.9	12	192.4	0.0589	967.53	8.66	8.06	0.0088	967.96	971.00	3.04	2.47	CB 3A
	915+38	0.88	0.53									956.19				957.06	960.23			0.015
D144	D145	0.73	0.42	10.00	4.94	5.61	2.1	2.3	12	52.1	0.0400	958.27	7.07	6.64	0.0057	958.70	960.27	1.57	1.00	CB 3A
	begin	1.61	0.94									956.19				957.02	960.23			0.015
D145	D142	0.31	0.20	10.60	4.83	5.46	5.5	6.3	12	124.5	0.0513	956.19	9.87	7.52	0.0410	956.93	960.23	3.30	3.04	CB 3A
	914+12	1.92	1.15									949.81				950.79	953.15			0.015
D141	D142	0.31	0.19	10.00	4.94	5.58	0.9	1.0	12	52.0	0.0092	950.29	3.34	3.19	0.0011	950.70	953.48	2.78	2.19	CB 3A
	begin	2.23	1.33									949.81				950.52	953.15			0.015
D142	DJ196	0.10	0.08	10.81	4.79	5.41	6.8	7.6	15	169.4	0.0451	949.56	10.00	12.79	0.0186	950.29	953.15	2.86	2.34	CB 3A
	914+08	2.33	1.41									941.92				943.09	946.53			0.015
DJ196	HW19	0.00	0.00	11.09	4.74	5.35	6.7	7.6	15	135.1	0.0323	941.73	8.78	10.82	0.0183	942.54	946.53	3.99	3.55	MH 3
	final	2.33	1.41									937.37				938.54	938.62			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 11/05/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : River Styx south to sump 911+00

Designer : AJE

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
	From To	(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
D130	D132	0.12	0.10	10.00	4.94	5.53	0.5	0.6	12	89.7	0.0130	939.89	3.15	3.79	0.0003	940.16	944.89	4.73	4.00	CB 3A
	begin	0.12	0.10									938.72				939.37	943.72			0.015
D132	D136	0.06	0.05	10.47	4.85	5.45	0.7	0.8	12	77.0	0.0090	938.72	3.08	3.14	0.0007	939.08	943.72	4.64	4.00	CB 3A
	910+99	0.18	0.15									938.03				938.72	943.36			0.015
D131	D134	0.87	0.46	10.00	4.94	5.55	2.3	2.6	12	103.2	0.0097	939.78	4.25	3.27	0.0068	940.48	944.78	4.30	4.00	CB 3A
	begin	1.05	0.61									938.78				939.62	943.78			0.015
D134	D135	0.38	0.21	10.40	4.86	5.46	3.3	3.7	15	55.9	0.0068	938.53	4.08	4.96	0.0043	939.43	943.78	4.35	4.00	CB 3A
	910+99	1.43	0.82									938.15				939.19	943.40			0.015
D138	D135	0.30	0.23	10.00	4.94	5.46	1.1	1.2	12	27.5	0.0073	938.60	3.21	2.83	0.0016	939.23	943.60	4.37	4.00	CB 3A
	begin	1.73	1.05									938.40				939.19	943.40			0.015
D135	D136	0.11	0.08	10.63	4.82	5.46	4.7	5.3	15	51.3	0.0101	938.15	5.15	6.07	0.0091	939.19	943.40	4.21	4.00	CB 3A
	910+99	1.84	1.13									937.63				938.72	943.36			0.015
D136	HW13	0.09	0.08	10.89	4.77	5.44	5.8	6.6	15	13.2	0.0197	937.63	7.00	8.45	0.0137	938.69	943.36	4.67	4.48	CB 3
	final	1.94	1.21									937.37				938.51	938.62			0.015



# STORM SEWER SYSTEM

**PID :** 92953      **Date :** 11/05/2015      **Project :** MED-18-12.99

**Location :** Medina, Ohio

**Description :** River Styx: Sta. 904+15 to 903+36 left

**Designer :** SWS

**Rainfall Area:** A

**Just Full Capacity Frequency (yrs.) :** 10

**Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 12.00

**Tailwater Elevation (ft.):** 0.00

JUNCTION		STATION	ΔAREA	ΔCA	BEGIN	RAINFALL		DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE
From	To	From	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S
		To	(acres)		(min.)	(10 yrs.)	(25 yrs.)	(10 yrs.)	(25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'
D161	DJ163	904+15	0.27	0.22	10.00	4.94	5.63	1.1	1.3	15	7.7	0.0194	931.65	4.51	8.40	0.0005	932.35	934.66	2.31	1.76	CB 3A
	begin	904+10	0.27	0.22									931.50				932.35	934.66			0.015
DJ163	EX16	904+10	0.00	0.00	10.03	4.94	5.58	1.1	1.3	15	73.5	0.0384	931.50	5.74	11.80	0.0005	931.79	934.66	2.87	1.91	MH 3
	final	903+36	0.27	0.22									928.68				929.53	933.68			0.015



# STORM SEWER SYSTEM

PID : 92953      Date : 11/05/2015      Project : MED-18-12.99

Location : Medina, Ohio

Description : River Styx: Sta. 904+15 to 903+36 right

Designer : SWS

Rainfall Area: A

Just Full Capacity Frequency (yrs.) : 10

Hydraulic Gradient Frequency (yrs.) : 25

Minimum Pipe Size : 12.00

Tailwater Elevation (ft.): 0.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE		PIPE			F/L PIPE	MEAN	JUST FULL	FRICT	HYGR EL.	COVER	COVER	COVER	INLET TYPE	
From	To	Σ AREA	Σ CA	TIME	INTENSITY	(cfs.)	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	IN / OUT	MINUS	MINUS	MANNING'S	
		(acres)		(min.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(10 yrs.) (25 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	HY GR	CROWN	'n'	
D7	D8	1.42	0.75	10.00	4.94	5.62	3.7	4.2	12	24.9	0.0245	930.69	6.80	5.20	0.0187	931.48	934.69	3.21	3.00	CB 3A
	begin	1.42	0.75									930.08				931.01	934.65			0.015
D8	EX9	0.00	0.00	10.06	4.93	5.61	3.7	4.2	12	12.0	0.0241	930.08	6.74	5.16	0.0187	930.95	934.65	3.70	3.57	MH 3
		1.42	0.75									929.79				930.72	933.89			0.015
EX9	D160	0.07	0.04	10.09	4.93	5.61	3.9	4.4	15	5.6	0.0249	929.54	6.97	9.51	0.0062	930.49	933.89	3.40	3.10	CB 3A
		1.49	0.79									929.40				930.45	933.95			0.015
D160	EXMH	0.13	0.07	10.10	4.92	5.59	4.2	4.8	15	34.0	0.0135	929.40	5.65	7.01	0.0073	930.26	933.95	3.69	3.30	CB 3
	final	1.62	0.86									928.94				930.01	933.98			0.015

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## APPENDIX F – CULVERT ANALYSIS

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Fri Dec 4, 2015 10:41:14 PM GMT-5  
 Study Area: Ohio  
 NAD 1983 Latitude: 41.1388 (41 08 20)  
 NAD 1983 Longitude: -81.8359 (-81 50 10)  
 Drainage Area: 1.04 mi<sup>2</sup>

### Culvert #1

Peak Flows Basin Characteristics			
100% Peak Flow Full Model (1.04 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	1.04	0.01	7422
Ohio Region C Indicator 1 if in C else 0 (dimensionless)	0	0	1
Ohio Region A Indicator 1 if in A else 0 (dimensionless)	1	0	1
Stream Slope 10 and 85 Longest Flow Path (feet per mi)	36.5	1.53	674
Percent Storage from NLCD1992 (percent)	0.96	0	25.8

Peak Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	104	ft <sup>3</sup> /s	37	2.1	51.6	208
PK5	181	ft <sup>3</sup> /s	35	3.3	93.1	350
PK10	236	ft <sup>3</sup> /s	34	4.4	122	459
PK25	309	ft <sup>3</sup> /s	35	5.9	155	614
PK50	363	ft <sup>3</sup> /s	37	6.8	178	740
PK100	418	ft <sup>3</sup> /s	38	7.5	199	878
PK500	547	ft <sup>3</sup> /s	42	8.6	240	1250

<http://pubs.usgs.gov/sir/2006/5312/> (<http://pubs.usgs.gov/sir/2006/5312/>)

Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006. A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312, 62 p.

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 Page Last Modified: 11/24/2015 14:32:58 (Web1)

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Fri Dec 4, 2015 10:44:45 PM GMT-5  
 Study Area: Ohio  
 NAD 1983 Latitude: 41.1384 (41 08 18)  
 NAD 1983 Longitude: -81.8324 (-81 49 57)  
 Drainage Area: 0.0856 mi<sup>2</sup>

### Culvert #2

Peak Flows Basin Characteristics			
100% Peak Flow Full Model (0.0856 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.0856	0.01	7422
Ohio Region C Indicator 1 if in C else 0 (dimensionless)	0	0	1
Ohio Region A Indicator 1 if in A else 0 (dimensionless)	1	0	1
Stream Slope 10 and 85 Longest Flow Path (feet per mi)	100	1.53	674
Percent Storage from NLCD1992 (percent)	0	0	25.8

Peak Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	19.3	ft <sup>3</sup> /s	37	2.1	9.04	41
PK5	37.2	ft <sup>3</sup> /s	35	3.3	18.1	76.4
PK10	50.8	ft <sup>3</sup> /s	34	4.4	24.6	105
PK25	69.1	ft <sup>3</sup> /s	35	5.9	32.5	147
PK50	83	ft <sup>3</sup> /s	37	6.8	37.9	182
PK100	97.2	ft <sup>3</sup> /s	38	7.5	42.9	220
PK500	132	ft <sup>3</sup> /s	42	8.6	53.2	327

<http://pubs.usgs.gov/sir/2006/5312/> (<http://pubs.usgs.gov/sir/2006/5312/>)

Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006. A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312, 62 p.

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Fri Dec 4, 2015 10:49:21 PM GMT-5  
 Study Area: Ohio  
 NAD 1983 Latitude: 41.1377 (41 08 16)  
 NAD 1983 Longitude: -81.8272 (-81 49 38)  
 Drainage Area: 0.2 mi<sup>2</sup>

### Culvert #3

Peak Flows Basin Characteristics			
100% Peak Flow Full Model (0.2 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.2	0.01	7422
Ohio Region C Indicator 1 if in C else 0 (dimensionless)	0	0	1
Ohio Region A Indicator 1 if in A else 0 (dimensionless)	1	0	1
Stream Slope 10 and 85 Longest Flow Path (feet per mi)	123	1.53	674
Percent Storage from NLCD1992 (percent)	1.83	0	25.8

Peak Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	31.5	ft <sup>3</sup> /s	37	2.1	14.7	67.5
PK5	57.8	ft <sup>3</sup> /s	35	3.3	28	120
PK10	77.5	ft <sup>3</sup> /s	34	4.4	37.2	161
PK25	103	ft <sup>3</sup> /s	35	5.9	48.3	221
PK50	123	ft <sup>3</sup> /s	37	6.8	55.7	271
PK100	143	ft <sup>3</sup> /s	38	7.5	62.4	326
PK500	190	ft <sup>3</sup> /s	42	8.6	76	476

<http://pubs.usgs.gov/sir/2006/5312/> (<http://pubs.usgs.gov/sir/2006/5312/>)

Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006. A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312, 62 p.

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Fri Dec 4, 2015 11:10:36 PM GMT-5  
 Study Area: Ohio  
 NAD 1983 Latitude: 41.1365 (41 08 12)  
 NAD 1983 Longitude: -81.8101 (-81 48 37)  
 Drainage Area: 0.0208 mi<sup>2</sup>

### Culvert #4

Peak Flows Basin Characteristics			
100% Peak Flow Full Model (0.0208 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.0208	0.01	7422
Ohio Region C Indicator 1 if in C else 0 (dimensionless)	0	0	1
Ohio Region A Indicator 1 if in A else 0 (dimensionless)	1	0	1
Stream Slope 10 and 85 Longest Flow Path (feet per mi)	201	1.53	674
Percent Storage from NLCD1992 (percent)	0	0	25.8

Peak Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	7.03	ft <sup>3</sup> /s	37	2.1	3.15	15.7
PK5	14.2	ft <sup>3</sup> /s	35	3.3	6.6	30.5
PK10	19.8	ft <sup>3</sup> /s	34	4.4	9.13	42.9
PK25	27.4	ft <sup>3</sup> /s	35	5.9	12.3	61.3
PK50	33.2	ft <sup>3</sup> /s	37	6.8	14.4	76.8
PK100	39.2	ft <sup>3</sup> /s	38	7.5	16.3	94
PK500	53.9	ft <sup>3</sup> /s	42	8.6	20.4	143

<http://pubs.usgs.gov/sir/2006/5312/> (<http://pubs.usgs.gov/sir/2006/5312/>)

Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006. A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312, 62 p.

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Fri Dec 4, 2015 10:18:34 PM GMT-5  
 Study Area: Ohio  
 NAD 1983 Latitude: 41.1358 (41 08 09)  
 NAD 1983 Longitude: -81.8047 (-81 48 17)  
 Drainage Area: 0.0363 mi<sup>2</sup>

### Culvert #5

Peak Flows Basin Characteristics			
100% Peak Flow Full Model (0.0363 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.0363	0.01	7422
Ohio Region C Indicator 1 if in C else 0 (dimensionless)	0	0	1
Ohio Region A Indicator 1 if in A else 0 (dimensionless)	1	0	1
Stream Slope 10 and 85 Longest Flow Path (feet per mi)	169	1.53	674
Percent Storage from NLCD1992 (percent)	3.83	0	25.8

Peak Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	7.89	ft <sup>3</sup> /s	37	2.1	3.52	17.7
PK5	14.6	ft <sup>3</sup> /s	35	3.3	6.77	31.7
PK10	19.6	ft <sup>3</sup> /s	34	4.4	9.01	42.8
PK25	26.2	ft <sup>3</sup> /s	35	5.9	11.7	59
PK50	31.1	ft <sup>3</sup> /s	37	6.8	13.4	72.3
PK100	36	ft <sup>3</sup> /s	38	7.5	14.9	87
PK500	47.9	ft <sup>3</sup> /s	42	8.6	18	128

<http://pubs.usgs.gov/sir/2006/5312/> (<http://pubs.usgs.gov/sir/2006/5312/>)

Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006. A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312, 62 p.

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# StreamStats Version 3.0

## Flow Statistics Ungaged Site Report

Date: Fri Dec 4, 2015 10:56:28 PM GMT-5  
 Study Area: Ohio  
 NAD 1983 Latitude: 41.1335 (41 08 01)  
 NAD 1983 Longitude: -81.8125 (-81 48 45)  
 Drainage Area: 0.2 mi<sup>2</sup>

## Culvert #6

Peak Flows Basin Characteristics			
100% Peak Flow Full Model (0.2 mi <sup>2</sup> )			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	0.2	0.01	7422
Ohio Region C Indicator 1 if in C else 0 (dimensionless)	0	0	1
Ohio Region A Indicator 1 if in A else 0 (dimensionless)	1	0	1
Stream Slope 10 and 85 Longest Flow Path (feet per mi)	180	1.53	674
Percent Storage from NLCD1992 (percent)	3.34	0	25.8

Peak Flows Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	30.5	ft <sup>3</sup> /s	37	2.1	14	66.7
PK5	55.9	ft <sup>3</sup> /s	35	3.3	26.5	118
PK10	74.8	ft <sup>3</sup> /s	34	4.4	35.2	159
PK25	99.8	ft <sup>3</sup> /s	35	5.9	45.6	218
PK50	118	ft <sup>3</sup> /s	37	6.8	52.4	267
PK100	137	ft <sup>3</sup> /s	38	7.5	58.6	322
PK500	183	ft <sup>3</sup> /s	42	8.6	71	471

<http://pubs.usgs.gov/sir/2006/5312/> (<http://pubs.usgs.gov/sir/2006/5312/>)

Koltun, G.F., Kula, S.P., and Puskas, B.M., 2006. A Streamflow Statistics (StreamStats) Web Application for Ohio: U.S. Geological Survey Scientific Investigations Report 2006-5312, 62 p.

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# CULVERT ANALYSIS

**PID :** 92953

**Date :** 10/14/2015

**Project :** MED-18-12.99

**Location :** Sta. 102+57.34

**Description :** Culvert #1 - Ex. 8' x 10' Concrete Box Culvert

**Designer :** GPD Group

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 966.30

**Outlet Invert Elevation (ft.) :** 965.10

**Pipe Quantity :** 1

**Culvert Type :** Box

**Pipe Length (ft.) :** 103.10

**Culvert Slope (ft./ft.) :** 0.0116

**Corrugation Type :**

**Pipe Size :** 10 x 8 ft.

**Design Manning 'n' :** (default)

**Entrance Type :** 0 degree (Extension of sides)

**Loss Coef. Ke :** 0.5000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
309.00	0.40	971.05	971.03	1 - C	16.44	1.88	3.09	0.0120	INLET	0.00	970.65
418.00	1.36	972.36	971.70	1 - C	18.11	2.31	3.79	0.0120	INLET	0.00	971.00



# CULVERT ANALYSIS

**PID :** 92953

**Date :** 10/14/2015

**Project :** MED-18-12.99

**Location :** Sta. 102+57.34

**Description :** Culvert #1 - Prop. 8' x 10' Concrete Box Culvert Extended

**Designer :** GPD Group

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 966.30

**Outlet Invert Elevation (ft.) :** 965.00

**Pipe Quantity :** 1

**Culvert Type :** Box

**Pipe Length (ft.) :** 113.10

**Culvert Slope (ft./ft.) :** 0.0115

**Corrugation Type :**

**Pipe Size :** 10 x 8 ft.

**Design Manning 'n' :** (default)

**Entrance Type :** 30 - 75 degrees Wingwalls

**Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
309.00	0.49	971.04	970.87	1 - C	16.37	1.89	3.09	0.0120	INLET	0.00	970.55
418.00	1.19	972.09	971.48	1 - C	18.04	2.32	3.79	0.0120	INLET	0.00	970.90





# CULVERT ANALYSIS

**PID :** 92953      **Date :** 05/12/2015      **Project :** MED-18-12.99      **Location :** Sta. 111+61.52  
**Description :** Culvert #2 - Ex. 36" Concrete Culvert      **Designer :** GPD Group

**HEADWATER CONTROL CODES:** INLET - Inlet Control.  
 OUTLET - Outlet Control.  
 OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.  
 OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.  
 N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1      **Use HW :** 0      **Inlet Invert Elevation (ft.) :** 980.60      **Outlet Invert Elevation (ft.) :** 978.80  
**Pipe Quantity :** 1  
**Culvert Type :** Circular Smooth      **Pipe Length (ft.) :** 103.13      **Culvert Slope (ft./ft.) :** 0.0175  
**Corrugation Type :**  
**Pipe Size :** 36 in.  
**Design Manning 'n' :** (default)  
**Entrance Type :** No Headwall      **Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
69.00	4.06	985.68	984.33	2 - E	14.71	1.89	2.64	0.0120	INLET	0.00	981.62
97.00	6.93	988.67	987.10	2 - E	15.38	2.51	2.88	0.0120	INLET	0.00	981.74



# CULVERT ANALYSIS

**PID :** 92953

**Date :** 05/12/2015

**Project :** MED-18-12.99

**Location :** Sta. 111+61.52

**Description :** Culvert #2 - Prop. 48" Concrete Culvert - Design Storm

**Designer :** GPD Group

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 979.07

**Outlet Invert Elevation (ft.) :** 978.50

**Pipe Quantity :** 1

**Culvert Type :** Circular Smooth

**Pipe Length (ft.) :** 30.10

**Culvert Slope (ft./ft.) :** 0.0189

**Corrugation Type :**

**Pipe Size :** 48 in.

**Design Manning 'n' :** 0.0150

**Entrance Type :** Full Headwall

**Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
76.00	1.14	982.96	N/A	1 - C	13.22	1.87	2.64	0.0150	INLET	0.00	981.32



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 2

Use HW : 1

Inlet Invert Elevation (ft.) : 980.38

Outlet Invert Elevation (ft.) : 979.07

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 75.14

Culvert Slope (ft./ft.) : 0.0174

Corrugation Type :

Pipe Size : 48 in.

Design Manning 'n' : 0.0150

Entrance Type : Full Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
73.00	1.21	984.17	983.84	1 - C	12.70	1.87	2.58	0.0150	INLET	0.00	982.96



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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**Pipe Number : 3**

**Use HW : 2**

**Inlet Invert Elevation (ft.) : 981.00**

**Outlet Invert Elevation (ft.) : 980.38**

**Pipe Quantity : 1**

**Culvert Type : Circular Smooth**

**Pipe Length (ft.) : 40.76**

**Culvert Slope (ft./ft.) : 0.0152**

**Corrugation Type :**

**Pipe Size : 48 in.**

**Design Manning 'n' : 0.0150**

**Entrance Type : Half Headwall**

**Loss Coef. Ke : 0.2000**

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
69.00	0.69	984.68	984.85	1 - B	5.61	1.88	2.51	0.0150	OUTLET	0.00	984.17



# CULVERT ANALYSIS

**PID :** 92953

**Date :** 05/12/2015

**Project :** MED-18-12.99

**Location :** Sta. 111+61.52

**Description :** Culvert #2 - Prop. 48" Concrete Culvert - Check Storm

**Designer :** GPD Group

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 979.07

**Outlet Invert Elevation (ft.) :** 978.50

**Pipe Quantity :** 1

**Culvert Type :** Circular Smooth

**Pipe Length (ft.) :** 30.10

**Culvert Slope (ft./ft.) :** 0.0189

**Corrugation Type :**

**Pipe Size :** 48 in.

**Design Manning 'n' :** 0.0150

**Entrance Type :** Full Headwall

**Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
105.00	1.95	984.00	983.57	2 - E	14.32	2.26	3.10	0.0150	INLET	0.00	981.75



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 2

Use HW : 1

Inlet Invert Elevation (ft.) : 980.38

Outlet Invert Elevation (ft.) : 979.07

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 75.14

Culvert Slope (ft./ft.) : 0.0174

Corrugation Type :

Pipe Size : 48 in.

Design Manning 'n' : 0.0150

Entrance Type : Full Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
102.00	1.73	985.19	985.73	2 - G	8.12	2.28	3.06	0.0150	OUTLET	0.00	984.00



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 3

Use HW : 2

Inlet Invert Elevation (ft.) : 981.00

Outlet Invert Elevation (ft.) : 980.38

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 40.76

Culvert Slope (ft./ft.) : 0.0152

Corrugation Type :

Pipe Size : 48 in.

Design Manning 'n' : 0.0150

Entrance Type : Half Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
97.00	1.36	985.65	987.09	2 - G	7.72	2.31	2.99	0.0150	OUTLET	0.00	985.73



# CULVERT ANALYSIS

**PID :** 92953

**Date :** 10/14/2015

**Project :** MED-18-12.99

**Location :** Sta. 127+35.43

**Description :** Culvert #3 - Ex. 4' x 4' Concrete Box Culvert

**Designer :** GPD Group

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 936.40

**Outlet Invert Elevation (ft.) :** 935.00

**Pipe Quantity :** 1

**Culvert Type :** Box

**Pipe Length (ft.) :** 181.39

**Culvert Slope (ft./ft.) :** 0.0077

**Corrugation Type :**

**Pipe Size :** 4.0 x 4.0 ft.

**Design Manning 'n' :** 0.0120

**Entrance Type :** 0 degree (Extension of sides)

**Loss Coef. Ke :** 0.5000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
103.00	2.87	941.24	939.82	2 - E	11.33	2.27	2.74	0.0120	INLET	0.00	938.37
143.00	4.34	943.05	941.51	2 - E	12.21	2.93	3.41	0.0120	INLET	0.00	938.71





# CULVERT ANALYSIS

**PID :** 92953

**Date :** 11/02/2015

**Project :** MED-18-12.99

**Location :** Sta. 174+44.91

**Description :** Culvert #4 - Ex..6' x 3' Concrete Box Culvert - Design

**Designer :** MDG

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 971.42

**Outlet Invert Elevation (ft.) :** 969.69

**Pipe Quantity :** 1

**Culvert Type :** Box

**Pipe Length (ft.) :** 61.72

**Culvert Slope (ft./ft.) :** 0.0280

**Corrugation Type :**

**Pipe Size :** 0.9 x 3.0 ft.

**Design Manning 'n' :** (default)

**Entrance Type :** 0 degree (Extension of sides)

**Loss Coef. Ke :** 0.5000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
27.00	5.59	978.28	976.67	2 - H	11.00	2.73	3.00	0.0120	INLET	0.00	972.69



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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**Pipe Number : 2**                      **Use HW : 1**                      **Inlet Invert Elevation (ft.) : 972.78**                      **Outlet Invert Elevation (ft.) : 971.42**  
**Pipe Quantity : 1**  
**Culvert Type : Box**                      **Pipe Length (ft.) : 48.60**                      **Culvert Slope (ft./ft.) : 0.0280**  
**Corrugation Type :**  
**Pipe Size : 6.0 x 3.0 ft.**  
**Design Manning 'n' : (default)**  
**Entrance Type : 0 degree (Extension of sides)**                      **Loss Coef. Ke : 0.5000**

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FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
27.00	0.06	973.99	978.34	2 - G	1.50	0.42	0.86	0.0120	OUTLET	0.00	978.28



# CULVERT ANALYSIS

**PID :** 92953

**Date :** 11/02/2015

**Project :** MED-18-12.99

**Location :** Sta. 174+44.91

**Description :** Culvert #4 - Ex..6' x 3' Concrete Box Culvert - Check

**Designer :** MDG

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 971.42

**Outlet Invert Elevation (ft.) :** 969.69

**Pipe Quantity :** 1

**Culvert Type :** Box

**Pipe Length (ft.) :** 61.72

**Culvert Slope (ft./ft.) :** 0.0280

**Corrugation Type :**

**Pipe Size :** 0.9 x 3.0 ft.

**Design Manning 'n' :** (default)

**Entrance Type :** 0 degree (Extension of sides)

**Loss Coef. Ke :** 0.5000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
39.00	10.99	983.68	980.99	2 - H	14.44	3.00	3.00	0.0120	INLET	0.00	972.69



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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**Pipe Number : 2**                      **Use HW : 1**                      **Inlet Invert Elevation (ft.) : 972.78**                      **Outlet Invert Elevation (ft.) : 971.42**  
**Pipe Quantity : 1**  
**Culvert Type : Box**                      **Pipe Length (ft.) : 48.60**                      **Culvert Slope (ft./ft.) : 0.0280**  
**Corrugation Type :**  
**Pipe Size : 6.0 x 3.0 ft.**  
**Design Manning 'n' : (default)**  
**Entrance Type : 0 degree (Extension of sides)**                      **Loss Coef. Ke : 0.5000**

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FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
39.00	0.12	974.44	983.80	2 - G	2.17	0.53	1.09	0.0120	OUTLET	0.00	983.68



# CULVERT ANALYSIS

**PID :** 92953

**Date :** 05/11/2015

**Project :** MED-18-12.99

**Location :** Sta. 189+24.99

**Description :** Culvert #5 - Ex. 48" Concrete Culvert

**Designer :** GPD Group

**HEADWATER CONTROL CODES:**

INLET - Inlet Control.

OUTLET - Outlet Control.

OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.

OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.

N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 1020.60

**Outlet Invert Elevation (ft.) :** 1007.80

**Pipe Quantity :** 1

**Culvert Type :** Circular Smooth

**Pipe Length (ft.) :** 149.58

**Culvert Slope (ft./ft.) :** 0.0856

**Corrugation Type :**

**Pipe Size :** 48 in.

**Design Manning 'n' :** 0.0150

**Entrance Type :** Full Headwall

**Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
26.00	12.13	1022.68	N/A	1 - C	16.78	0.72	1.51	0.0150	INLET	0.00	1009.55
36.00	11.56	1023.12	1011.84	1 - C	18.49	0.85	1.79	0.0150	INLET	0.00	1011.56



# CULVERT ANALYSIS

**PID :** 92953      **Date :** 10/14/2015      **Project :** MED-18-12.99      **Location :** Sta. 189+24.99  
**Description :** Culvert #5 - Prop. 48" Concrete Culvert - Design      **Designer :** GPD Group

**HEADWATER CONTROL CODES:** INLET - Inlet Control.  
 OUTLET - Outlet Control.  
 OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.  
 OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.  
 N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1      **Use HW :** 0      **Inlet Invert Elevation (ft.) :** 1006.75      **Outlet Invert Elevation (ft.) :** 1004.70  
**Pipe Quantity :** 1  
**Culvert Type :** Circular Smooth      **Pipe Length (ft.) :** 53.99      **Culvert Slope (ft./ft.) :** 0.0380  
**Corrugation Type :**  
**Pipe Size :** 48 in.  
**Design Manning 'n' :** 0.0150  
**Entrance Type :** Full Headwall      **Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
62.00	2.29	1010.18	N/A	1 - C	16.13	1.38	2.37	0.0150	INLET	0.00	1007.45



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 2

Use HW : 1

Inlet Invert Elevation (ft.) : 1020.26

Outlet Invert Elevation (ft.) : 1009.31

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 127.97

Culvert Slope (ft./ft.) : 0.0856

Corrugation Type :

Pipe Size : 48 in.

Design Manning 'n' : 0.0150

Entrance Type : Full Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
62.00	11.19	1023.69	N/A	1 - C	21.63	1.12	2.37	0.0150	INLET	0.00	1010.18



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 3

Use HW : 2

Inlet Invert Elevation (ft.) : 1022.50

Outlet Invert Elevation (ft.) : 1022.40

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 10.00

Culvert Slope (ft./ft.) : 0.0100

Corrugation Type :

Pipe Size : 36 in.

Design Manning 'n' : 0.0150

Entrance Type : Full Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
26.00	0.27	1024.86	N/A	1 - C	6.55	1.41	1.65	0.0150	INLET	0.00	1023.69





# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 4

Use HW : 3

Inlet Invert Elevation (ft.) : 1023.00

Outlet Invert Elevation (ft.) : 1022.88

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 12.00

Culvert Slope (ft./ft.) : 0.0100

Corrugation Type :

Pipe Size : 21 in.

Design Manning 'n' : 0.0150

Entrance Type : Half Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
26.00	2.82	1027.81	1027.60	2 - H	10.81	1.75	1.69	0.0150	INLET	0.00	1025.00



# CULVERT ANALYSIS

**PID :** 92953      **Date :** 10/14/2015      **Project :** MED-18-12.99      **Location :** Sta. 189+24.99  
**Description :** Culvert #5 - Prop. 48" Concrete Culvert - Check      **Designer :** GPD Group

**HEADWATER CONTROL CODES:** INLET - Inlet Control.  
 OUTLET - Outlet Control.  
 OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.  
 OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.  
 N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1      **Use HW :** 0      **Inlet Invert Elevation (ft.) :** 1006.75      **Outlet Invert Elevation (ft.) :** 1004.70  
**Pipe Quantity :** 1  
**Culvert Type :** Circular Smooth      **Pipe Length (ft.) :** 53.99      **Culvert Slope (ft./ft.) :** 0.0380  
**Corrugation Type :**  
**Pipe Size :** 48 in.  
**Design Manning 'n' :** 0.0150  
**Entrance Type :** Full Headwall      **Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
77.00	2.64	1010.67	N/A	1 - C	17.15	1.55	2.66	0.0150	INLET	0.00	1007.70



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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**Pipe Number : 2**                      **Use HW : 1**                      **Inlet Invert Elevation (ft.) : 1020.26**                      **Outlet Invert Elevation (ft.) : 1009.31**  
**Pipe Quantity : 1**  
**Culvert Type : Circular Smooth**                      **Pipe Length (ft.) : 127.97**                      **Culvert Slope (ft./ft.) : 0.0856**  
**Corrugation Type :**  
**Pipe Size : 48 in.**  
**Design Manning 'n' : 0.0150**  
**Entrance Type : Full Headwall**                      **Loss Coef. Ke : 0.2000**

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FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
77.00	11.54	1024.18	N/A	1 - C	22.98	1.25	2.66	0.0150	INLET	0.00	1010.67



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 3

Use HW : 2

Inlet Invert Elevation (ft.) : 1022.50

Outlet Invert Elevation (ft.) : 1022.40

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 10.00

Culvert Slope (ft./ft.) : 0.0100

Corrugation Type :

Pipe Size : 36 in.

Design Manning 'n' : 0.0150

Entrance Type : Full Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
36.00	0.52	1025.36	N/A	1 - C	7.40	1.71	1.95	0.0150	INLET	0.00	1024.18



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 4

Use HW : 3

Inlet Invert Elevation (ft.) : 1023.00

Outlet Invert Elevation (ft.) : 1022.88

Pipe Quantity : 1

Culvert Type : Circular Smooth

Pipe Length (ft.) : 12.00

Culvert Slope (ft./ft.) : 0.0100

Corrugation Type :

Pipe Size : 21 in.

Design Manning 'n' : 0.0150

Entrance Type : Half Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
36.00	5.67	1031.07	1030.39	2 - H	14.97	1.75	1.73	0.0150	INLET	0.00	1025.40



# CULVERT ANALYSIS

**PID :** 92953      **Date :** 05/12/2015      **Project :** MED-18-12.99

**Location :** Sta. 911+39.85 - River Styx Rd.

**Description :** Culvert #6 - Ex.60" Concrete Culvert

**Designer :** GPD Group

**HEADWATER CONTROL CODES:** INLET - Inlet Control.  
 OUTLET - Outlet Control.  
 OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.  
 OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.  
 N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1

**Use HW :** 0

**Inlet Invert Elevation (ft.) :** 937.60

**Outlet Invert Elevation (ft.) :** 936.10

**Pipe Quantity :** 1

**Culvert Type :** Circular Smooth

**Pipe Length (ft.) :** 88.37

**Culvert Slope (ft./ft.) :** 0.0170

**Corrugation Type :**

**Pipe Size :** 60 in.

**Design Manning 'n' :** (default)

**Entrance Type :** Full Headwall

**Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
100.00	1.67	941.70	N/A	1 - C	15.93	1.78	2.85	0.0120	INLET	0.00	939.49
137.00	2.28	942.56	N/A	1 - C	17.36	2.11	3.35	0.0120	INLET	0.00	939.66



# CULVERT ANALYSIS

**PID :** 92953      **Date :** 10/14/2015      **Project :** MED-18-12.99      **Location :** Sta. 911+39.85 - River Styx Rd.  
**Description :** Culvert #6 - Prop. 48" x 76" Concrete Culvert Extended - Design      **Designer :** GPD Group

**HEADWATER CONTROL CODES:** INLET - Inlet Control.  
 OUTLET - Outlet Control.  
 OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.  
 OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.  
 N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1      **Use HW :** 0      **Inlet Invert Elevation (ft.) :** 937.60      **Outlet Invert Elevation (ft.) :** 936.10  
**Pipe Quantity :** 1  
**Culvert Type :** Elliptical      **Pipe Length (ft.) :** 90.97      **Culvert Slope (ft./ft.) :** 0.0165  
**Corrugation Type :**  
**Pipe Size :** 48 x 76 in.  
**Design Manning 'n' :** 0.0150  
**Entrance Type :** Full Headwall      **Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
100.00	1.70	940.97	N/A	1 - C	12.93	1.60	2.35	0.0150	INLET	0.00	939.12



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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Pipe Number : 2

Use HW : 1

Inlet Invert Elevation (ft.) : 938.20

Outlet Invert Elevation (ft.) : 937.60

Pipe Quantity : 1

Culvert Type : Elliptical

Pipe Length (ft.) : 32.00

Culvert Slope (ft./ft.) : 0.0188

Corrugation Type :

Pipe Size : 48 x 76 in.

Design Manning 'n' : 0.0150

Entrance Type : Half Headwall

Loss Coef. Ke : 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
100.00	0.63	941.61	941.48	1 - C	13.52	1.54	2.35	0.0150	INLET	0.00	940.97





# CULVERT ANALYSIS

**PID :** 92953      **Date :** 10/14/2015      **Project :** MED-18-12.99

**Location :** Sta. 911+39.85 - River Styx Rd.

**Description :** Culvert #6 - Prop. 48" x 76" Concrete Culvert Extended - Check

**Designer :** GPD Group

**HEADWATER CONTROL CODES:** INLET - Inlet Control.  
 OUTLET - Outlet Control.  
 OUTLET\* - Outlet Control with backwater curve used to compute headwater. See Figure III - 7E in HDS 5 for type flow.  
 OUTLET\*\* - Outlet Control - See Figure III - 7D in HDS 5 for type flow.  
 N/A - Flow is supercritical with low headwater and low tailwater. Control Section is at the inlet.

**Pipe Number :** 1      **Use HW :** 0      **Inlet Invert Elevation (ft.) :** 937.60      **Outlet Invert Elevation (ft.) :** 936.10  
**Pipe Quantity :** 1  
**Culvert Type :** Elliptical      **Pipe Length (ft.) :** 90.97      **Culvert Slope (ft./ft.) :** 0.0165  
**Corrugation Type :**  
**Pipe Size :** 48 x 76 in.  
**Design Manning 'n' :** 0.0150  
**Entrance Type :** Full Headwall      **Loss Coef. Ke :** 0.2000

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
137.00	2.28	941.77	N/A	1 - C	14.21	1.90	2.79	0.0150	INLET	0.00	939.33



# CULVERT ANALYSIS

FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
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**Pipe Number : 2**                      **Use HW : 1**                      **Inlet Invert Elevation (ft.) : 938.20**                      **Outlet Invert Elevation (ft.) : 937.60**  
**Pipe Quantity : 1**  
**Culvert Type : Elliptical**                      **Pipe Length (ft.) : 32.00**                      **Culvert Slope (ft./ft.) : 0.0188**  
**Corrugation Type :**  
**Pipe Size : 48 x 76 in.**  
**Design Manning 'n' : 0.0150**  
**Entrance Type : Half Headwall**                      **Loss Coef. Ke : 0.2000**

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FLOW (cfs.)	HEAD LOSS (ft.)	HWI (ft.)	HWO (ft.)	FLOW TYPE	VELOCITY (fps.)	DN (ft.)	DC (ft.)	MANNING N	HEADWATER CONTROL	BURIED DEPTH (ft.)	TAILWATER ELEVATION (ft.)
137.00	0.94	942.37	942.71	1 - B	6.67	1.83	2.79	0.0150	OUTLET	0.00	941.77

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12/2/2015  
3:43:55 PM  
MGL/AGS



CALCULATED  
CHECKED

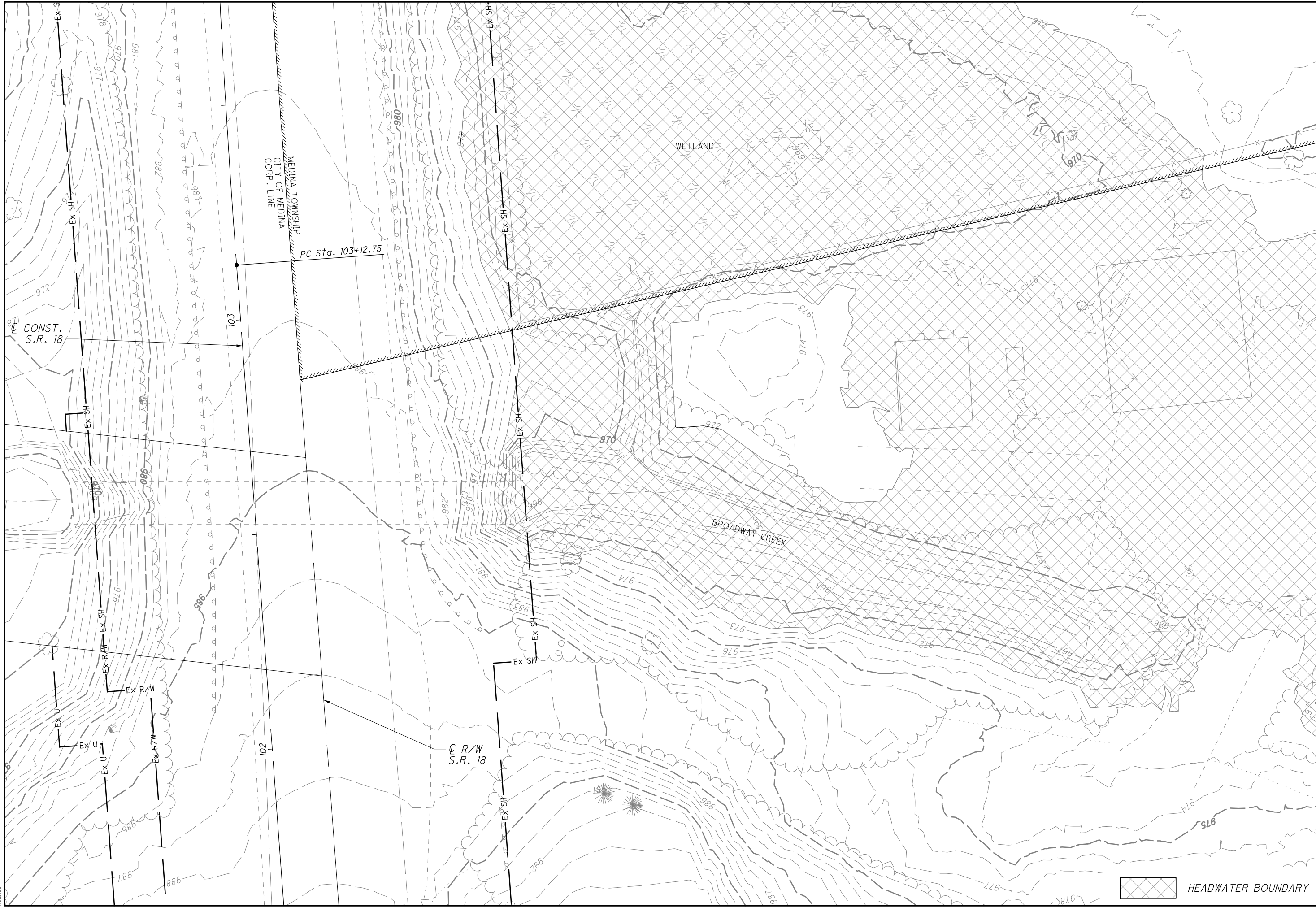
0 5 10 20  
HORIZONTAL  
SCALE IN FEET

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #1 - EXIST. DESIGN STORM (25 YR.)**

**MED-18-12.99**

F  
1

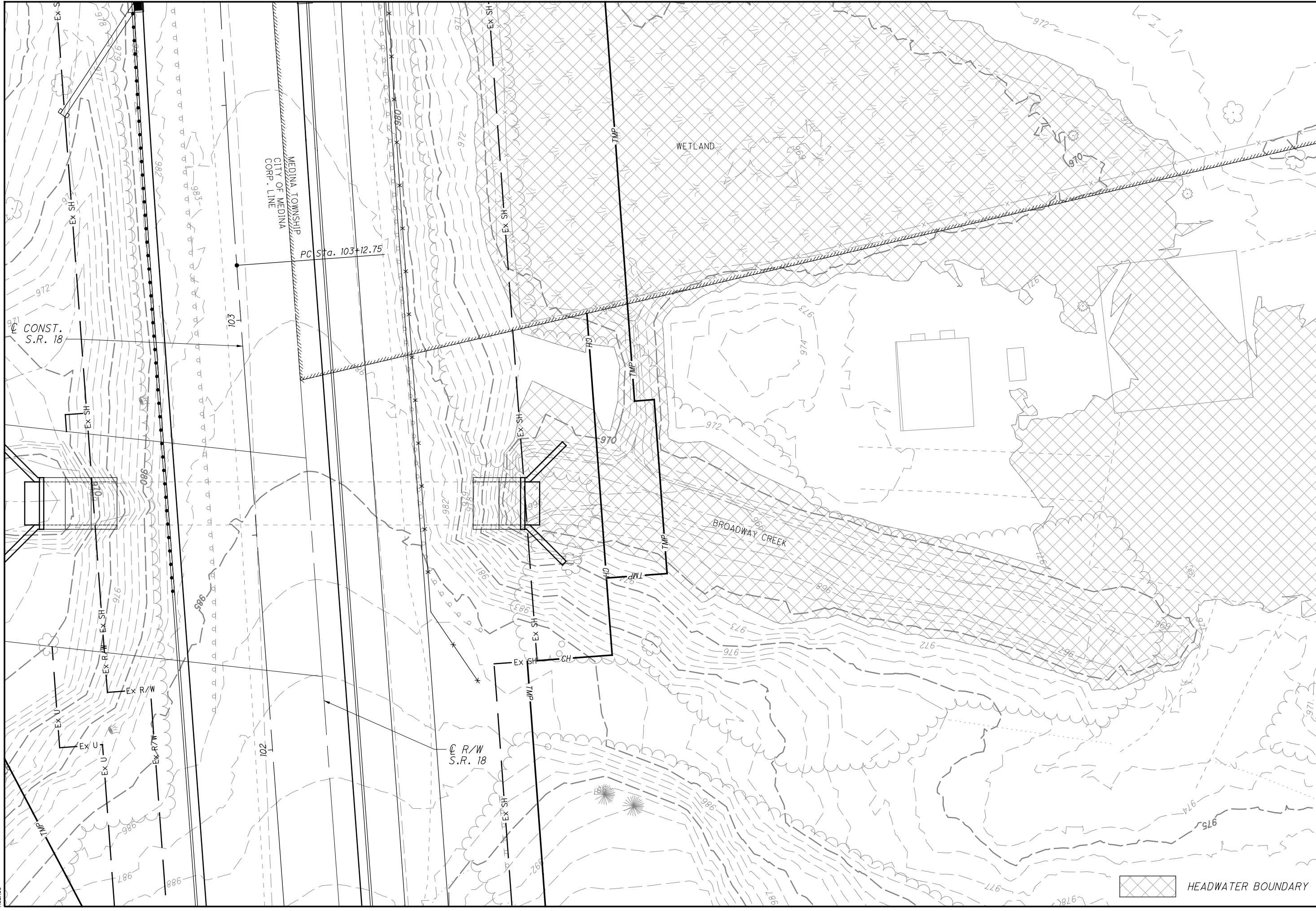
 HEADWATER BOUNDARY



CALCULATED  
CHECKED  
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #1 - EXIST. CHECK STORM (100 YR.)**

**MED-18-12.99**  
F  
2

\\NARMDA\DATA\2013\20130113\MED\129293\DRAINAGE\DOCS\DRAWING\REPORT\AFFENIX\F - CULVERT ANALYSIS\CULVERT #1 - PR - 025.DGN  
12/2/2015  
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MGL/ASS

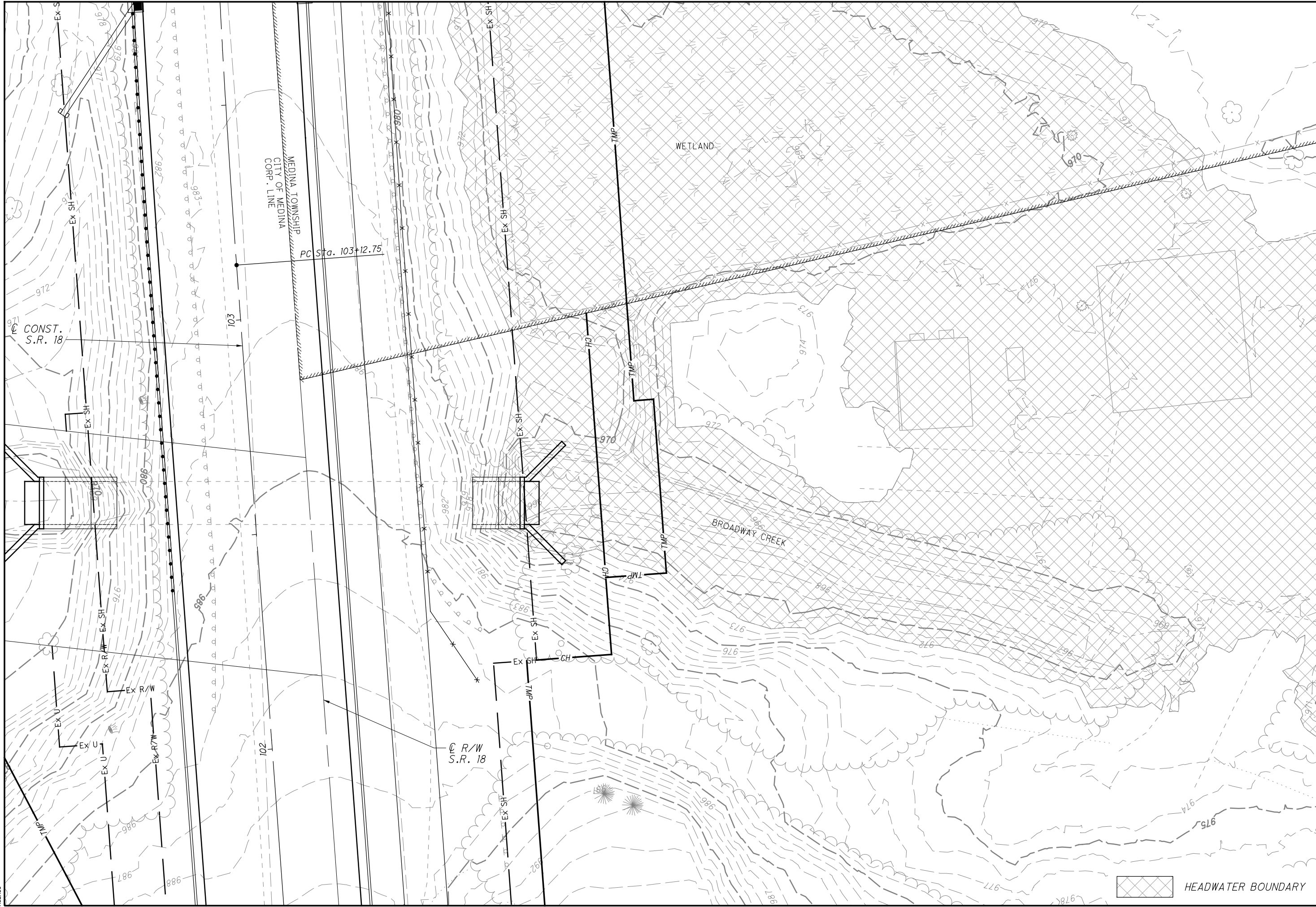


CALCULATED  
CHECKED  
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #1 - PROP. DESIGN STORM (25 YR.)**

**MED-18-12.99**

F  
3

 HEADWATER BOUNDARY



CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #1 - PROP. CHECK STORM (100 YR.)**

**MED-18-12.99**

\\ARNDT\DATA\2013\20130130\13\WED\92983\DRAINAGE\UDCS\DRAWING\REPORT\AFFENIX\F - CULVERT ANALYSIS\CULVERT #2 - EX - 025.DGN  
12/2/2015  
3:23:20 PM  
MGL/AS



CALCULATED	CHECKED	N	0 5 10 20 HORIZONTAL SCALE IN FEET
<b>CULVERT #2 - EXIST. DESIGN STORM (25 YR.)</b>		<b>MED-18-12.99</b>	
F 5			



HEADWATER BOUNDARY

CALCULATED  
CHECKED

0 5 10 20  
HORIZONTAL  
SCALE IN FEET

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #2 - EXIST. DESIGN STORM (100 YR.)**

**MED-18-12.99**



\\SARINBA\DATA\2013\20130130\13\WED\92983\UPA1\INHA\0005\CULVERT #2 - PR - 025.DGN  
3/2/2017  
4:53:55 PM  
000TY81STD\_USER



CALCULATED  
CHECKED

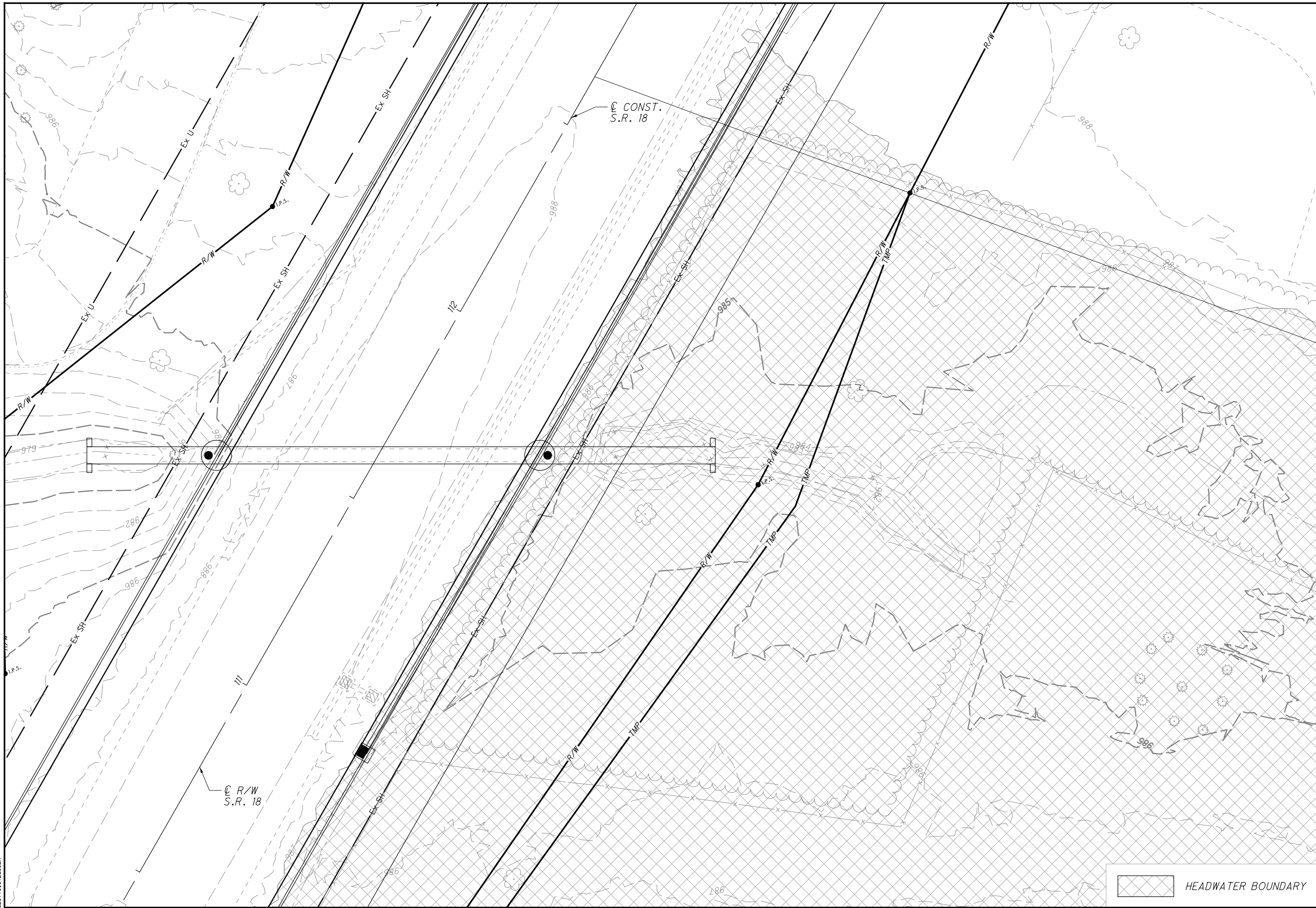
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #2 - PROP. DESIGN STORM (25 YR.)**

**MED-18-12.99**

F  
7

 HEADWATER BOUNDARY

\\SARINBA\DATA\2013\20130130\13\WED\92953\UPA\INRAE\ODDCS\CULVERT #2 - PR - 180.DGN  
3/2/2017  
5:04:40 PM  
000TY81STD\_USER



HEADWATER BOUNDARY

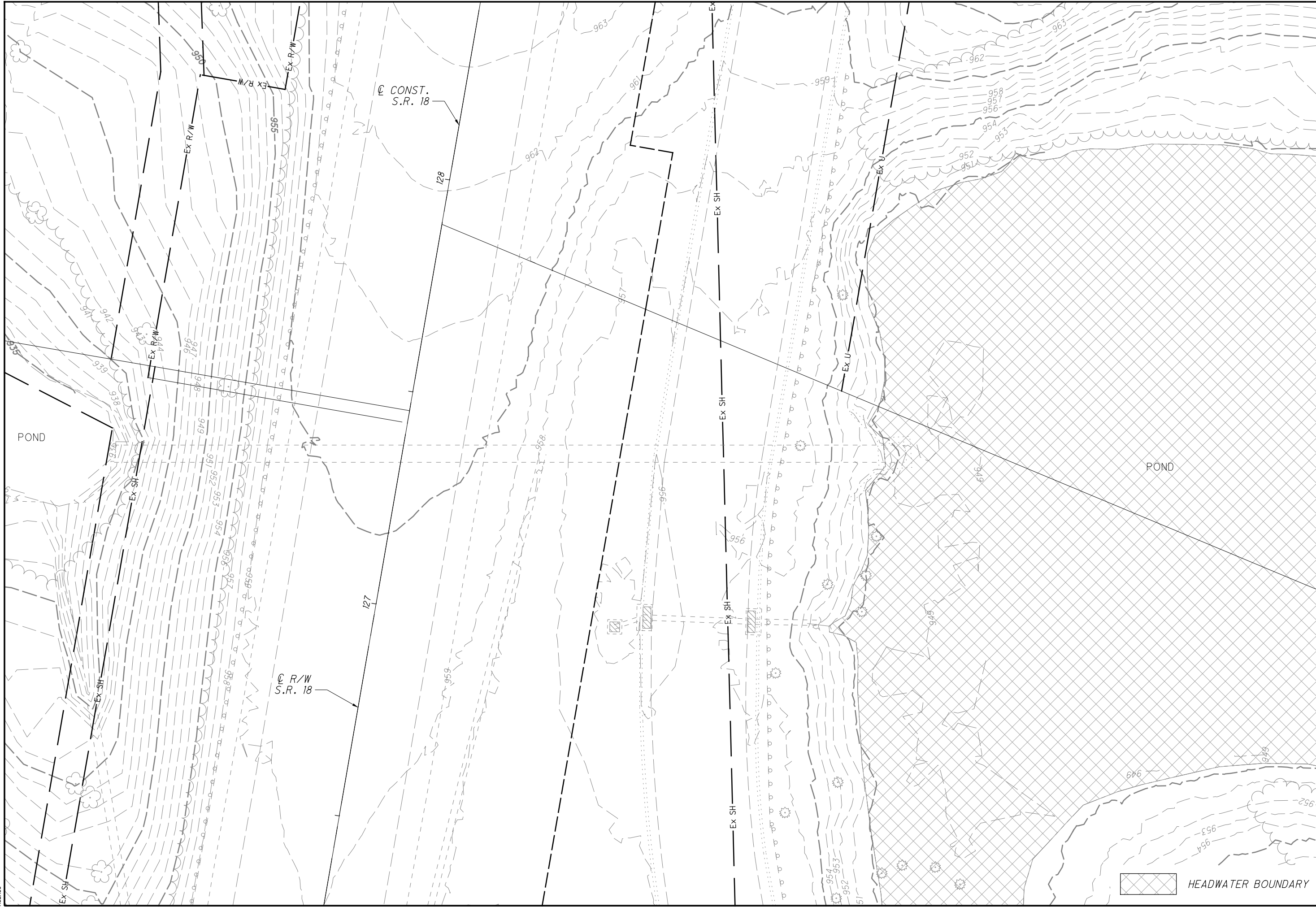


CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #2 - PROP. CHECK STORM (100 YR.)**

**MED-18-12.99**

F  
8



CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #3 - EXIST. DESIGN STORM (25 YR.)**



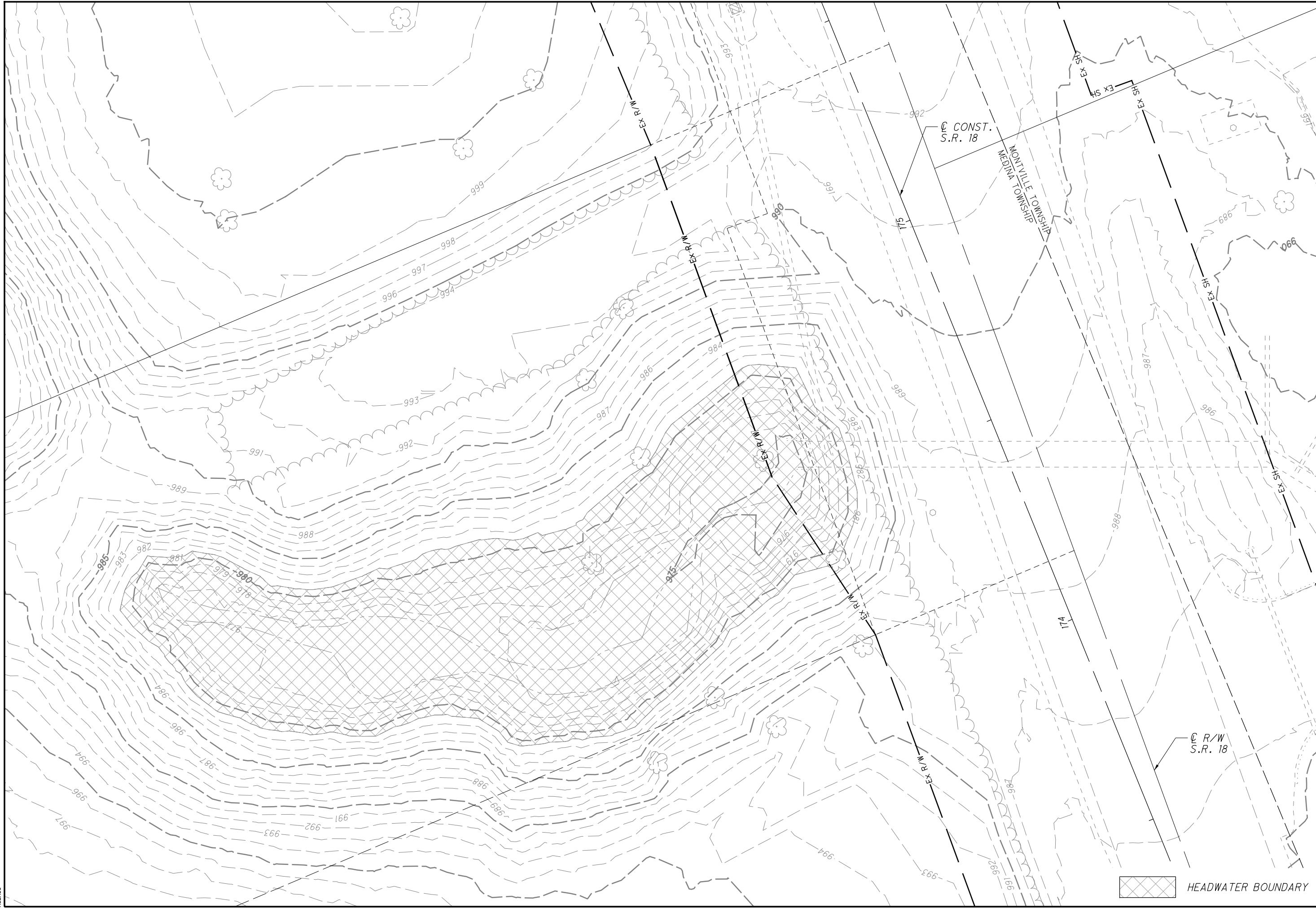
CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #3 - EXIST. CHECK STORM (100 YR.)**

**MED-18-12.99**

F  
10

\\ARNDT\DATA\2013\20130113\MED\12953\DRAINAGE\DRAINAGE REPORT\AFFENIX F - CULVERT ANALYSIS\CULVERT #4 - EX - 025.DGN  
12/2/2015  
3:44:07 PM  
MGL/ASS



CALCULATED  
CHECKED

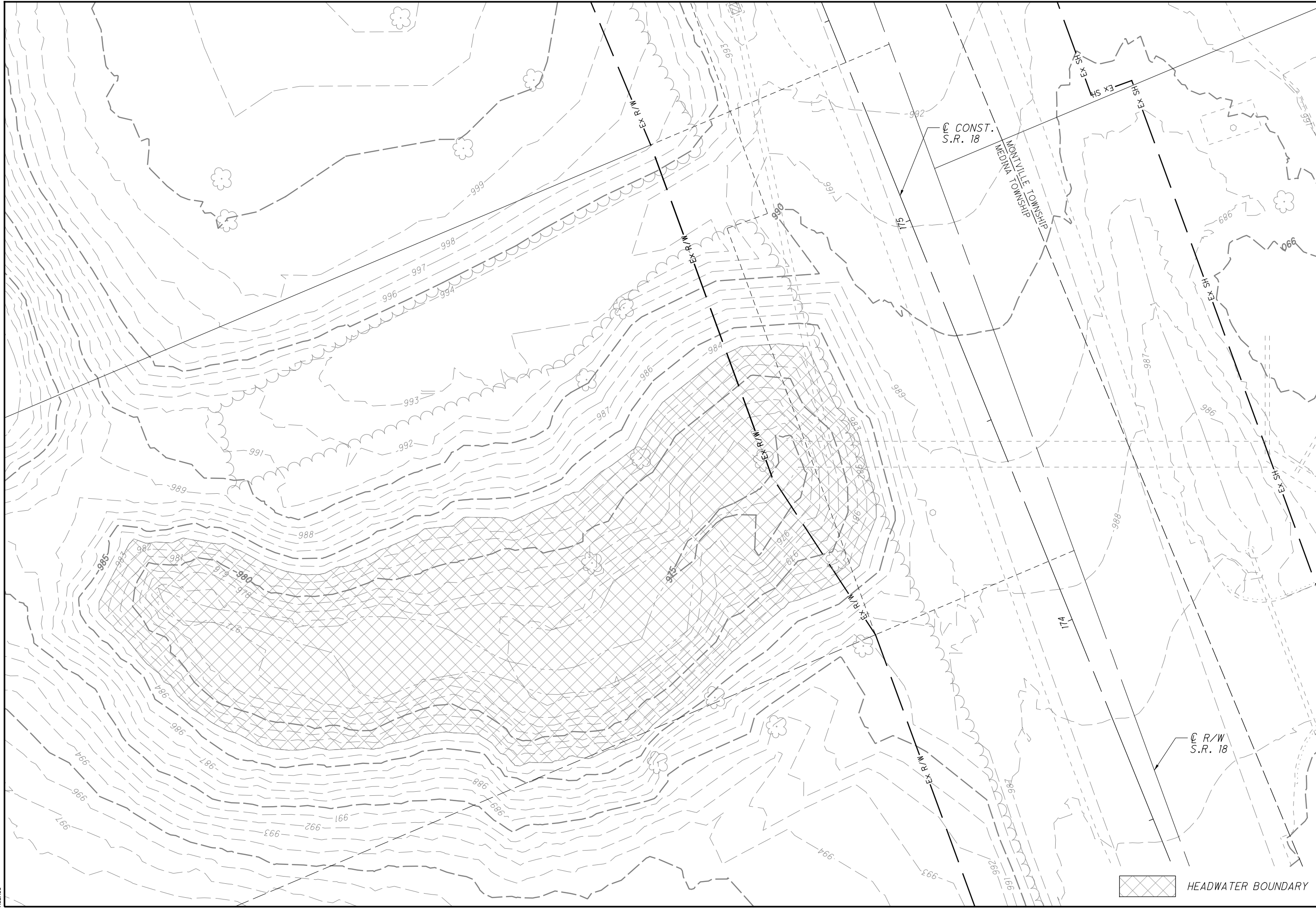
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #4 - EXIST. DESIGN STORM (25 YR.)**

**MED-18-12.99**

F  
11

 HEADWATER BOUNDARY

\\ARNDT\DATA\2013\20130113\MED\12983\DRAINAGE\REPORT\AFFENIX F - CULVERT ANALYSIS\DRAINAGE REPORT\AFFENIX F - EX - 100.DGN  
12/2/2015  
3:47:22 PM  
MGL/ASS



CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #4 - EXIST. CHECK STORM (100 YR.)**

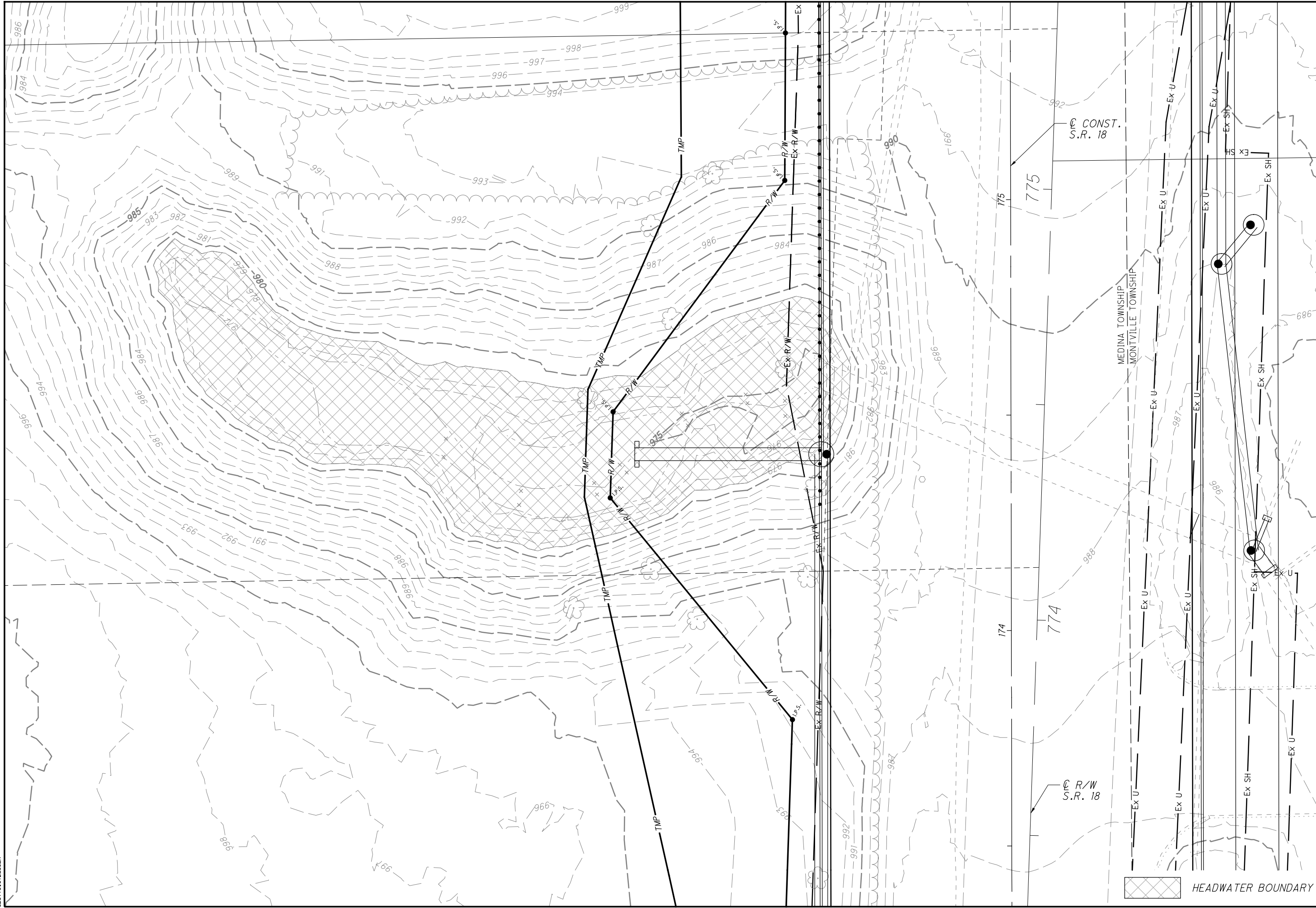
**MED-18-12.99**

F  
12

 HEADWATER BOUNDARY



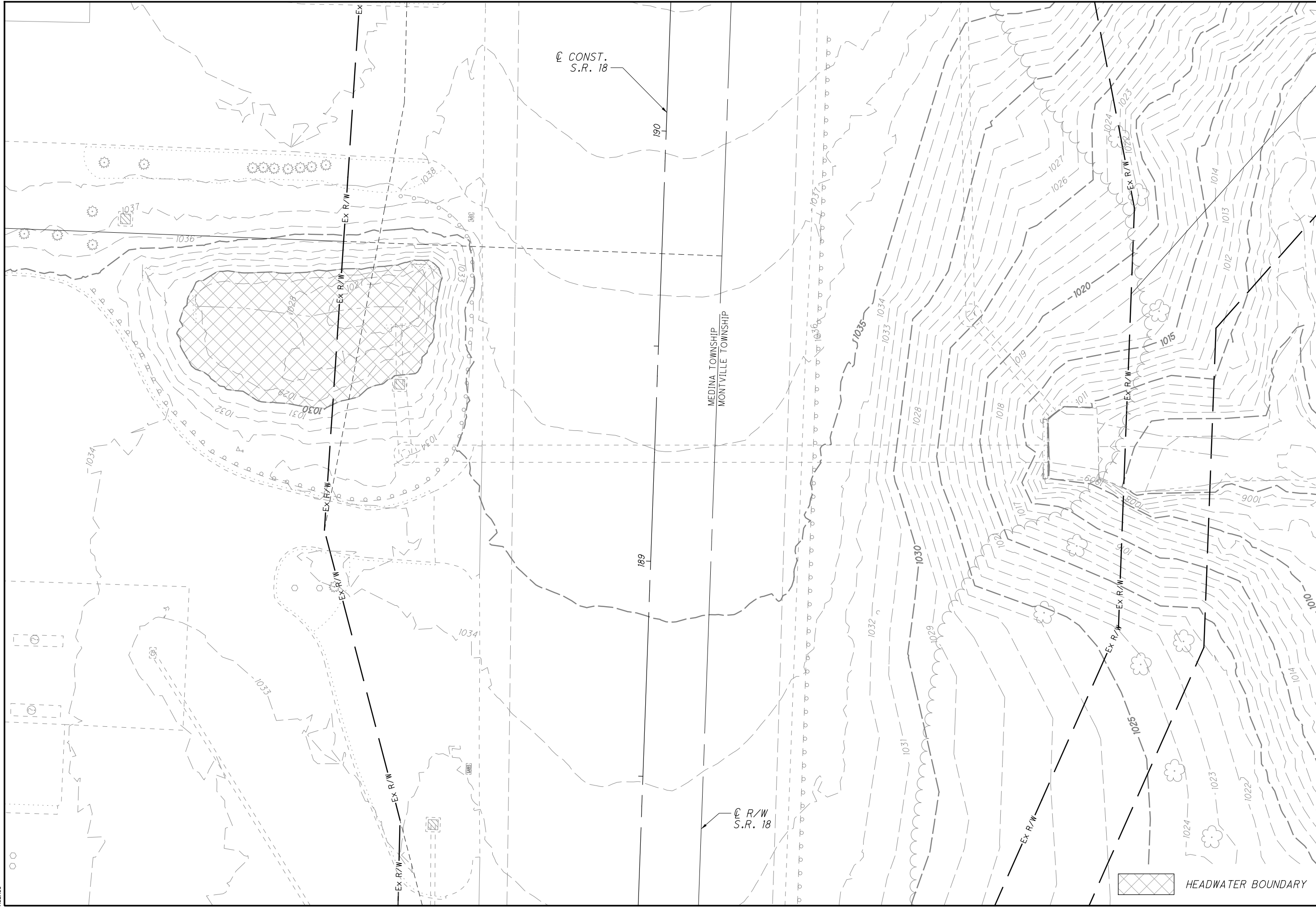
	 HORIZONTAL SCALE IN FEET
	CALCULATED CHECKED
<b>CULVERT ANALYSIS - HEADWATER PLAN</b> <b>CULVERT #4 - PROP. DESIGN STORM (25 YR.)</b>	
<b>MED-18-12.99</b>	F 13



CALCULATED	0
	10
CHECKED	5
	20
HORIZONTAL SCALE IN FEET	
N	
MED - 18 - 12.99	
CULVERT ANALYSIS - HEADWATER PLAN	
CULVERT #4 - PROP. CHECK STORM (100 YR.)	
F	14

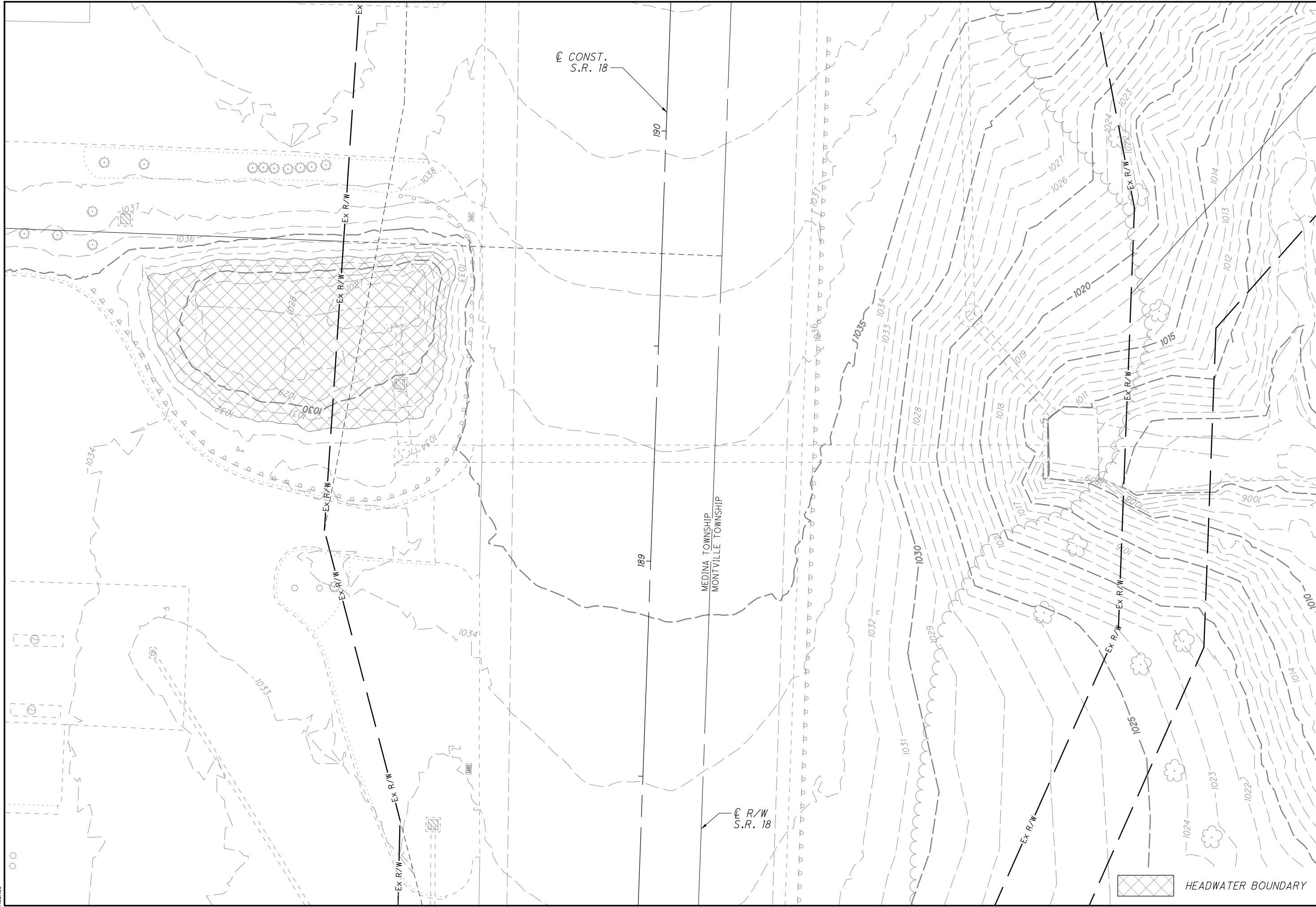
HEADWATER BOUNDARY





CALCULATED	CHECKED	MED - 18 - 12.99	CULVERT ANALYSIS - HEADWATER PLAN CULVERT #5 - EXIST. DESIGN STORM (25 YR.)	N

\\ARNDT\DATA\2013\20130130\13MED\92953\DRAINAGE\DRAINAGE REPORT\AFFENDIX F - CULVERT ANALYSIS\CULVERT #5 - EX - 100.DGN  
12/2/2015  
4:08:20 PM  
MGL/ASS



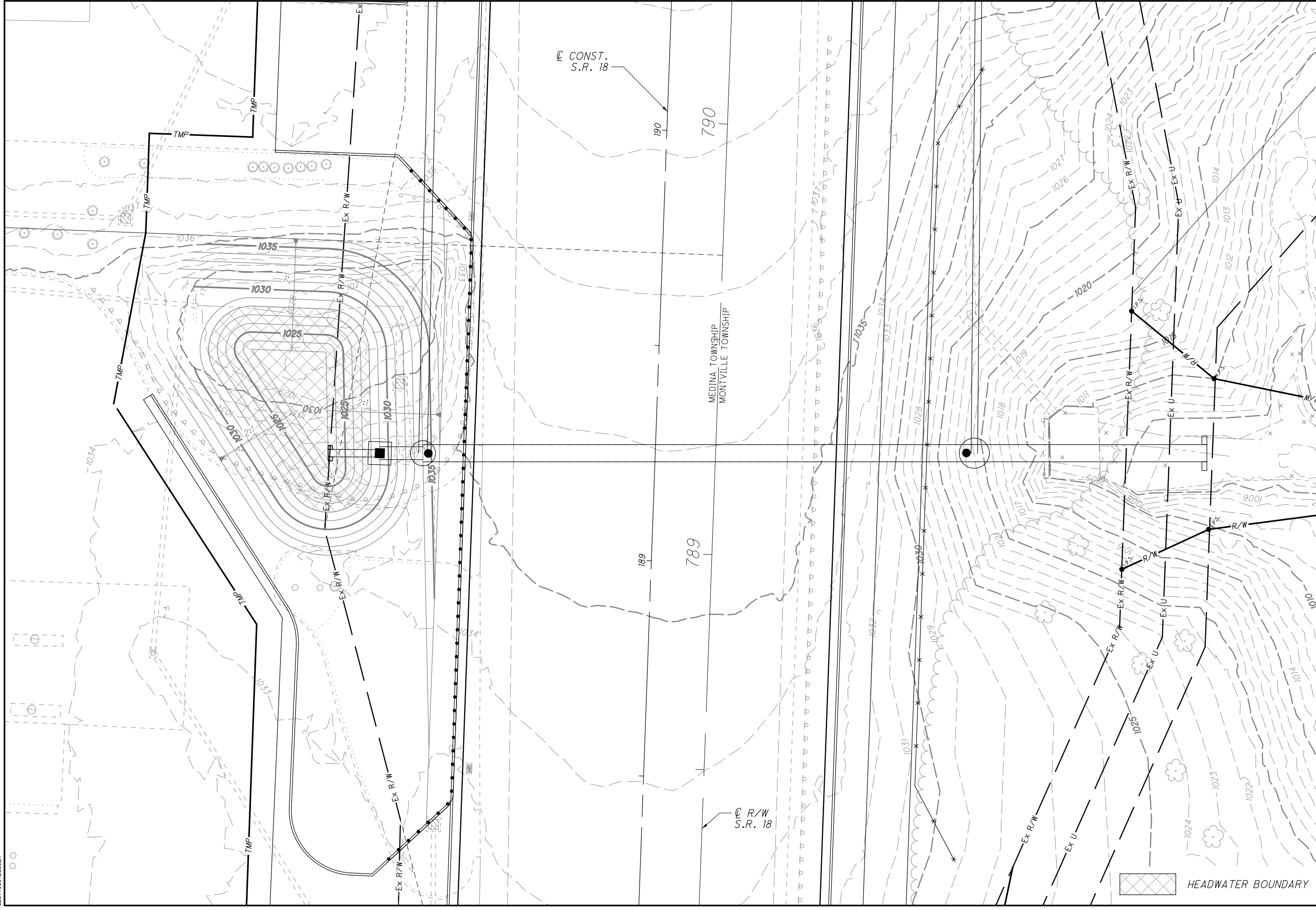
CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #5 - EXIST. CHECK STORM (100 YR.)**

**MED-18-12.99**

F  
16

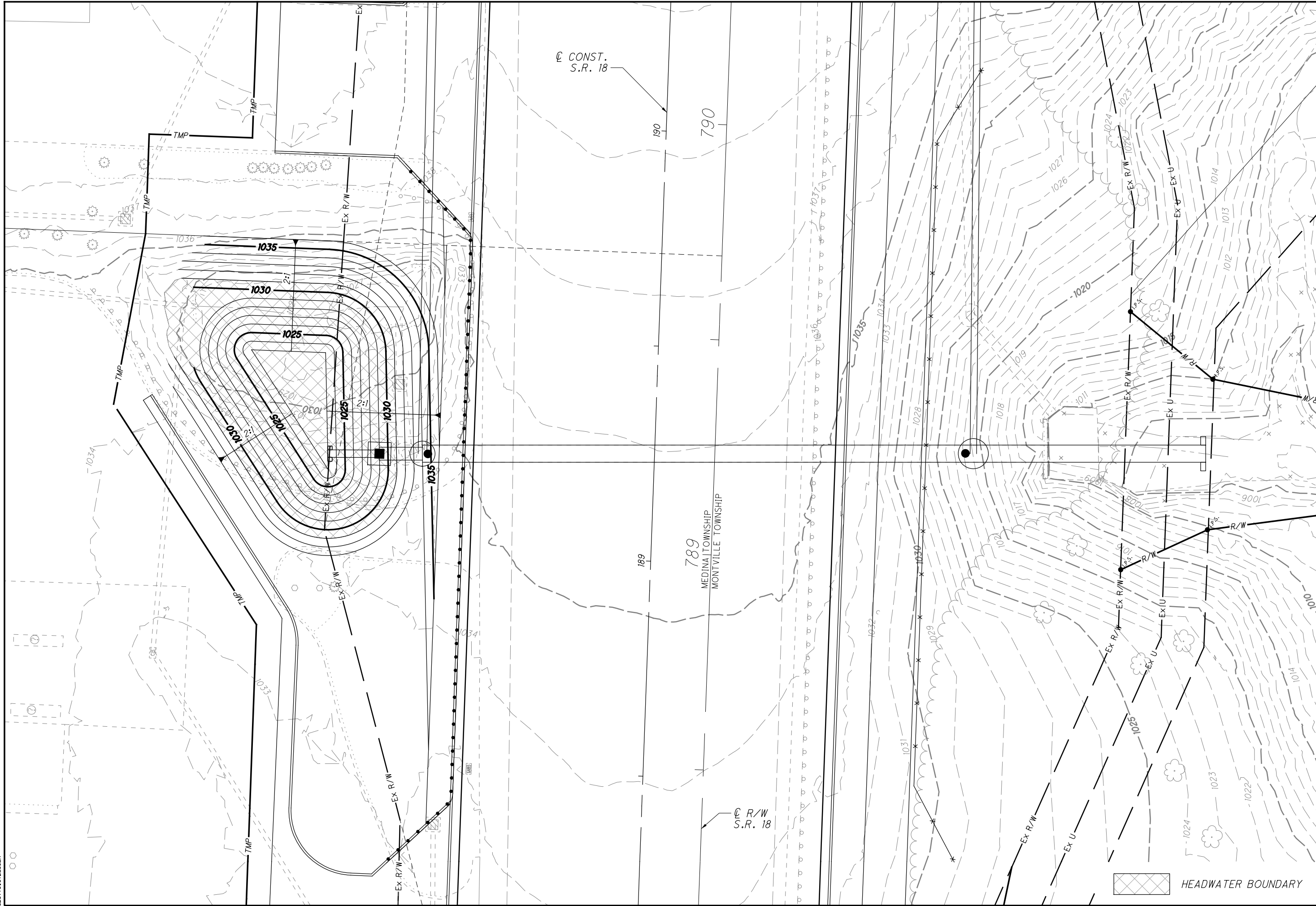
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3/7/2017  
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000TY81STD\_USER



CALCULATED  
CHECKED  
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #5 - PROP. DESIGN STORM (25 YR.)**

**MED-18-12.99**  
F  
17

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3/7/2017  
4:20:53 PM  
000TY81STD\_USER



CALCULATED  
CHECKED

**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #5 - PROP. CHECK STORM (100 YR.)**

**MED-18-12.99**

F  
18

HEADWATER BOUNDARY

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12/2/2015 4:23:07 PM  
MGL/AGS



CALCULATED		CHECKED	
<b>CULVERT ANALYSIS - HEADWATER PLAN</b>			
<b>CULVERT #6 - EXIST. DESIGN STORM (25 YR.)</b>			
<b>MED-18-12.99</b>		<b>F</b>	
		<b>19</b>	

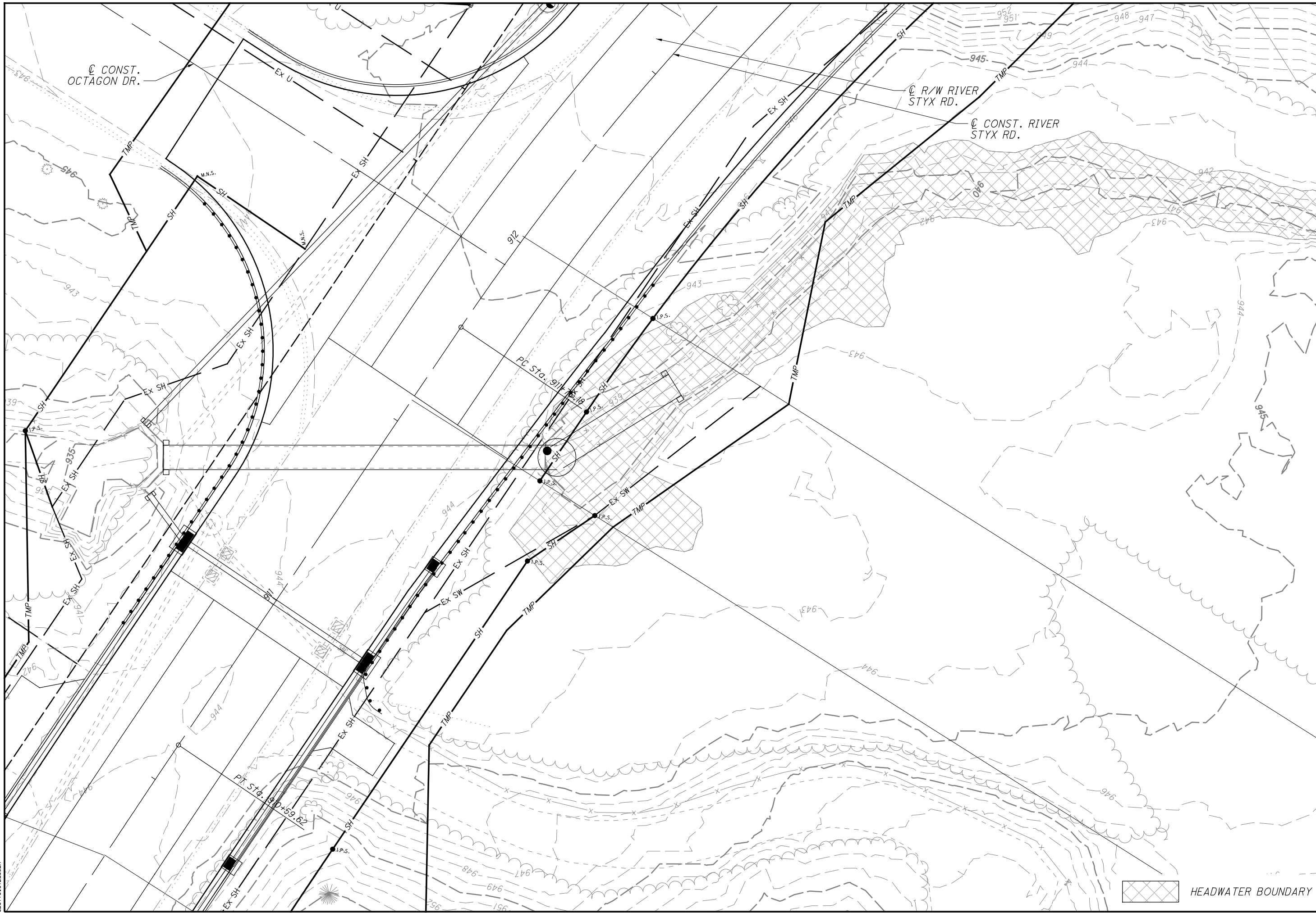
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12/2/2015  
4:25:05 PM  
MGL/AGS



CALCULATED  
CHECKED  
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #6 - EXIST. CHECK STORM (100 YR.)**

**MED-18-12.99**  
F  
20

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3/2/2017  
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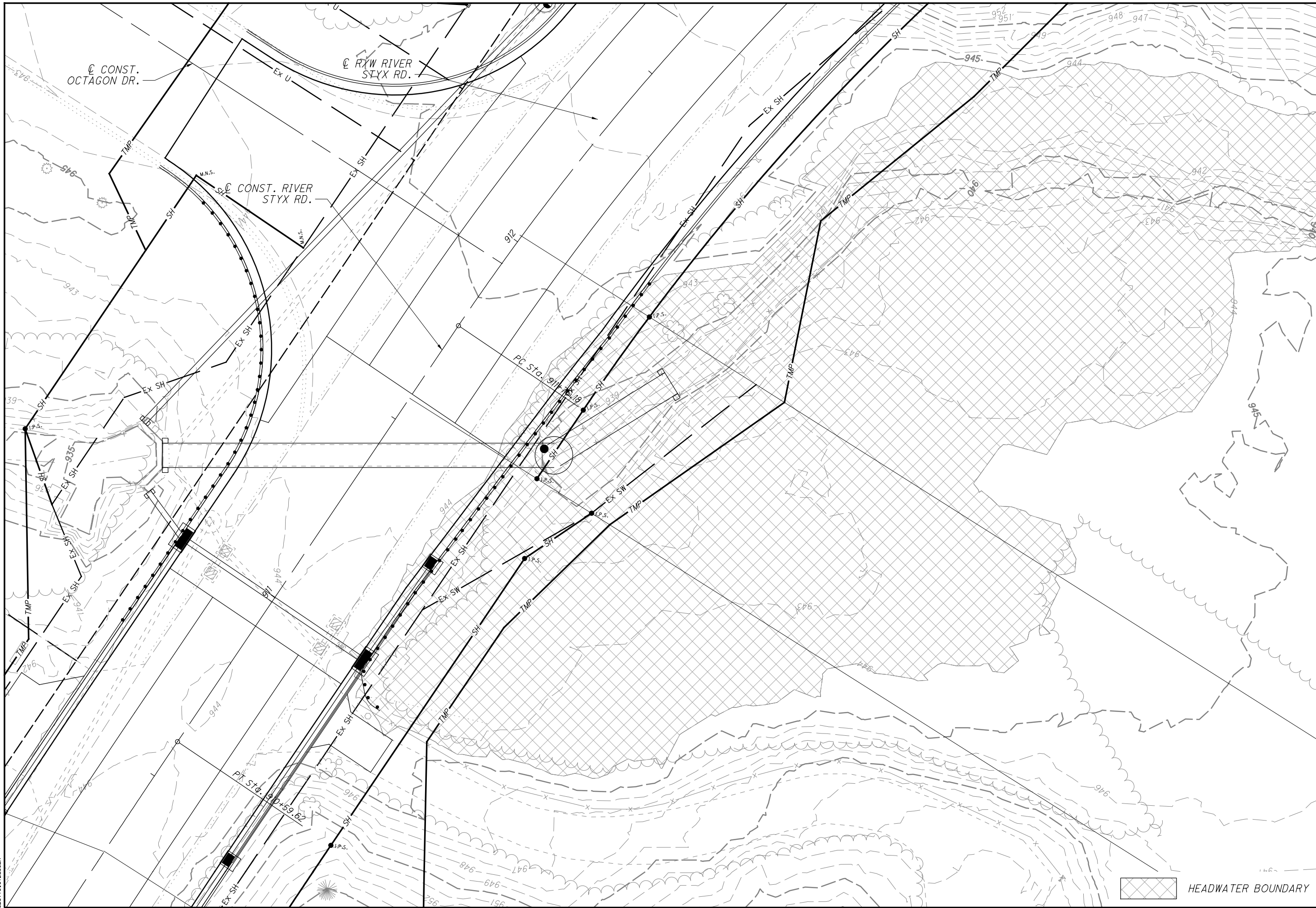


CALCULATED  
CHECKED  
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #6 - PROP. DESIGN STORM (25 YR.)**

**MED-18-12.99**  
F  
21

 HEADWATER BOUNDARY

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3/2/2017  
9:11:35 PM  
000TY81STD\_USER



CALCULATED  
CHECKED  
**CULVERT ANALYSIS - HEADWATER PLAN**  
**CULVERT #6 - PROP. CHECK STORM (100 YR.)**

**MED - 18 - 12.99**  
F  
22

 HEADWATER BOUNDARY



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**APPENDIX G – POST CONSTRUCTION STORM WATER MANAGEMENT &  
EROSION CONTROL**

---



Ohio Department of Transportation - District 3  
Final Drainage Design Report  
MED-18-12.99



Treatment Percent - Based on Entire Project		
Route	Ex. Impervious Area - A <sub>ix</sub> (Acres)	New Impervious Area - A <sub>in</sub> (Acres)
Project Limits	31.4	2.2
Totals:	31.4	2.2

100% Treatment at T% of project: 25%

Project EDA (Acres) = 45.0

\*Required Treatment Area (Acres) = 11.3

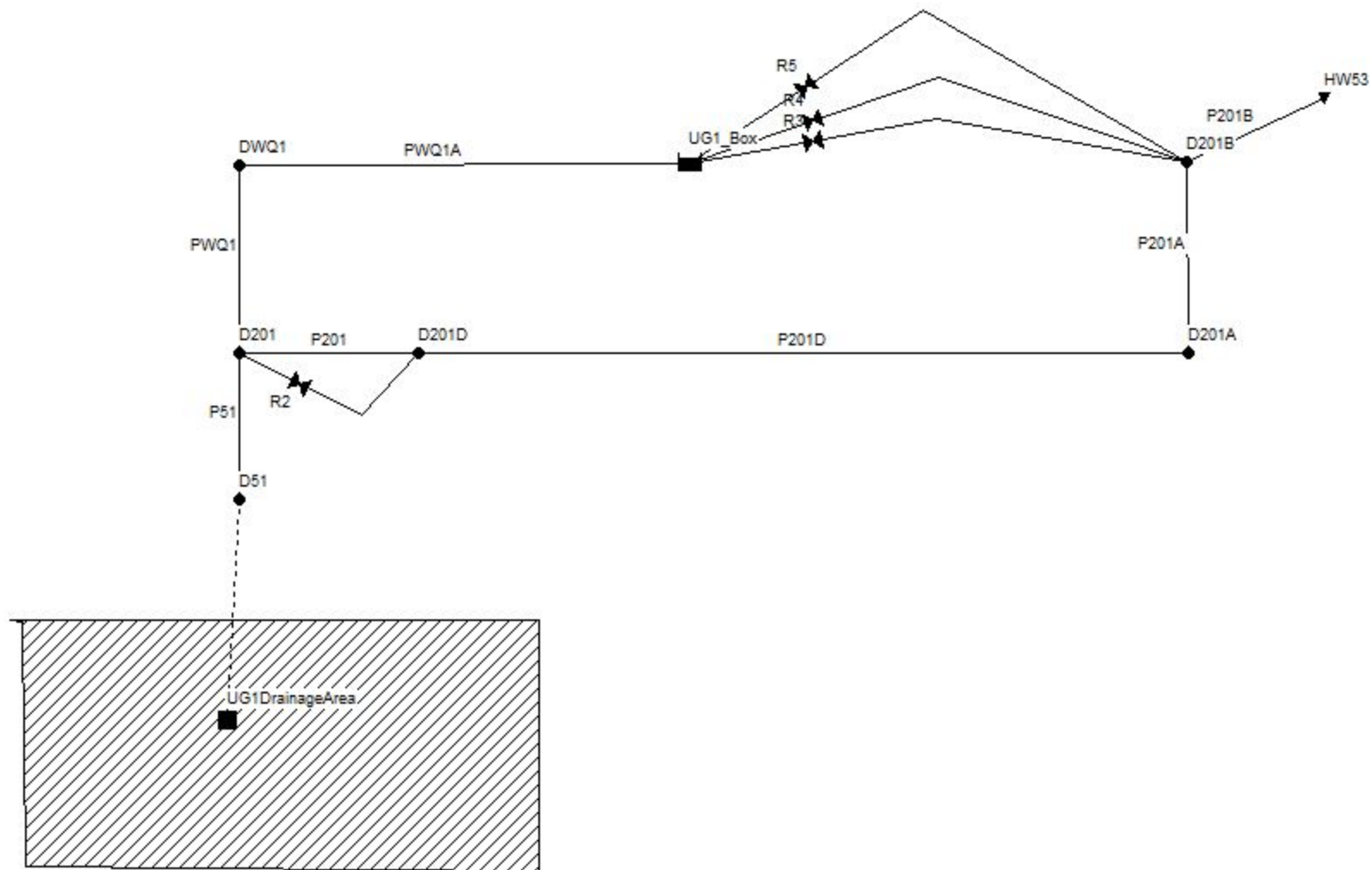
\*Treat 100% of WQv for 25% of EDA.

Water Quality Volume				
Drainage Area #	Total Contributing Drainage Area (Acres)	C <sub>q</sub>	WQv (Acre-Ft)	Total Contributing EDA Area (Acres)
Burgundy Bay Rd. UG	10.00	0.62	0.39	6.32
S. Frontage Rd. UG	3.65	0.76	0.17	3.06
N. Frontage Rd. UG	4.51	0.62	0.17	2.88

Total Contributing EDA Area (Acres) = 12.3

Manufactured System								
Location	Side	Contributing Drainage Area (Acres)	Contributing ODOT Drainage Area (Acres)	Runoff Coefficient	WQf (cfs)	Type	Reserved Area	Weir Height (in)
Burgundy Bay Rd. UG	LT	10.00	6.32	0.75	4.88	4	25' x 37'	12
S. Frontage Rd. UG	RT	3.65	3.06	0.84	1.99	2	20' x 32'	8
N. Frontage Rd. UG	LT	4.51	2.88	0.76	2.23	3	25' x 33'	9

# UNDERGROUND SYSTEM NO. 1



Project: MED-18 - UG1  
 Project Number: 2013013  
 Designer: JAG  
 Date: 01/09/2016

### Water Quality Flow Calculations

$$WQ_f \text{ Required} = C * P * A / 12$$

Runoff Coefficient = C =	0.75
Precipitation Intensity = i =	0.65 in/hr
Area Draining to BMP = A =	10 Ac
Required $WQ_f = C * i * A =$	4.875 cfs
Manufactured System Type =	Type 4

### Water Quality Volume Calculations

$$WQ_v \text{ Required} = C * P * A / 12$$

Runoff Coefficient = C <sub>q</sub> =	0.62
Precipitation Depth = P =	0.75 in
Area Draining to BMP = A =	10 Ac
Required $WQ_v = C * P * A / 12 =$	0.388 Ac-ft 16880 cf
Additional 20% storage required = $WQ_v * 20\%$	N/A cf
Total Required $WQ_v =$	16880 cf
Total $WQ_v$ Provided =	16880 cf

**UNDERGROUND SYSTEM NO. 1 - VAULT LAYOUT - DRAWDOWN INPUTS**

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:30:00
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING       NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0
    
```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
UG1DrainageArea	25-Year	D51	.001	100	1000	1	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
UG1DrainageArea	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

```

;;Subcatchment CurveNum HydCon DryTime
;;-----
UG1DrainageArea 80      0.5      7
    
```

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
;Diversion Manhole					
D201	951.56	0	0	10	0
;Hydrodynamic Separator					
DWQ1	951.56	0	0	10	0
D201A	949.29	0	0	10	0
D51	951.68	0	0	10	0
D201B	944.40	0	0	10	0

```

D201D          951.22      0          0          10          0

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
;-----
HW53            943.94      FIXED        938.0            NO

[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve          Poned      Evap.
                Elev.        Depth        Depth        Curve        Params         Area       Frac.
                -----
UG1_Box        944.56      7            6            TABULAR      BoxWQ1         0          0

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node       Node         Length      N            Offset     Offset     Flow       Flow
;-----
P201            D201      D201D      22.2        .015         0          0          0          0
PWQ1            D201      DWQ1       20          .015         0          0          0          0
PWQ1A          DWQ1      UG1_Box    18.5        .015         0          7.00      0          0
P51            D51       D201       8           .015         0          0          0          0
P201A          D201A     D201B     16.6        .015         0          4.63      0          0
P201B          D201B     HW53      36.2        .015         0          0          0          0
P201D          D201D     D201A    124.5       .015         0          0          0          0

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node       Node         Type         Height     Coeff.      Gate     Time
;-----
R3              UG1_Box    D201B     SIDE         0          0.65       NO       0
R4              UG1_Box    D201B     SIDE         4.1        0.65       NO       0

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir         Crest      Disch.      Flap      End      End
                Node       Node         Type         Height     Coeff.      Gate     Con.    Coeff.
;-----
R5              UG1_Box    D201B     TRANSVERSE   6          3.33       NO       0       0
R2              D201      D201D     TRANSVERSE   0          3.33       NO       0       0

[XSECTIONS]
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;-----
P201            CIRCULAR   2          0          0          0          1
PWQ1            CIRCULAR   2          0          0          0          1
PWQ1A          CIRCULAR   2          0          0          0          1
P51            CIRCULAR   2          0          0          0          1
P201A          CIRCULAR   2.0        0          0          0          1
P201B          CIRCULAR   2          0          0          0          1
P201D          CIRCULAR   2          0          0          0          1
R3              CIRCULAR   .1042      0          0          0          0
R4              CIRCULAR   .25        0          0          0          0
R5              RECT_OPEN  1          4          0          0          0
R2              RECT_OPEN  1          2          0          0          0

[LOSSES]
;;Link          Inlet      Outlet      Average      Flap Gate
;-----

[CURVES]
;;Name          Type      X-Value      Y-Value
;-----
;144x20x6 for WQ
BoxWQ1          Storage   0            2880
BoxWQ1          Storage   7            2880

[TIMESERIES]
;;Name          Date      Time      Value
;-----
;1-Year
1-Year          0         0
1-Year          0.5       0.01025

```

1-Year	1	0.0123
1-Year	1.5	0.01025
1-Year	2	0.0123
1-Year	2.5	0.0123
1-Year	3	0.01435
1-Year	3.5	0.0123
1-Year	4	0.01435
1-Year	4.5	0.0164
1-Year	5	0.01435
1-Year	5.5	0.0164
1-Year	6	0.01845
1-Year	6.5	0.01845
1-Year	7	0.01845
1-Year	7.5	0.02255
1-Year	8	0.02255
1-Year	8.5	0.02665
1-Year	9	0.0287
1-Year	9.5	0.0328
1-Year	10	0.0369
1-Year	10.5	0.04715
1-Year	11	0.06355
1-Year	11.5	0.0984
1-Year	12	0.779
1-Year	12.5	0.1476
1-Year	13	0.07585
1-Year	13.5	0.05535
1-Year	14	0.04305
1-Year	14.5	0.0369
1-Year	15	0.0328
1-Year	15.5	0.0287
1-Year	16	0.0246
1-Year	16.5	0.02255
1-Year	17	0.02255
1-Year	17.5	0.0205
1-Year	18	0.01845
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1-Year	19.5	0.0164
1-Year	20	0.01435
1-Year	20.5	0.01435
1-Year	21	0.0123
1-Year	21.5	0.01435
1-Year	22	0.0123
1-Year	22.5	0.0123
1-Year	23	0.01025
1-Year	23.5	0.0123
1-Year	24	0.01025

;2-Year		
2-Year	0	0
2-Year	0.5	0.0123
2-Year	1	0.01476
2-Year	1.5	0.0123
2-Year	2	0.01476
2-Year	2.5	0.01476
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2-Year	6	0.02214
2-Year	6.5	0.02214
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2-Year	7.5	0.02706
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2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626

2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
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2-Year	15.5	0.03444
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2-Year	16.5	0.02706
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2-Year	18	0.02214
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2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
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5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142



5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843

25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year

50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368

50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year		
100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

DrawdownTest 11/10/2016 00:00 23433

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL

NODES ALL  
LINKS ALL

[TAGS]

[MAP]

DIMENSIONS -3832.078 0.000 13832.078 10000.000  
Units None

[COORDINATES]

;;Node	X-Coord	Y-Coord
D201	-1257.528	7771.538
DWQ1	-1257.528	8134.721
D201A	576.983	7770.361
D51	-1258.666	7486.805
D201B	576.149	8139.270
D201D	-911.377	7769.672
HW53	840.177	8262.929
UG1_Box	-389.344	8135.998

[VERTICES]

;;Link	X-Coord	Y-Coord
R3	91.539	8222.823
R4	95.082	8302.838
R5	64.285	8433.923
R2	-1020.352	7650.790

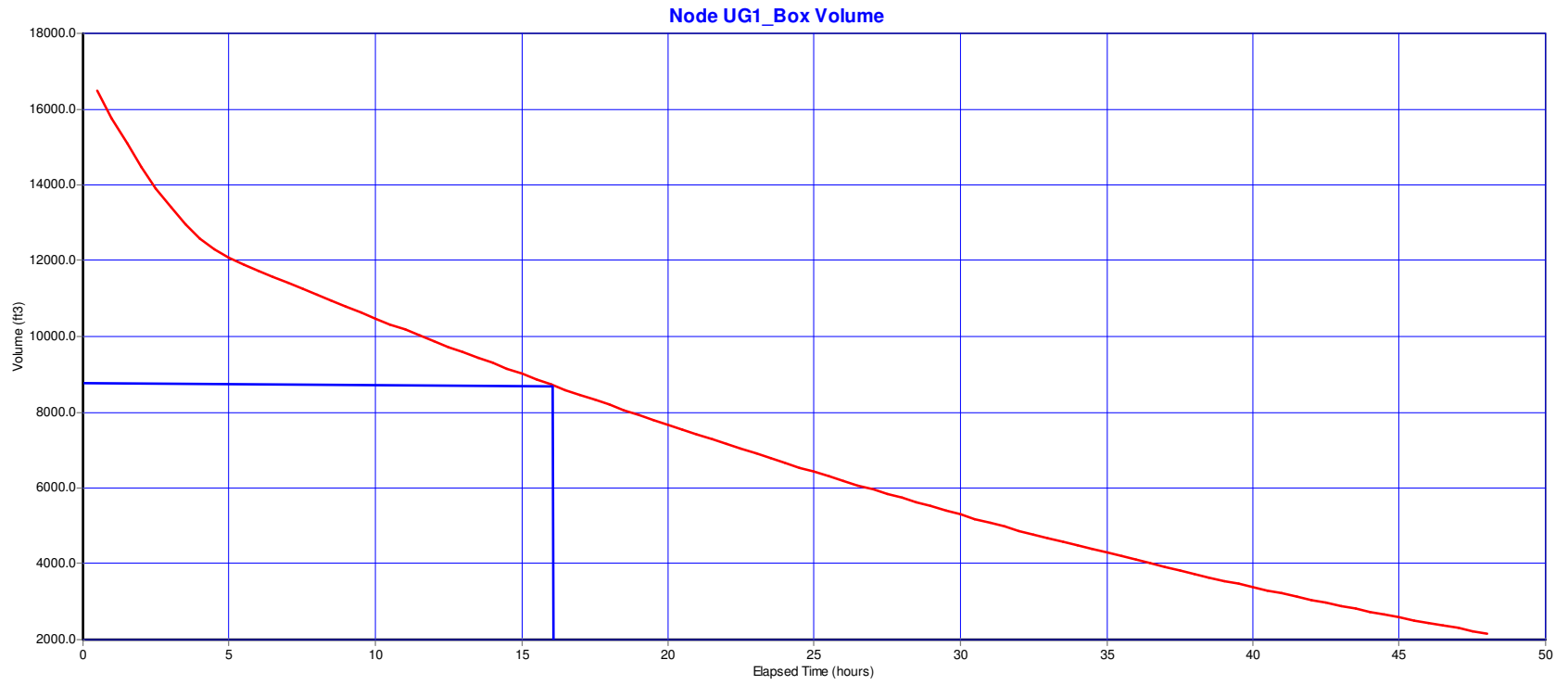
[Polygons]

;;Subcatchment	X-Coord	Y-Coord
UG1DrainageArea	-1677.282	7251.071
UG1DrainageArea	-1672.586	6776.784
UG1DrainageArea	-677.054	6767.392
UG1DrainageArea	-677.054	7255.767
UG1DrainageArea	-1700.762	7255.767

[SYMBOLS]

;;Gage	X-Coord	Y-Coord
1-Year	-3403.856	8880.415
10-Year	-3190.506	8880.523
25-Year	-2947.250	8873.859
100-Year	-2730.653	8867.194

UNDERGROUND SYSTEM NO. 1 - VAULT LAYOUT - DRAWDOWN GRAPH



**UNDERGROUND SYSTEM NO. 1 - VAULT LAYOUT - 25 YEAR STORM MODEL INPUT**

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
START_DATE           11/10/2016
START_TIME           00:00:00
REPORT_START_DATE    11/10/2016
REPORT_START_TIME    00:00:00
END_DATE             11/12/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:30:00
WET_STEP             00:05:30
DRY_STEP             01:00:30
ROUTING_STEP         0:00:10
ALLOW_PONDING       NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
    
```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch    Source
;;-----
1-Year      CUMULATIVE 0:30    1.0     TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0     TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0     TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0     TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
UG1DrainageArea	25-Year	D51	10.0	100	1000	1	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
UG1DrainageArea	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

```

;;Subcatchment CurveNum HydCon DryTime
;;-----
UG1DrainageArea 80      0.5      7
    
```

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
;Diversion Manhole					
D201	951.56	0	0	10	0
;Hydrodynamic Separator					
DWQ1	951.56	0	0	10	0
D201A	949.29	0	0	10	0
D51	951.68	0	0	10	0
D201B	944.40	0	0	10	0

```

D201D          951.22      0      0      10      0

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
;-----
HW53            943.94      FIXED        938.0            NO

[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve          Ponded      Evap.
                Elev.        Depth        Depth        Curve        Params         Area        Frac.
                -----
UG1_Box        944.56      7            0            TABULAR      BoxWQ1         0           0

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node       Node         Length      N            Offset     Offset     Flow       Flow
                -----
P201            D201      D201D      22.2        .015         0          0          0          0
PWQ1            D201      DWQ1       20          .015         0          0          0          0
PWQ1A          DWQ1      UG1_Box    18.5        .015         0          7.00       0          0
P51            D51       D201       8           .015         0          0          0          0
P201A          D201A     D201B     16.6        .015         0          4.63       0          0
P201B          D201B     HW53       36.2        .015         0          0          0          0
P201D          D201D     D201A     124.5       .015         0          0          0          0

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node       Node         Type         Height     Coeff.      Gate     Time
                -----
R3              UG1_Box    D201B     SIDE         0          0.65       NO       0
R4              UG1_Box    D201B     SIDE         4.1        0.65       NO       0

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
                Node       Node         Type      Height     Coeff.      Gate     Con.    Coeff.
                -----
R5              UG1_Box    D201B     TRANSVERSE  6          3.33       NO       0       0
R2              D201      D201D     TRANSVERSE  0          3.33       NO       0       0

[XSECTIONS]
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;-----
P201            CIRCULAR  2          0          0          0          1
PWQ1            CIRCULAR  2          0          0          0          1
PWQ1A          CIRCULAR  2          0          0          0          1
P51            CIRCULAR  2          0          0          0          1
P201A          CIRCULAR  2.0        0          0          0          1
P201B          CIRCULAR  2          0          0          0          1
P201D          CIRCULAR  2          0          0          0          1
R3              CIRCULAR  .1042      0          0          0          0
R4              CIRCULAR  .25        0          0          0          0
R5              RECT_OPEN  1          4          0          0          0
R2              RECT_OPEN  1          2          0          0          0

[LOSSES]
;;Link          Inlet      Outlet      Average      Flap Gate
;-----

[CURVES]
;;Name          Type      X-Value      Y-Value
;-----
;144x20x6 for WQ
BoxWQ1          Storage   0            2880
BoxWQ1          Storage   7            2880

[TIMESERIES]
;;Name          Date      Time      Value
;-----
;1-Year
1-Year          0         0
1-Year          0.5       0.01025

```

1-Year	1	0.0123
1-Year	1.5	0.01025
1-Year	2	0.0123
1-Year	2.5	0.0123
1-Year	3	0.01435
1-Year	3.5	0.0123
1-Year	4	0.01435
1-Year	4.5	0.0164
1-Year	5	0.01435
1-Year	5.5	0.0164
1-Year	6	0.01845
1-Year	6.5	0.01845
1-Year	7	0.01845
1-Year	7.5	0.02255
1-Year	8	0.02255
1-Year	8.5	0.02665
1-Year	9	0.0287
1-Year	9.5	0.0328
1-Year	10	0.0369
1-Year	10.5	0.04715
1-Year	11	0.06355
1-Year	11.5	0.0984
1-Year	12	0.779
1-Year	12.5	0.1476
1-Year	13	0.07585
1-Year	13.5	0.05535
1-Year	14	0.04305
1-Year	14.5	0.0369
1-Year	15	0.0328
1-Year	15.5	0.0287
1-Year	16	0.0246
1-Year	16.5	0.02255
1-Year	17	0.02255
1-Year	17.5	0.0205
1-Year	18	0.01845
1-Year	18.5	0.0164
1-Year	19	0.0164
1-Year	19.5	0.0164
1-Year	20	0.01435
1-Year	20.5	0.01435
1-Year	21	0.0123
1-Year	21.5	0.01435
1-Year	22	0.0123
1-Year	22.5	0.0123
1-Year	23	0.01025
1-Year	23.5	0.0123
1-Year	24	0.01025

; 2-Year		
2-Year	0	0
2-Year	0.5	0.0123
2-Year	1	0.01476
2-Year	1.5	0.0123
2-Year	2	0.01476
2-Year	2.5	0.01476
2-Year	3	0.01722
2-Year	3.5	0.01476
2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626



2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142

5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843

25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year

50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368

50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year		
100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

DrawdownTest 11/10/2016 00:00 23433

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL

NODES ALL  
LINKS ALL

[TAGS]

[MAP]

DIMENSIONS -3832.078 0.000 13832.078 10000.000  
Units None

[COORDINATES]

;;Node	X-Coord	Y-Coord
;;	-----	-----
D201	-1257.528	7771.538
DWQ1	-1257.528	8134.721
D201A	576.983	7770.361
D51	-1258.666	7486.805
D201B	576.149	8139.270
D201D	-911.377	7769.672
HW53	840.177	8262.929
UG1_Box	-389.344	8135.998

[VERTICES]

;;Link	X-Coord	Y-Coord
;;	-----	-----
R3	91.539	8222.823
R4	95.082	8302.838
R5	64.285	8433.923
R2	-1020.352	7650.790

[Polygons]

;;Subcatchment	X-Coord	Y-Coord
;;	-----	-----
UG1DrainageArea	-1680.057	7258.539
UG1DrainageArea	-1675.361	6784.252
UG1DrainageArea	-679.829	6774.860
UG1DrainageArea	-679.829	7263.235
UG1DrainageArea	-1703.537	7263.235

[SYMBOLS]

;;Gage	X-Coord	Y-Coord
;;	-----	-----
1-Year	-3403.856	8880.415
10-Year	-3190.506	8880.523
25-Year	-2947.250	8873.859
100-Year	-2730.653	8867.194

# UNDERGROUND SYSTEM NO. 1 - VAULT LAYOUT - 25 YEAR STATUS REPORT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

\*\*\*\*\*  
 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.  
 \*\*\*\*\*

\*\*\*\*\*  
 Analysis Options  
 \*\*\*\*\*  
 Flow Units ..... CFS  
 Process Models:  
   Rainfall/Runoff ..... YES  
   Snowmelt ..... NO  
   Groundwater ..... NO  
   Flow Routing ..... YES  
   Ponding Allowed ..... NO  
   Water Quality ..... NO  
 Infiltration Method ..... CURVE\_NUMBER  
 Flow Routing Method ..... DYNWAVE  
 Starting Date ..... NOV-10-2016 00:00:00  
 Ending Date ..... NOV-12-2016 00:00:00  
 Antecedent Dry Days ..... 0.0  
 Report Time Step ..... 00:30:00  
 Wet Time Step ..... 00:05:30  
 Dry Time Step ..... 01:00:30  
 Routing Time Step ..... 10.00 sec

WARNING 04: minimum elevation drop used for Conduit PWQ1

WARNING 04: minimum elevation drop used for Conduit PWQ1A

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation .....	2.445	2.933
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.000	0.000
Surface Runoff .....	2.458	2.949
Final Surface Storage ....	0.000	0.000
Continuity Error (%) .....	-0.540	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	2.458	0.801
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	2.347	0.765
Internal Outflow .....	0.000	0.000
Storage Losses .....	0.000	0.000
Initial Stored Volume ....	0.000	0.000
Final Stored Volume .....	0.111	0.036
Continuity Error (%) .....	0.002	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link P51 (59.26%)  
 Link P201B (2.17%)

\*\*\*\*\*

Highest Flow Instability Indexes

\*\*\*\*\*  
 Link P51 (8)  
 Link R2 (6)  
 Link PWQ1 (5)  
 Link P201 (4)

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*

Minimum Time Step : 0.50 sec  
 Average Time Step : 4.31 sec  
 Maximum Time Step : 10.00 sec  
 Percent in Steady State : 0.00  
 Average Iterations per Step : 2.10

\*\*\*\*\*  
 Subcatchment Runoff Summary  
 \*\*\*\*\*

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10 <sup>6</sup> gal	Peak Runoff CFS	Runoff Coeff
UG1DrainageArea	2.93	0.00	0.00	0.00	2.95	0.80	28.57	1.005

\*\*\*\*\*  
 Node Depth Summary  
 \*\*\*\*\*

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
D201	JUNCTION	0.29	1.28	952.84	0 12:27
DWQ1	JUNCTION	0.26	1.17	952.73	0 12:29
D201A	JUNCTION	0.36	1.36	950.65	0 12:28
D51	JUNCTION	0.43	1.93	953.61	0 12:29
D201B	JUNCTION	0.42	1.49	945.89	0 12:30
D201D	JUNCTION	0.36	1.37	952.59	0 12:28
HW53	OUTFALL	0.42	1.49	945.43	0 12:30
UG1_Box	STORAGE	3.77	5.77	950.33	0 13:33

\*\*\*\*\*  
 Node Inflow Summary  
 \*\*\*\*\*

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 <sup>6</sup> gal	Total Inflow Volume 10 <sup>6</sup> gal
D201	JUNCTION	0.00	30.83	0 12:25	0.000	0.801
DWQ1	JUNCTION	0.00	8.77	0 12:29	0.000	0.156
D201A	JUNCTION	0.00	19.85	0 12:28	0.000	0.645
D51	JUNCTION	28.57	28.57	0 12:30	0.801	0.801
D201B	JUNCTION	0.00	20.01	0 12:30	0.000	0.765
D201D	JUNCTION	0.00	19.92	0 12:28	0.000	0.645
HW53	OUTFALL	0.00	20.01	0 12:30	0.000	0.765
UG1_Box	STORAGE	0.00	8.74	0 12:30	0.000	0.156

\*\*\*\*\*  
 Node Surcharge Summary  
 \*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 ft3	Avg Pcmt Full	E&I Pcmt Loss	Maximum Volume 1000 ft3	Max Pcmt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
UG1_Box	10.848	54	0	16.626	82	0 13:33	0.42

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq. Pcmt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
HW53	99.47	3.29	20.01	0.765
System	99.47	3.29	20.01	0.765

\*\*\*\*\*  
Link Flow Summary  
\*\*\*\*\*

Link	Type	Maximum  Flow  CFS	Time of Max Occurrence days hr:min	Maximum  Veloc  ft/sec	Max/ Full Flow	Max/ Full Depth
P201	CONDUIT	15.25	0 12:28	6.96	0.63	0.66
PWQ1	CONDUIT	8.77	0 12:29	4.38	6.33	0.61
PWQ1A	CONDUIT	8.74	0 12:30	4.88	6.06	0.56
P51	CONDUIT	30.83	0 12:25	11.58	1.28	0.80
P201A	CONDUIT	19.84	0 12:28	8.70	0.81	0.68
P201B	CONDUIT	20.01	0 12:30	7.96	0.91	0.75
P201D	CONDUIT	19.85	0 12:28	8.68	0.81	0.68
R3	ORIFICE	0.10	0 13:42			1.00
R4	ORIFICE	0.32	0 13:33			1.00
R5	WEIR	0.00	0 00:00			0.00
R2	WEIR	4.72	0 12:16			1.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	--- Fraction of Dry Up Dry	Time in Flow Sub Crit	Class Sup Crit	---- Down Crit	Avg. Froude Number	Avg. Flow Change
P201	1.00	0.00 0.00 0.00	0.49	0.51	0.00 0.00	0.85	0.0000
PWQ1	1.00	0.00 0.00 0.00	1.00	0.00	0.00 0.00	0.35	0.0011
PWQ1A	1.00	0.00 0.00 0.00	0.00	0.00	0.00 1.00	0.55	0.0003
P51	1.00	0.00 0.00 0.00	0.11	0.88	0.00 0.00	1.89	0.0066



P201A	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.43	0.0000
P201B	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00	1.34	0.0001
P201D	1.00	0.00	0.00	0.00	0.18	0.81	0.00	0.00	1.34	0.0000

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
PWQ1	0.01	0.01	0.01	0.76	0.01
PWQ1A	0.01	0.01	0.01	0.74	0.01
P51	0.01	0.01	0.01	0.36	0.01

Analysis begun on: Sun Jan 15 11:32:18 2017  
 Analysis ended on: Sun Jan 15 11:32:19 2017  
 Total elapsed time: 00:00:01

## UNDERGROUND SYSTEM NO. 1 - PIPE LAYOUT - DRAWDOWN INPUTS

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:30:00
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING      NO
INERTIAL_DAMPING    PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0
  
```

[EVAPORATION]

```

;;Type      Parameters
;-----
CONSTANT    0.0
DRY_ONLY    NO
  
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year
  
```

[SUBCATCHMENTS]

Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
UG1DrainageArea	25-Year	D51	0.001	100	1000	1	0	

[SUBAREAS]

Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
UG1DrainageArea	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

Subcatchment	CurveNum	HydCon	DryTime
UG1DrainageArea	80	0.5	7

[JUNCTIONS]

Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
;Diversion Manhole					
D201	951.56	0	0	10	0
;Hydrodynamic Separator					
DWQ1	951.56	0	0	10	0
D201A	949.29	0	0	10	0
D51	951.68	0	0	10	0
D201B	944.40	0	0	10	0

```

D201D          951.22      0      0      10      0

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
;;              Elev.        Type          Time Series      Gate
;;-----
HW53           943.94      FIXED        938.0            NO

[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve          Poned      Evap.
;;              Elev.        Depth        Depth        Curve        Params         Area       Frac.
;;              -----
UG1_Pipe       944.56      7           6            TABULAR      PipeWQ1        0         0

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
;;              Node       Node        Length      N            Offset     Offset     Flow       Flow
;;-----
P201           D201      D201D      22.2        .015         0          0          0          0
PWQ1           D201      DWQ1       10          .015         0          0          0          0
PWQ1A         DWQ1      UG1_Pipe   18.5        .015         0          7          0          0
P51           D51       D201       8           .015         0          0          0          0
P201A         D201A    D201B     16.6        .015         0          4.63      0          0
P201B         D201B    HW53      36.2        .015         0          0          0          0
P201D         D201D    D201A    124.5       .015         0          0          0          0

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
;;              Node       Node        Type          Height     Coeff.      Gate      Time
;;-----
R3             UG1_Pipe   D201B     SIDE         0          0.65       NO       0
R4             UG1_Pipe   D201B     SIDE         4.25      0.65       NO       0

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir         Crest      Disch.      Flap      End      End
;;              Node       Node        Type          Height     Coeff.      Gate      Con.    Coeff.
;;-----
R5             UG1_Pipe   D201B     TRANSVERSE   6          3.33      NO       0       0
R2             D201      D201D     TRANSVERSE   0          3.33      NO       0       0

[XSECTIONS]
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
P201           CIRCULAR   2          0          0          0          1
PWQ1           CIRCULAR   2          0          0          0          1
PWQ1A         CIRCULAR   2          0          0          0          1
P51           CIRCULAR   2.25      0          0          0          1
P201A         CIRCULAR   2          0          0          0          1
P201B         CIRCULAR   2          0          0          0          1
P201D         CIRCULAR   2          0          0          0          1
R3            CIRCULAR   .1042     0          0          0          0
R4            CIRCULAR   .25       0          0          0          0
R5            RECT_OPEN  1         4          0          0          0
R2            RECT_OPEN  1         2          0          0          0

[LOSSES]
;;Link          Inlet      Outlet      Average      Flap Gate
;;-----

[CURVES]
;;Name          Type      X-Value      Y-Value
;;-----
;485'x7' dia pipe
PipeWQ1         Storage   0            0
PipeWQ1         Storage   0.4375      1644
PipeWQ1         Storage   0.875       2246
PipeWQ1         Storage   1.3125     2650
PipeWQ1         Storage   1.75       2940
PipeWQ1         Storage   2.1875     3147
PipeWQ1         Storage   2.625      3287
PipeWQ1         Storage   3.0625     3368
PipeWQ1         Storage   3.5        3395

```

PipeWQ1	3.9375	3368
PipeWQ1	4.375	3287
PipeWQ1	4.8125	3147
PipeWQ1	5.25	2940
PipeWQ1	5.6875	2650
PipeWQ1	6.125	2246
PipeWQ1	6.5625	1644
PipeWQ1	7	0

[TIMESERIES]

;;Name	Date	Time	Value
-----			
;;			
;1-Year			
1-Year		0	0
1-Year		0.5	0.01025
1-Year		1	0.0123
1-Year		1.5	0.01025
1-Year		2	0.0123
1-Year		2.5	0.0123
1-Year		3	0.01435
1-Year		3.5	0.0123
1-Year		4	0.01435
1-Year		4.5	0.0164
1-Year		5	0.01435
1-Year		5.5	0.0164
1-Year		6	0.01845
1-Year		6.5	0.01845
1-Year		7	0.01845
1-Year		7.5	0.02255
1-Year		8	0.02255
1-Year		8.5	0.02665
1-Year		9	0.0287
1-Year		9.5	0.0328
1-Year		10	0.0369
1-Year		10.5	0.04715
1-Year		11	0.06355
1-Year		11.5	0.0984
1-Year		12	0.779
1-Year		12.5	0.1476
1-Year		13	0.07585
1-Year		13.5	0.05535
1-Year		14	0.04305
1-Year		14.5	0.0369
1-Year		15	0.0328
1-Year		15.5	0.0287
1-Year		16	0.0246
1-Year		16.5	0.02255
1-Year		17	0.02255
1-Year		17.5	0.0205
1-Year		18	0.01845
1-Year		18.5	0.0164
1-Year		19	0.0164
1-Year		19.5	0.0164
1-Year		20	0.01435
1-Year		20.5	0.01435
1-Year		21	0.0123
1-Year		21.5	0.01435
1-Year		22	0.0123
1-Year		22.5	0.0123
1-Year		23	0.01025
1-Year		23.5	0.0123
1-Year		24	0.01025
;2-Year			
2-Year		0	0
2-Year		0.5	0.0123
2-Year		1	0.01476
2-Year		1.5	0.0123
2-Year		2	0.01476
2-Year		2.5	0.01476
2-Year		3	0.01722
2-Year		3.5	0.01476

2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123
;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426

5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year		
25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year		
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50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808

50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864



100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

DrawdownTest 11/10/2016 00:00 23433

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

[TAGS]

[MAP]  
DIMENSIONS 0.000 0.000 10000.000 10000.000  
Units None

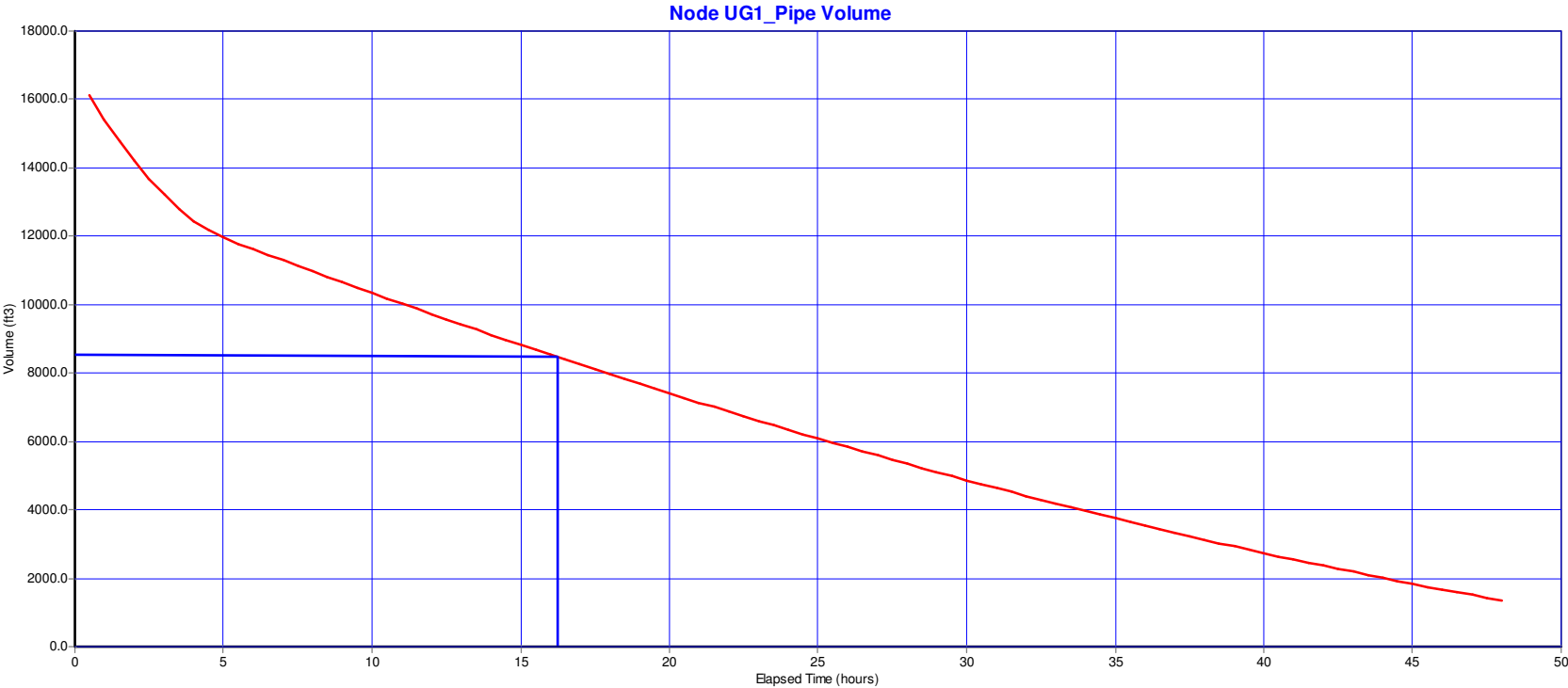
[COORDINATES]  
;;Node X-Coord Y-Coord  
;;-----  
D201 -1257.528 7771.538  
DWQ1 -1257.528 8134.721  
D201A 576.983 7770.361  
D51 -1258.666 7486.805  
D201B 576.149 8139.270  
D201D -916.354 7772.044  
HW53 840.177 8262.929  
UG1\_Pipe -391.366 8146.420

[VERTICES]  
;;Link X-Coord Y-Coord  
;;-----  
R3 91.539 8222.823  
R4 95.082 8302.838  
R5 82.232 8423.709  
R2 -1066.495 7657.807

[Polygons]  
;;Subcatchment X-Coord Y-Coord  
;;-----  
UG1DrainageArea -1659.450 7274.001  
UG1DrainageArea -1654.754 6799.714  
UG1DrainageArea -659.222 6790.322  
UG1DrainageArea -659.222 7278.697  
UG1DrainageArea -1682.930 7278.697

[SYMBOLS]  
;;Gage X-Coord Y-Coord  
;;-----  
1-Year -3403.856 8880.415  
10-Year -3195.871 8884.682  
25-Year -2961.615 8884.682  
100-Year -2724.106 8881.428

UNDERGROUND SYSTEM NO. 1 - PIPE LAYOUT - DRAWDOWN GRAPH



# UNDERGROUND SYSTEM NO. 1 - PIPE LAYOUT - 25 YEAR STORM MODEL INPUT

```

[TITLE]

[OPTIONS]
FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:30:00
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING       NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0

[EVAPORATION]
;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO

[RAINGAGES]
;;          Rain      Time   Snow   Data
;;Name      Type      Intrvl Catch  Source
;;-----
1-Year      CUMULATIVE 0:30   1.0    TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30   1.0    TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30   1.0    TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30   1.0    TIMESERIES 100-Year

[SUBCATCHMENTS]
;;          Total      Pcnt.      Pcnt.      Curb      Snow
;;Name      Raingage      Outlet      Area      Imperv      Width      Slope      Length      Pack
;;-----
UG1DrainageArea 25-Year      D51          10.0      100         1000       1          0

[SUBAREAS]
;;Subcatchment  N-Imperv  N-Perv  S-Imperv  S-Perv  PctZero  RouteTo  PctRouted
;;-----
UG1DrainageArea .011     .15     .05       .1       100      OUTLET

[INFILTRATION]
;;Subcatchment  CurveNum  HydCon  DryTime
;;-----
UG1DrainageArea 80        0.5     7

[JUNCTIONS]
;;          Invert      Max.      Init.      Surcharge  Poned
;;Name      Elev.      Depth     Depth     Depth     Area
;;-----
;Diversion Manhole
D201        951.56    0         0         10        0
;Hydrodynamic Separator
DWQ1        951.56    0         0         10        0
D201A       949.29    0         0         10        0
D51         951.68    0         0         10        0
D201B       944.40    0         0         10        0

```

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D201D          951.22      0      0      10      0

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
;;-----
HW53            943.94      FIXED        938.0            NO

[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve          Poned      Evap.
                Elev.        Depth        Depth        Curve        Params         Area       Frac.
                -----
UG1_Pipe       944.56      7            0            TABULAR      PipeWQ1        0          0

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node       Node         Length      N            Offset     Offset     Flow       Flow
                -----
P201            D201      D201D       22.2        .015         0          0          0          0
PWQ1            D201      DWQ1        10          .015         0          0          0          0
PWQ1A          DWQ1      UG1_Pipe    18.5        .015         0          7          0          0
P51            D51       D201        8           .015         0          0          0          0
P201A          D201A     D201B       16.6        .015         0          4.63      0          0
P201B          D201B     HW53        36.2        .015         0          0          0          0
P201D          D201D     D201A       124.5       .015         0          0          0          0

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node       Node         Type         Height     Coeff.      Gate      Time
                -----
R3              UG1_Pipe   D201B       SIDE         0          0.65       NO        0
R4              UG1_Pipe   D201B       SIDE         4.25      0.65       NO        0

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir         Crest      Disch.      Flap      End      End
                Node       Node         Type         Height     Coeff.      Gate      Con.    Coeff.
                -----
R5              UG1_Pipe   D201B       TRANSVERSE   6          3.33       NO        0        0
R2              D201      D201D       TRANSVERSE   0          3.33       NO        0        0

[XSECTIONS]
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
P201            CIRCULAR   2          0          0          0          1
PWQ1            CIRCULAR   2          0          0          0          1
PWQ1A          CIRCULAR   2          0          0          0          1
P51            CIRCULAR   2.25      0          0          0          1
P201A          CIRCULAR   2          0          0          0          1
P201B          CIRCULAR   2          0          0          0          1
P201D          CIRCULAR   2          0          0          0          1
R3              CIRCULAR   .1042     0          0          0          0
R4              CIRCULAR   .25       0          0          0          0
R5              RECT_OPEN  1          4          0          0          0
R2              RECT_OPEN  1          2          0          0          0

[LOSSES]
;;Link          Inlet      Outlet      Average      Flap Gate
;;-----

[CURVES]
;;Name          Type      X-Value      Y-Value
;;-----
;485'x7' dia pipe
PipeWQ1         Storage   0            0
PipeWQ1         Storage   0.4375       1644
PipeWQ1         Storage   0.875        2246
PipeWQ1         Storage   1.3125       2650
PipeWQ1         Storage   1.75         2940
PipeWQ1         Storage   2.1875       3147
PipeWQ1         Storage   2.625        3287
PipeWQ1         Storage   3.0625       3368
PipeWQ1         Storage   3.5          3395

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PipeWQ1	3.9375	3368
PipeWQ1	4.375	3287
PipeWQ1	4.8125	3147
PipeWQ1	5.25	2940
PipeWQ1	5.6875	2650
PipeWQ1	6.125	2246
PipeWQ1	6.5625	1644
PipeWQ1	7	0

[TIMESERIES]

;;Name	Date	Time	Value
;-----			
;1-Year			
1-Year		0	0
1-Year		0.5	0.01025
1-Year		1	0.0123
1-Year		1.5	0.01025
1-Year		2	0.0123
1-Year		2.5	0.0123
1-Year		3	0.01435
1-Year		3.5	0.0123
1-Year		4	0.01435
1-Year		4.5	0.0164
1-Year		5	0.01435
1-Year		5.5	0.0164
1-Year		6	0.01845
1-Year		6.5	0.01845
1-Year		7	0.01845
1-Year		7.5	0.02255
1-Year		8	0.02255
1-Year		8.5	0.02665
1-Year		9	0.0287
1-Year		9.5	0.0328
1-Year		10	0.0369
1-Year		10.5	0.04715
1-Year		11	0.06355
1-Year		11.5	0.0984
1-Year		12	0.779
1-Year		12.5	0.1476
1-Year		13	0.07585
1-Year		13.5	0.05535
1-Year		14	0.04305
1-Year		14.5	0.0369
1-Year		15	0.0328
1-Year		15.5	0.0287
1-Year		16	0.0246
1-Year		16.5	0.02255
1-Year		17	0.02255
1-Year		17.5	0.0205
1-Year		18	0.01845
1-Year		18.5	0.0164
1-Year		19	0.0164
1-Year		19.5	0.0164
1-Year		20	0.01435
1-Year		20.5	0.01435
1-Year		21	0.0123
1-Year		21.5	0.01435
1-Year		22	0.0123
1-Year		22.5	0.0123
1-Year		23	0.01025
1-Year		23.5	0.0123
1-Year		24	0.01025
;2-Year			
2-Year		0	0
2-Year		0.5	0.0123
2-Year		1	0.01476
2-Year		1.5	0.0123
2-Year		2	0.01476
2-Year		2.5	0.01476
2-Year		3	0.01722
2-Year		3.5	0.01476

2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123
;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426

5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year		
25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year		
50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808



50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864

100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

DrawdownTest 11/10/2016 00:00 23433

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

[TAGS]

[MAP]  
DIMENSIONS 0.000 0.000 10000.000 10000.000  
Units None

[COORDINATES]  
;;Node X-Coord Y-Coord  
;;-----  
D201 -1257.528 7771.538  
DWQ1 -1257.528 8134.721  
D201A 576.983 7770.361  
D51 -1258.666 7486.805  
D201B 576.149 8139.270  
D201D -916.354 7772.044  
HW53 840.177 8262.929  
UG1\_Pipe -391.366 8146.420

[VERTICES]  
;;Link X-Coord Y-Coord  
;;-----  
R3 91.539 8222.823  
R4 95.082 8302.838  
R5 82.232 8423.709  
R2 -1066.495 7657.807

[Polygons]  
;;Subcatchment X-Coord Y-Coord  
;;-----  
UG1DrainageArea -1659.450 7274.001  
UG1DrainageArea -1654.754 6799.714  
UG1DrainageArea -659.222 6790.322  
UG1DrainageArea -659.222 7278.697  
UG1DrainageArea -1682.930 7278.697

[SYMBOLS]  
;;Gage X-Coord Y-Coord  
;;-----  
1-Year -3403.856 8880.415  
10-Year -3195.871 8884.682  
25-Year -2961.615 8884.682  
100-Year -2724.106 8881.428

# UNDERGROUND SYSTEM NO. 1 - PIPE LAYOUT - 25 YEAR STATUS REPORT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

\*\*\*\*\*  
 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.  
 \*\*\*\*\*

\*\*\*\*\*  
 Analysis Options  
 \*\*\*\*\*  
 Flow Units ..... CFS  
 Process Models:  
   Rainfall/Runoff ..... YES  
   Snowmelt ..... NO  
   Groundwater ..... NO  
   Flow Routing ..... YES  
   Ponding Allowed ..... NO  
   Water Quality ..... NO  
 Infiltration Method ..... CURVE\_NUMBER  
 Flow Routing Method ..... DYNWAVE  
 Starting Date ..... NOV-10-2016 00:00:00  
 Ending Date ..... NOV-12-2016 00:00:00  
 Antecedent Dry Days ..... 0.0  
 Report Time Step ..... 00:30:00  
 Wet Time Step ..... 00:05:30  
 Dry Time Step ..... 01:00:30  
 Routing Time Step ..... 10.00 sec

WARNING 04: minimum elevation drop used for Conduit PWQ1

WARNING 04: minimum elevation drop used for Conduit PWQ1A

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation .....	2.445	2.933
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.000	0.000
Surface Runoff .....	2.458	2.949
Final Surface Storage ....	0.000	0.000
Continuity Error (%) .....	-0.540	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	2.458	0.801
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	2.354	0.767
Internal Outflow .....	0.000	0.000
Storage Losses .....	0.000	0.000
Initial Stored Volume ....	0.000	0.000
Final Stored Volume .....	0.103	0.034
Continuity Error (%) .....	0.002	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link P51 (45.90%)  
 Link PWQ1 (5.62%)  
 Link P201A (4.44%)

\*\*\*\*\*  
Highest Flow Instability Indexes  
\*\*\*\*\*  
All links are stable.

\*\*\*\*\*  
Routing Time Step Summary  
\*\*\*\*\*  
Minimum Time Step : 0.50 sec  
Average Time Step : 4.85 sec  
Maximum Time Step : 10.00 sec  
Percent in Steady State : 0.00  
Average Iterations per Step : 2.00

\*\*\*\*\*  
Subcatchment Runoff Summary  
\*\*\*\*\*

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
UG1DrainageArea	2.93	0.00	0.00	0.00	2.95	0.80	28.57	1.005

\*\*\*\*\*  
Node Depth Summary  
\*\*\*\*\*

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
D201	JUNCTION	0.29	1.25	952.81	0 12:30
DWQ1	JUNCTION	0.28	1.19	952.75	0 12:30
D201A	JUNCTION	0.36	1.35	950.64	0 12:30
D51	JUNCTION	0.40	1.62	953.30	0 12:30
D201B	JUNCTION	0.43	1.47	945.87	0 12:30
D201D	JUNCTION	0.36	1.35	952.57	0 12:30
HW53	OUTFALL	0.43	1.47	945.41	0 12:30
UG1_Pipe	STORAGE	3.93	6.08	950.64	0 13:08

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
D201	JUNCTION	0.00	28.57	0 12:30	0.000	0.801
DWQ1	JUNCTION	0.00	9.09	0 12:30	0.000	0.166
D201A	JUNCTION	0.00	19.48	0 12:30	0.000	0.634
D51	JUNCTION	28.57	28.57	0 12:30	0.801	0.801
D201B	JUNCTION	0.00	19.69	0 12:30	0.000	0.767
D201D	JUNCTION	0.00	19.48	0 12:30	0.000	0.634
HW53	OUTFALL	0.00	19.69	0 12:30	0.000	0.767
UG1_Pipe	STORAGE	0.00	9.09	0 12:30	0.000	0.167

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
UG1_Pipe	10.692	58	0	17.052	93	0 13:08	0.76

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
HW53	99.41	3.45	19.69	0.767
System	99.41	3.45	19.69	0.767

\*\*\*\*\*  
Link Flow Summary  
\*\*\*\*\*

Link	Type	Maximum  Flow  CFS	Time of Max Occurrence days hr:min	Maximum  Veloc  ft/sec	Max/ Full Flow	Max/ Full Depth
P201	CONDUIT	14.87	0 12:30	6.88	0.61	0.65
PWQ1	CONDUIT	9.09	0 12:30	4.53	4.64	0.61
PWQ1A	CONDUIT	9.09	0 12:30	4.96	6.31	0.57
P51	CONDUIT	28.57	0 12:30	10.67	0.87	0.64
P201A	CONDUIT	19.48	0 12:30	8.67	0.79	0.67
P201B	CONDUIT	19.69	0 12:30	7.95	0.89	0.74
P201D	CONDUIT	19.48	0 12:30	8.65	0.80	0.67
R3	ORIFICE	0.11	0 13:41			1.00
R4	ORIFICE	0.33	0 13:08			1.00
R5	WEIR	0.32	0 13:08			0.08
R2	WEIR	4.61	0 12:27			1.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	--- Dry	Fraction of Up Dry	Down Dry	Time in Sub Crit	Flow Sup Crit	Class Up Crit	--- Down Crit	Avg. Froude Number	Avg. Flow Change
P201	1.00	0.01	0.00	0.00	0.50	0.50	0.00	0.00	0.83	0.0000
PWQ1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.36	0.0003
PWQ1A	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.54	0.0004
P51	1.00	0.01	0.00	0.00	0.14	0.85	0.00	0.00	1.84	0.0001
P201A	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	1.42	0.0001
P201B	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	1.33	0.0001

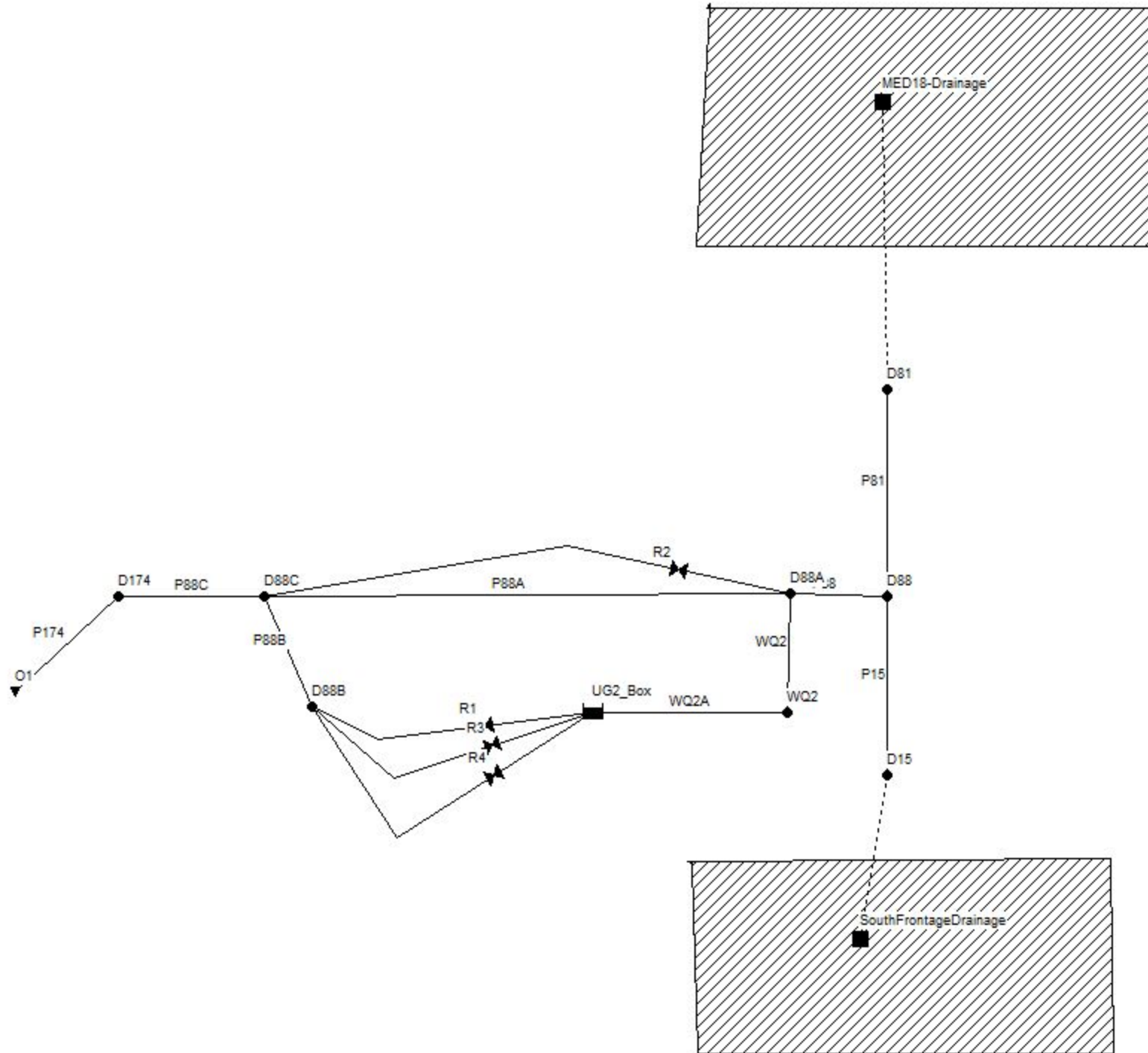
P201D 1.00 0.01 0.00 0.00 0.21 0.79 0.00 0.00 1.32 0.0001

\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
PWQ1	0.01	0.01	0.01	0.64	0.01
PWQ1A	0.01	0.01	0.01	0.80	0.01

Analysis begun on: Sun Jan 15 11:37:54 2017  
Analysis ended on: Sun Jan 15 11:37:54 2017  
Total elapsed time: < 1 sec

UNDERGROUND SYSTEM NO. 2



Project: MED-18 - UG2  
 Project Number: 2013013  
 Designer: JAG  
 Date: 01/09/2016

### Water Quality Flow Calculations

$$WQ_f \text{ Required} = C * P * A / 12$$

Runoff Coefficient = C =	0.84
Precipitation Intensity = i =	0.65 in/hr
Area Draining to BMP = A =	3.65 Ac
Required $WQ_f = C * i * A =$	1.993 cfs
Manufactured System Type =	Type 2

### Water Quality Volume Calculations

$$WQ_v \text{ Required} = C * P * A / 12$$

Runoff Coefficient = C <sub>q</sub> =	0.76
Precipitation Depth = P =	0.75 in
Area Draining to BMP = A =	3.65 Ac
Required $WQ_v = C * P * A / 12 =$	0.173 Ac-ft 7552 cf
Additional 20% storage required = $WQ_v * 20\%$	N/A cf
Total Required $WQ_v =$	7552 cf
Total $WQ_v$ Provided =	7552 cf

### Stormtech System Drawdown Calculations

$Z_0$ = Bottom Water Quality Volume Elevation =	976.59 ft
$Z_{WQv}$ = Total Water Quality Volume Elevation =	983.34 ft
$Z_{1/2WQv}$ = Pond Elevation Distance Between $WQ_v$ and half of $WQ_v$ =	2.98 ft
Minimum $WQ_v$ Drawdown Time	48.00 hrs
Minimum First 1/2 $WQ_v$ Drawdown Time	16.00 hrs
Average Allowable Release Rate of $WQ_v = Q_{WQv} = WQ_v /$ allowable time	0.044 ft <sup>3</sup> /s
Average Allowable Release Rate of The First Half of $WQ_v =$ $Q_{1/2WQv} = 0.5 * WQ_v /$ allowable time	0.066 ft <sup>3</sup> /s

#### Orifice Equation

$Q = A * C * \text{Sqrt}(2 * g * h)$	
Orifice Diameter = D =	0.90 in
C =	0.60
Gravity = g =	32.2 ft/s <sup>2</sup>
$A = \text{Pi}/4 * D^2 =$	0.0044 ft <sup>2</sup>
Average Head on Orifice for $WQ_v = H_{WQv} = ((Z_{WQv} - Z_0) / 2) -$ 1/2D =	3.3375 ft
Average Head on Orifice for First Half of the $WQ_v =$ $H_{1/2WQv} = ((Z_{WQv} - Z_0) + (Z_{1/2WQv}) / 2) - 1/2D =$	4.8275 ft
Actual Average Discharge Rate of $WQ_v = Q_{WQv} = A * C * \text{Sqrt}(2 * g * H_{WQv}) =$	0.039 ft <sup>3</sup> /s



Actual Average Discharge Rate of First Half of WQv =

$$Q_{1/2WQv} = A * C * \text{Sqrt}(2 * g * H_{1/2WQv}) =$$

0.047	ft <sup>3</sup> /s
-------	--------------------

Actual WQv Drawdown Time = WQv / (Q<sub>WQv</sub> \* 3,600) =

53.98	hrs
-------	-----

<b>GOOD</b>
-------------

Actual Drawdown Time of the First Half of WQv = 1/2 \*  
WQv / (Q<sub>1/2WQv</sub> \* 3,600) =

22.44	hrs
-------	-----

<b>GOOD</b>
-------------

### Water Quality Summary

Water Quality Volume (cf)	Minimum Drawdown time (hrs)	First Half Minimum Drawdown time (hrs)	Water Quality Elevation (ft)	Orifice Size (in)	Actual Drawdown Time (hrs)	First half Actual Drawdown time (hrs)
7552	48.00	16.00	983.34	0.90	53.98	22.44

**UNDERGROUND SYSTEM NO. 2 - VAULT LAYOUT - DRAWDOWN INPUTS**

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE           11/10/2016
START_TIME           00:00:00
REPORT_START_DATE    11/10/2016
REPORT_START_TIME    00:00:00
END_DATE             11/12/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:30:00
WET_STEP             00:05:30
DRY_STEP             01:00:30
ROUTING_STEP         0:00:10
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
    
```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
MED18-Drainage	25-Year	D81	.001	100	100	1.0	0	
SouthFrontageDrainage	25-Year	D15	.001	100	100	2	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
MED18-Drainage	.011	.15	.05	.1	100	OUTLET	
SouthFrontageDrainage	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

;;Subcatchment	CurveNum	HydCon	DryTime
MED18-Drainage	3.0	0.5	4
SouthFrontageDrainage	80	0.5	7

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
D81	988.13	0	0	10	0
D88	983.75	0	0	10	0
D88C	976.41	0	0	10	0
;Hydrodynamic Separator					

```

WQ2          983.59    0      0      10      0
D88B         976.59    0      0      10      0
;Diversion Manhole
D88A         983.59    0      0      10      0
D174         975.18    0      0      10      0
D15          984.43    0      0      10      0

```

```

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
;;-----
;Headwall for WQ2
O1              961.29      FREE         NO                NO

```

```

[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve
                Elev.        Depth        Depth        Curve        Params
                -----
UG2_Box         976.59      7            6            TABULAR      BoxWQ2
                -----
                Ponded      Evap.        Infiltration
                Area      Frac.
                -----
                0          0

```

```

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node      Node         Length      N            Offset     Offset     Flow      Flow
                -----
P81             D81        D88         24.5        .015         0          4.15       0          0
P88A            D88A       D88C        111         .015         0          6.07       0          10
P174            D174       O1          292.1       .015         0          0           0          0
WQ2             D88A       WQ2         10          .015         0          0           0          10
WQ2A            WQ2        UG2_Box     16          .015         0          7           0          10
P88B            D88B       D88C        12          .015         0          0           0          0
P88             D88        D88A        16          .015         0          0           0          0
P88C            D88C       D174        67          .015         0          0           0          0
P15             D15        D88         72.1        .015         0          0           0          0

```

```

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node      Node         Type         Height     Coeff.      Gate      Time
                -----
R1              UG2_Box    D88B        SIDE         0          0.65       NO       0
R3              UG2_Box    D88B        SIDE         4.5        0.65       NO       0

```

```

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
                Node      Node         Type      Height     Coeff.      Gate      Con.    Coeff.
                -----
R2              D88A       D88C        TRANSVERSE 0          3.33       NO       0       0
R4              UG2_Box    D88B        TRANSVERSE 6          3.33       NO       0       0

```

```

[XSECTIONS]
;;
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
                -----
P81             CIRCULAR  1.5        0          0          0          1
P88A            CIRCULAR  2          0          0          0          1
P174            CIRCULAR  3          0          0          0          1
WQ2             CIRCULAR  1.25       0          0          0          1
WQ2A            CIRCULAR  1.25       0          0          0          1
P88B            CIRCULAR  2          0          0          0          1
P88             CIRCULAR  2          0          0          0          1
P88C            CIRCULAR  2          0          0          0          1
P15             CIRCULAR  1.5        0          0          0          1
R1              CIRCULAR  .083       0          0          0          0
R3              CIRCULAR  .083       0          0          0          0
R2              RECT_OPEN 0.67       2          0          0          0
R4              RECT_OPEN 1          4          0          0          0

```

```

[LOSSES]
;;
;;Link          Inlet      Outlet      Average      Flap Gate
                -----

```

```

[CURVES]
;;
;;Name          Type      X-Value      Y-Value
                -----

```

```

;63x20x6 for WQv
BoxWQ2      Storage    0      1260
BoxWQ2      Storage    7      1260

```

```

[TIMESERIES]
;Name      Date      Time      Value
;-----
;1-Year
1-Year      0      0
1-Year      0.5    0.01025
1-Year      1      0.0123
1-Year      1.5    0.01025
1-Year      2      0.0123
1-Year      2.5    0.0123
1-Year      3      0.01435
1-Year      3.5    0.0123
1-Year      4      0.01435
1-Year      4.5    0.0164
1-Year      5      0.01435
1-Year      5.5    0.0164
1-Year      6      0.01845
1-Year      6.5    0.01845
1-Year      7      0.01845
1-Year      7.5    0.02255
1-Year      8      0.02255
1-Year      8.5    0.02665
1-Year      9      0.0287
1-Year      9.5    0.0328
1-Year      10     0.0369
1-Year      10.5   0.04715
1-Year      11     0.06355
1-Year      11.5   0.0984
1-Year      12     0.779
1-Year      12.5   0.1476
1-Year      13     0.07585
1-Year      13.5   0.05535
1-Year      14     0.04305
1-Year      14.5   0.0369
1-Year      15     0.0328
1-Year      15.5   0.0287
1-Year      16     0.0246
1-Year      16.5   0.02255
1-Year      17     0.02255
1-Year      17.5   0.0205
1-Year      18     0.01845
1-Year      18.5   0.0164
1-Year      19     0.0164
1-Year      19.5   0.0164
1-Year      20     0.01435
1-Year      20.5   0.01435
1-Year      21     0.0123
1-Year      21.5   0.01435
1-Year      22     0.0123
1-Year      22.5   0.0123
1-Year      23     0.01025
1-Year      23.5   0.0123
1-Year      24     0.01025

;2-Year
2-Year      0      0
2-Year      0.5    0.0123
2-Year      1      0.01476
2-Year      1.5    0.0123
2-Year      2      0.01476
2-Year      2.5    0.01476
2-Year      3      0.01722
2-Year      3.5    0.01476
2-Year      4      0.01722
2-Year      4.5    0.01968
2-Year      5      0.01722
2-Year      5.5    0.01968
2-Year      6      0.02214

```

2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year

5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366

5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135

25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135
; 50-Year		
50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544

50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244
;100-Year		
100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312



100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

```
[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES      ALL
LINKS      ALL
```

```
[TAGS]
```

```
[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

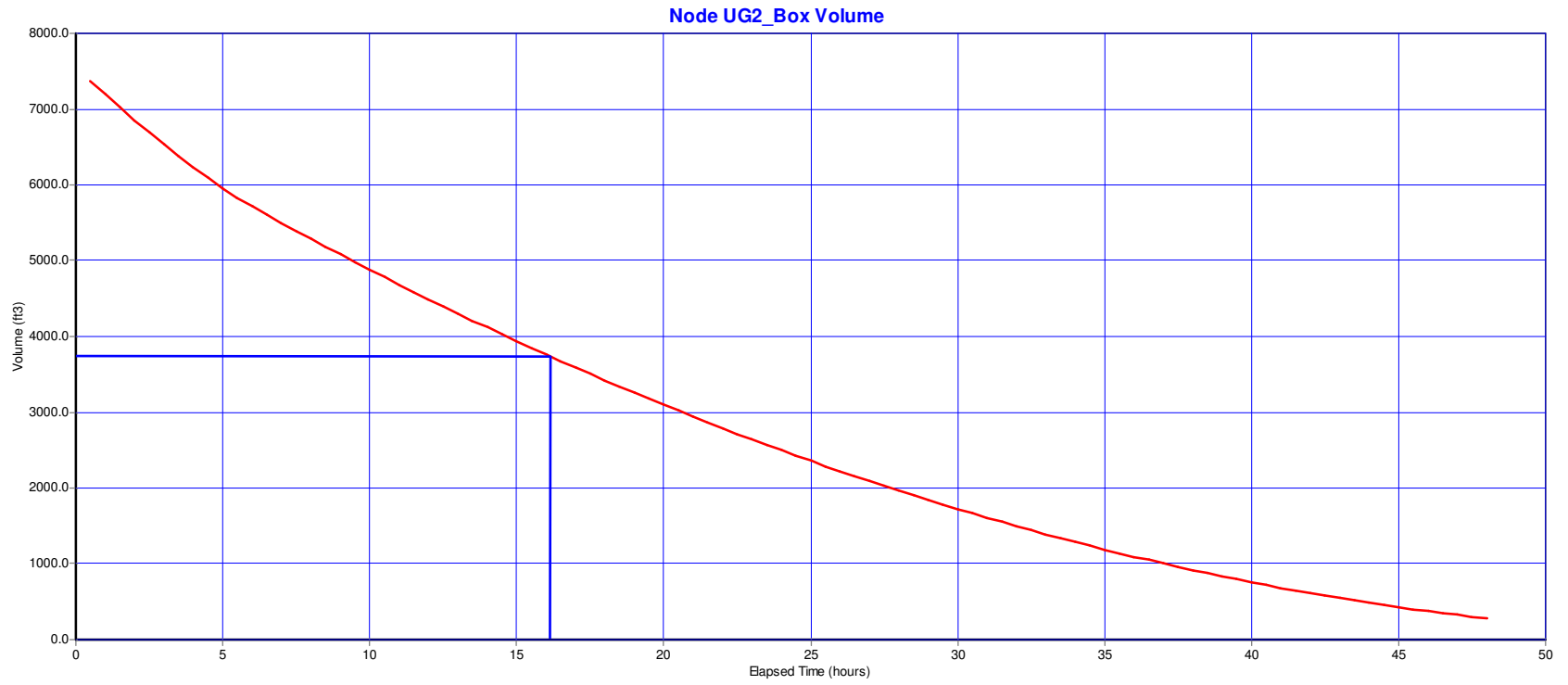
```
[COORDINATES]
;;Node      X-Coord      Y-Coord
;;-----
D81          1852.033      7618.769
D88          1851.922      6894.690
D88C        -325.060      6894.725
WQ2         1504.888      6488.070
D88B        -154.697      6507.443
D88A        1512.871      6901.978
D174        -830.899      6894.725
D15         1852.033      6269.864
O1          -1191.311      6561.704
UG2_Box     823.090      6489.614
```

```
[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----
R1          74.389      6396.555
R3          127.423      6258.914
R2          734.261      7073.347
R4          138.388      6050.877
```

```
[Polygons]
;;Subcatchment X-Coord      Y-Coord
;;-----
MED18-Drainage 1194.740      8964.777
MED18-Drainage 1150.246      8119.393
MED18-Drainage 2729.779      8119.393
MED18-Drainage 2729.779      8953.654
MED18-Drainage 1183.617      8953.654
SouthFrontageDrainage 1168.014      5961.943
SouthFrontageDrainage 1191.234      5294.362
SouthFrontageDrainage 2642.498      5294.362
SouthFrontageDrainage 2630.888      5979.359
SouthFrontageDrainage 1156.404      5967.749
```

```
[SYMBOLS]
;;Gage      X-Coord      Y-Coord
;;-----
1-Year      -3473.639      9301.258
10-Year     -3137.933      9297.467
25-Year     -2758.148      9302.669
100-Year    -2378.363      9297.467
```

UNDERGROUND SYSTEM NO. 2 - VAULT LAYOUT - DRAWDOWN GRAPH



**UNDERGROUND SYSTEM NO. 2 - VAULT LAYOUT - 25 YEAR STORM MODEL INPUT**

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:30:00
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING       NO
INERTIAL_DAMPING    PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0
    
```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch      Source
;;-----
1-Year      CUMULATIVE 0:30    1.0        TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0        TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0        TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0        TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
MED18-Drainage	25-Year	D81	2.13	100	100	1.0	0	
SouthFrontageDrainage	25-Year	D15	1.52	100	100	2	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
MED18-Drainage	.011	.15	.05	.1	100	OUTLET	
SouthFrontageDrainage	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

```

;;Subcatchment CurveNum HydCon DryTime
;;-----
MED18-Drainage 3.0      0.5    4
SouthFrontageDrainage 80      0.5    7
    
```

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
D81	988.13	0	0	10	0
D88	983.75	0	0	10	0
D88C	976.41	0	0	10	0
;Hydrodynamic Separator					

```

WQ2          983.59    0      0      10      0
D88B        976.59    0      0      10      0
;Diversion Manhole
D88A        983.59    0      0      10      0
D174        975.18    0      0      10      0
D15         984.43    0      0      10      0

```

```

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
;;-----
;Headwall for WQ2
O1             961.29      FREE        NO                NO

```

```

[STORAGE]
;;
;;Name          Invert      Max.        Init.        Storage      Curve
                Elev.        Depth       Depth       Curve        Params
                -----
UG2_Box        976.59      7           0           TABULAR      BoxWQ2
                -----
                Ponded      Evap.
                Area      Frac.
                -----
                0           0
                -----
                Infiltration
                -----

```

```

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node      Node         Length      N            Offset     Offset     Flow      Flow
                -----
P81             D81        D88         24.5        .015         0          4.15       0          0
P88A           D88A       D88C        111         .015         0          6.07       0          10
P174           D174       O1          292.1       .015         0          0           0          0
WQ2            D88A       WQ2         10          .015         0          0           0          10
WQ2A           WQ2        UG2_Box     16          .015         0          7           0          10
P88B           D88B       D88C        12          .015         0          0           0          0
P88            D88        D88A        16          .015         0          0           0          0
P88C           D88C       D174        67          .015         0          0           0          0
P15            D15        D88         72.1        .015         0          0           0          0

```

```

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node      Node         Type         Height     Coeff.      Gate      Time
                -----
R1             UG2_Box    D88B        SIDE         0          0.65       NO       0
R3             UG2_Box    D88B        SIDE         4.5        0.65       NO       0

```

```

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
                Node      Node         Type      Height     Coeff.      Gate      Con.     Coeff.
                -----
R2             D88A       D88C        TRANSVERSE 0          3.33       NO       0         0
R4             UG2_Box    D88B        TRANSVERSE 6          3.33       NO       0         0

```

```

[XSECTIONS]
;;
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
                -----
P81             CIRCULAR  1.5        0          0          0          1
P88A           CIRCULAR  2          0          0          0          1
P174           CIRCULAR  3          0          0          0          1
WQ2            CIRCULAR  1.25       0          0          0          1
WQ2A           CIRCULAR  1.25       0          0          0          1
P88B           CIRCULAR  2          0          0          0          1
P88            CIRCULAR  2          0          0          0          1
P88C           CIRCULAR  2          0          0          0          1
P15            CIRCULAR  1.5        0          0          0          1
R1             CIRCULAR  .083       0          0          0          0
R3             CIRCULAR  .083       0          0          0          0
R2             RECT_OPEN 0.67       2          0          0          0
R4             RECT_OPEN 1          4          0          0          0

```

```

[LOSSES]
;;
;;Link          Inlet      Outlet      Average      Flap Gate
                -----

```

```

[CURVES]
;;
;;Name          Type      X-Value      Y-Value
                -----

```

```

;63x20x6 for WQv
BoxWQ2      Storage    0      1260
BoxWQ2      Storage    7      1260

```

```

[TIMESERIES]
;Name      Date      Time      Value
;-----
;1-Year
1-Year      0      0
1-Year      0.5    0.01025
1-Year      1      0.0123
1-Year      1.5    0.01025
1-Year      2      0.0123
1-Year      2.5    0.0123
1-Year      3      0.01435
1-Year      3.5    0.0123
1-Year      4      0.01435
1-Year      4.5    0.0164
1-Year      5      0.01435
1-Year      5.5    0.0164
1-Year      6      0.01845
1-Year      6.5    0.01845
1-Year      7      0.01845
1-Year      7.5    0.02255
1-Year      8      0.02255
1-Year      8.5    0.02665
1-Year      9      0.0287
1-Year      9.5    0.0328
1-Year      10     0.0369
1-Year      10.5   0.04715
1-Year      11     0.06355
1-Year      11.5   0.0984
1-Year      12     0.779
1-Year      12.5   0.1476
1-Year      13     0.07585
1-Year      13.5   0.05535
1-Year      14     0.04305
1-Year      14.5   0.0369
1-Year      15     0.0328
1-Year      15.5   0.0287
1-Year      16     0.0246
1-Year      16.5   0.02255
1-Year      17     0.02255
1-Year      17.5   0.0205
1-Year      18     0.01845
1-Year      18.5   0.0164
1-Year      19     0.0164
1-Year      19.5   0.0164
1-Year      20     0.01435
1-Year      20.5   0.01435
1-Year      21     0.0123
1-Year      21.5   0.01435
1-Year      22     0.0123
1-Year      22.5   0.0123
1-Year      23     0.01025
1-Year      23.5   0.0123
1-Year      24     0.01025

;2-Year
2-Year      0      0
2-Year      0.5    0.0123
2-Year      1      0.01476
2-Year      1.5    0.0123
2-Year      2      0.01476
2-Year      2.5    0.01476
2-Year      3      0.01722
2-Year      3.5    0.01476
2-Year      4      0.01722
2-Year      4.5    0.01968
2-Year      5      0.01722
2-Year      5.5    0.01968
2-Year      6      0.02214

```

2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366

5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135

25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135
; 50-Year		
50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544



50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244
;100-Year		
100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312

100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

```
[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

```
[TAGS]
```

```
[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

```
[COORDINATES]
;;Node      X-Coord      Y-Coord
;;-----
D81          1852.033      7618.769
D88          1851.922      6894.690
D88C        -325.060      6894.725
WQ2          1504.888      6488.070
D88B        -154.697      6507.443
D88A        1512.871      6901.978
D174        -830.899      6894.725
D15         1852.033      6269.864
O1          -1191.311      6561.704
UG2_Box     823.090      6489.614
```

```
[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----
R1          74.389      6396.555
R3          127.423      6258.914
R2          734.261      7073.347
R4          138.388      6050.877
```

```
[Polygons]
;;Subcatchment X-Coord      Y-Coord
;;-----
MED18-Drainage 1230.659      8962.182
MED18-Drainage 1186.165      8116.798
MED18-Drainage 2765.698      8116.798
MED18-Drainage 2765.698      8951.059
MED18-Drainage 1219.536      8951.059
SouthFrontageDrainage 1168.014      5961.943
SouthFrontageDrainage 1191.234      5294.362
SouthFrontageDrainage 2642.498      5294.362
SouthFrontageDrainage 2630.888      5979.359
SouthFrontageDrainage 1156.404      5967.749
```

```
[SYMBOLS]
;;Gage      X-Coord      Y-Coord
;;-----
1-Year      -3473.639      9301.258
10-Year     -3137.933      9297.467
25-Year     -2758.148      9302.669
100-Year    -2378.363      9297.467
```

# UNDERGROUND SYSTEM NO. 2 - VAULT LAYOUT - 25 YEAR STATUS REPORT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

-----

\*\*\*\*\*  
 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.  
 \*\*\*\*\*

\*\*\*\*\*  
 Analysis Options  
 \*\*\*\*\*  
 Flow Units ..... CFS  
 Process Models:  
   Rainfall/Runoff ..... YES  
   Snowmelt ..... NO  
   Groundwater ..... NO  
   Flow Routing ..... YES  
   Ponding Allowed ..... NO  
   Water Quality ..... NO  
 Infiltration Method ..... CURVE\_NUMBER  
 Flow Routing Method ..... DYNWAVE  
 Starting Date ..... NOV-10-2016 00:00:00  
 Ending Date ..... NOV-12-2016 00:00:00  
 Antecedent Dry Days ..... 0.0  
 Report Time Step ..... 00:30:00  
 Wet Time Step ..... 00:05:30  
 Dry Time Step ..... 01:00:30  
 Routing Time Step ..... 10.00 sec

WARNING 04: minimum elevation drop used for Conduit WQ2

WARNING 04: minimum elevation drop used for Conduit WQ2A

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation .....	0.892	2.933
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.000	0.000
Surface Runoff .....	0.896	2.946
Final Surface Storage ....	0.000	0.000
Continuity Error (%) .....	-0.447	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	0.896	0.292
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	0.889	0.290
Internal Outflow .....	0.000	0.000
Storage Losses .....	0.000	0.000
Initial Stored Volume ....	0.000	0.000
Final Stored Volume .....	0.008	0.002
Continuity Error (%) .....	0.000	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link P88 (20.37%)  
 Link WQ2 (11.18%)  
 Link WQ2A (1.73%)

\*\*\*\*\*  
Highest Flow Instability Indexes  
\*\*\*\*\*  
All links are stable.

\*\*\*\*\*  
Routing Time Step Summary  
\*\*\*\*\*  
Minimum Time Step : 0.95 sec  
Average Time Step : 7.40 sec  
Maximum Time Step : 10.00 sec  
Percent in Steady State : 0.00  
Average Iterations per Step : 2.00

\*\*\*\*\*  
Subcatchment Runoff Summary  
\*\*\*\*\*

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10 <sup>6</sup> gal	Peak Runoff CFS	Runoff Coeff
MED18-Drainage	2.93	0.00	0.00	0.00	2.94	0.17	6.01	1.004
SouthFrontageDrainage	2.93	0.00	0.00	0.00	2.95	0.12	4.34	1.005

\*\*\*\*\*  
Node Depth Summary  
\*\*\*\*\*

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
D81	JUNCTION	0.17	0.91	989.04	0 12:30
D88	JUNCTION	0.20	1.03	984.78	0 12:30
D88C	JUNCTION	0.18	0.79	977.20	0 12:30
WQ2	JUNCTION	0.11	0.63	984.22	0 12:30
D88B	JUNCTION	0.10	0.61	977.20	0 12:30
D88A	JUNCTION	0.12	0.68	984.27	0 12:30
D174	JUNCTION	0.12	0.53	975.71	0 12:30
D15	JUNCTION	0.14	0.74	985.17	0 12:30
O1	OUTFALL	0.12	0.53	961.82	0 12:30
UG2_Box	STORAGE	1.44	2.98	979.57	0 14:37

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 <sup>6</sup> gal	Total Inflow Volume 10 <sup>6</sup> gal
D81	JUNCTION	6.01	6.01	0 12:30	0.170	0.170
D88	JUNCTION	0.00	10.35	0 12:30	0.000	0.292
D88C	JUNCTION	0.00	8.57	0 12:30	0.000	0.290
WQ2	JUNCTION	0.00	1.80	0 12:30	0.000	0.034
D88B	JUNCTION	0.00	0.07	0 12:01	0.000	0.032
D88A	JUNCTION	0.00	10.35	0 12:30	0.000	0.292
D174	JUNCTION	0.00	8.57	0 12:30	0.000	0.290
D15	JUNCTION	4.34	4.34	0 12:30	0.122	0.122
O1	OUTFALL	0.00	8.57	0 12:30	0.000	0.290
UG2_Box	STORAGE	0.00	1.80	0 12:30	0.000	0.034

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
UG2_Box	1.815	21	0	3.753	43	0 14:37	0.05

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
O1	99.02	0.96	8.57	0.290
System	99.02	0.96	8.57	0.290

\*\*\*\*\*  
Link Flow Summary  
\*\*\*\*\*

Link	Type	Maximum  Flow  CFS	Time of Max Occurrence days hr:min	Maximum  Veloc  ft/sec	Max/ Full Flow	Max/ Full Depth
P81	CONDUIT	6.01	0 12:30	5.37	0.68	0.61
P88A	CONDUIT	4.85	0 12:30	5.17	0.25	0.34
P174	CONDUIT	8.57	0 12:30	10.12	0.07	0.18
WQ2	CONDUIT	1.80	0 12:30	2.78	3.22	0.52
WQ2A	CONDUIT	1.80	0 12:30	3.23	4.08	0.46
P88B	CONDUIT	0.08	0 13:49	1.32	0.00	0.35
P88	CONDUIT	10.35	0 12:30	8.07	0.53	0.43
P88C	CONDUIT	8.57	0 12:30	9.46	0.32	0.33
P15	CONDUIT	4.34	0 12:30	4.02	0.49	0.59
R1	ORIFICE	0.05	0 14:37			1.00
R3	ORIFICE	0.00	0 00:00			0.00
R2	WEIR	3.69	0 12:30			1.00
R4	WEIR	0.00	0 00:00			0.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	--- Dry	Fraction Up Dry	of Down Dry	Time Sub Crit	in Sup Crit	Flow Class Up Crit	---- Down Crit	Avg. Froude Number	Avg. Flow Change

P81	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.99	0.0001
P88A	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.95	0.0000
P174	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	2.42	0.0000
WQ2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.20	0.0003
WQ2A	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.36	0.0004
P88B	1.00	0.01	0.01	0.00	0.64	0.34	0.00	0.00	0.54	0.0000
P88	1.00	0.01	0.00	0.00	0.26	0.73	0.00	0.00	1.47	0.0000
P88C	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	1.86	0.0000
P15	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.55	0.0000

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
WQ2	0.01	0.01	0.01	0.60	0.01
WQ2A	0.01	0.01	0.01	0.68	0.01

Analysis begun on: Sun Jan 15 12:23:25 2017  
 Analysis ended on: Sun Jan 15 12:23:25 2017  
 Total elapsed time: < 1 sec

UNDERGROUND SYSTEM NO. 2 - PIPE LAYOUT - DRAWDOWN INPUTS

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
START_DATE           11/10/2016
START_TIME           00:00:00
REPORT_START_DATE    11/10/2016
REPORT_START_TIME    00:00:00
END_DATE             11/12/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:00:30
WET_STEP             00:05:30
DRY_STEP             01:00:30
ROUTING_STEP         0:00:10
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
    
```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
MED18-Drainage	25-Year	D81	.001	100	100	1.0	0	
SouthFrontageDrainage	25-Year	D15	.001	100	100	2	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
MED18-Drainage	.011	.15	.05	.1	100	OUTLET	
SouthFrontageDrainage	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

;;Subcatchment	CurveNum	HydCon	DryTime
MED18-Drainage	3.0	0.5	4
SouthFrontageDrainage	80	0.5	7

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
D81	988.13	0	0	10	0
D88	983.75	0	0	10	0
D88C	976.41	0	0	10	0
;Hydrodynamic Separator					

```

WQ2          983.59    0      0      10      0
D88B        976.59    0      0      10      0
;Diversion Manhole
D88A        983.59    0      0      10      0
D174        975.18    0      0      10      0
D15         984.43    0      0      10      0

```

```

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
;;-----
;Headwall for WQ2
O1             961.29      FREE         NO                NO

```

```

[STORAGE]
;;
;;Name          Invert      Max.        Init.        Storage      Curve      Ponded      Evap.
                Elev.        Depth       Depth       Curve        Params     Area        Frac.
                -----
UG2_Pipe       976.59      7           6           TABULAR      PipeWQ2    0           0

```

```

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node       Node         Length      N            Offset     Offset     Flow       Flow
                -----
P81            D81        D88         24.5        .015         0          4.15       0          0
P88A          D88A      D88C        111         .015         0          6.07       0          10
P174          D174      O1          292.1       .015         0          0          0          0
WQ2           D88A      WQ2         10          .015         0          0          0          10
WQ2A          WQ2       UG2_Pipe    16          .015         0          7          0          10
P88B          D88B      D88C        12          .015         0          0          0          0
P88           D88       D88A        16          .015         0          0          0          0
P88C          D88C      D174        67          .015         0          0          0          0
P15           D15       D88         72.1        .015         0          0          0          0

```

```

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node       Node         Type         Height     Coeff.      Gate      Time
                -----
R1             UG2_Pipe   D88B        SIDE         0          0.65       NO       0
R3             UG2_Pipe   D88B        SIDE         4.8        0.65       NO       0

```

```

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
                Node       Node         Type      Height     Coeff.      Gate      Con.    Coeff.
                -----
R2             D88A      D88C        TRANSVERSE 0          3.33       NO       0       0
R4             UG2_Pipe   D88B        TRANSVERSE 6          3.33       NO       0       0

```

```

[XSECTIONS]
;;
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
                -----
P81            CIRCULAR   1.5        0          0          0          1
P88A          CIRCULAR   2          0          0          0          1
P174          CIRCULAR   3          0          0          0          1
WQ2           CIRCULAR   1.25       0          0          0          1
WQ2A          CIRCULAR   1.25       0          0          0          1
P88B          CIRCULAR   2          0          0          0          1
P88           CIRCULAR   2          0          0          0          1
P88C          CIRCULAR   2          0          0          0          1
P15           CIRCULAR   1.5        0          0          0          1
R1            CIRCULAR   .083       0          0          0          0
R3            CIRCULAR   .083       0          0          0          0
R2            RECT_OPEN  0.67       2          0          0          0
R4            RECT_OPEN  1          4          0          0          0

```

```

[LOSSES]
;;
;;Link          Inlet      Outlet      Average      Flap Gate
                -----

```

```

[CURVES]
;;
;;Name          Type      X-Value      Y-Value
                -----

```



```

;216 LF of 7' dia pipe
PipeWQ2      Storage    0      0
PipeWQ2      0.4375    732
PipeWQ2      0.875     1000
PipeWQ2      1.3125    1180
PipeWQ2      1.75      1309
PipeWQ2      2.1875    1402
PipeWQ2      2.625     1464
PipeWQ2      3.0625    1500
PipeWQ2      3.5       1512
PipeWQ2      3.9375    1500
PipeWQ2      4.375     1464
PipeWQ2      4.8125    1402
PipeWQ2      5.25      1309
PipeWQ2      5.6875    1180
PipeWQ2      6.125     1000
PipeWQ2      6.5625    732
PipeWQ2      7         0

```

```

[TIMESERIES]
;Name      Date      Time      Value
;-----
;1-Year
1-Year      0         0
1-Year      0.5       0.01025
1-Year      1         0.0123
1-Year      1.5       0.01025
1-Year      2         0.0123
1-Year      2.5       0.0123
1-Year      3         0.01435
1-Year      3.5       0.0123
1-Year      4         0.01435
1-Year      4.5       0.0164
1-Year      5         0.01435
1-Year      5.5       0.0164
1-Year      6         0.01845
1-Year      6.5       0.01845
1-Year      7         0.01845
1-Year      7.5       0.02255
1-Year      8         0.02255
1-Year      8.5       0.02665
1-Year      9         0.0287
1-Year      9.5       0.0328
1-Year      10        0.0369
1-Year      10.5     0.04715
1-Year      11        0.06355
1-Year      11.5     0.0984
1-Year      12        0.779
1-Year      12.5     0.1476
1-Year      13        0.07585
1-Year      13.5     0.05535
1-Year      14        0.04305
1-Year      14.5     0.0369
1-Year      15        0.0328
1-Year      15.5     0.0287
1-Year      16        0.0246
1-Year      16.5     0.02255
1-Year      17        0.02255
1-Year      17.5     0.0205
1-Year      18        0.01845
1-Year      18.5     0.0164
1-Year      19        0.0164
1-Year      19.5     0.0164
1-Year      20        0.01435
1-Year      20.5     0.01435
1-Year      21        0.0123
1-Year      21.5     0.01435
1-Year      22        0.0123
1-Year      22.5     0.0123
1-Year      23        0.01025
1-Year      23.5     0.0123
1-Year      24        0.01025

```

;2-Year		
2-Year	0	0
2-Year	0.5	0.0123
2-Year	1	0.01476
2-Year	1.5	0.0123
2-Year	2	0.01476
2-Year	2.5	0.01476
2-Year	3	0.01722
2-Year	3.5	0.01476
2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284

5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284

10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year

50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904

50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832

100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

```
[REPORT]
INPUT      NO
CONTROLS  NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

```
[TAGS]
```

```
[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

```
[COORDINATES]
;;Node      X-Coord      Y-Coord
;;-----
D81          1852.033      7618.769
D88          1851.922      6894.690
D88C         -325.060      6894.725
WQ2          1504.888      6488.070
D88B         -149.798      6502.304
D88A         1503.492      6892.320
D174         -830.899      6894.725
D15          1852.033      6269.864
O1           -1191.311     6561.704
UG2_Pipe     823.090       6489.614
```

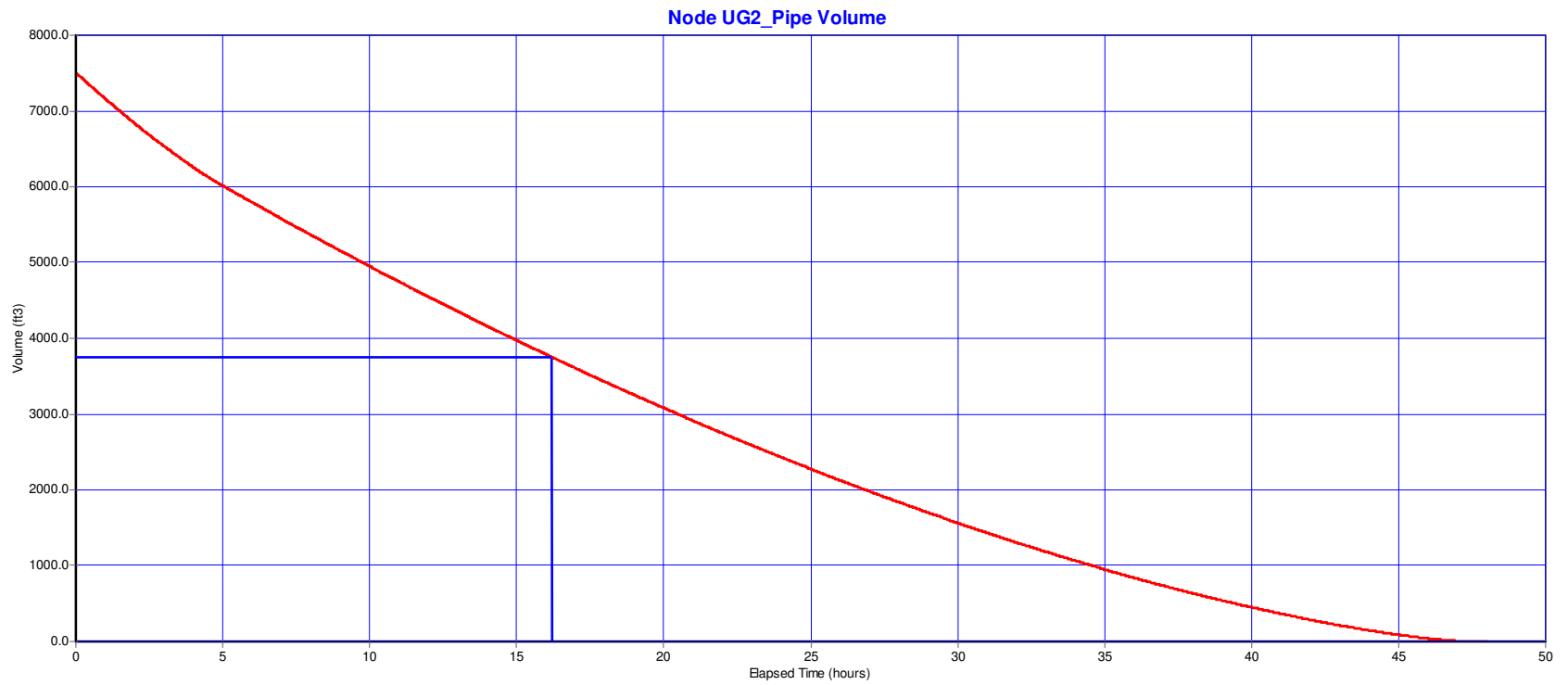
```
[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----
R1           74.389       6396.555
R3           127.423      6258.914
R2           734.261      7073.347
R4           142.658      6109.524
```

```
[Polygons]
;;Subcatchment X-Coord      Y-Coord
;;-----
MED18-Drainage 1237.501     8965.855
MED18-Drainage 1193.007     8120.471
MED18-Drainage 2772.540     8120.471
MED18-Drainage 2772.540     8954.732
MED18-Drainage 1226.378     8954.732
SouthFrontageDrainage 1168.014     5961.943
SouthFrontageDrainage 1191.234     5294.362
SouthFrontageDrainage 2642.498     5294.362
SouthFrontageDrainage 2630.888     5979.359
SouthFrontageDrainage 1156.404     5967.749
```

```
[SYMBOLS]
;;Gage      X-Coord      Y-Coord
;;-----
1-Year      -3544.855     9370.488
```

10-Year	-3210.543	9372.718
25-Year	-2852.367	9367.527
100-Year	-2400.755	9357.145

UNDERGROUND SYSTEM NO. 2 - PIPE LAYOUT - DRAWDOWN GRAPH





## UNDERGROUND SYSTEM NO. 2 - PIPE LAYOUT - 25 YEAR STORM MODEL INPUT

```

[TITLE]

[OPTIONS]
FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
START_DATE           11/10/2016
START_TIME           00:00:00
REPORT_START_DATE    11/10/2016
REPORT_START_TIME    00:00:00
END_DATE             11/12/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:00:30
WET_STEP             00:05:30
DRY_STEP             01:00:30
ROUTING_STEP         0:00:10
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO

[RAINGAGES]
;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year

[SUBCATCHMENTS]
;;          Raingage      Outlet      Total      Pcnt.      Pcnt.      Curb      Snow
;;Name      Raingage      Outlet      Area      Imperv      Width      Slope      Length     Pack
;;-----
MED18-Drainage 25-Year      D81          2.13      100        100        1.0        0
SouthFrontageDrainage 25-Year      D15          1.52      100        100        2          0

[SUBAREAS]
;;Subcatchment  N-Imperv  N-Perv      S-Imperv  S-Perv      PctZero      RouteTo      PctRouted
;;-----
MED18-Drainage .011      .15         .05         .1         100          OUTLET
SouthFrontageDrainage .011      .15         .05         .1         100          OUTLET

[INFILTRATION]
;;Subcatchment  CurveNum  HydCon      DryTime
;;-----
MED18-Drainage 3.0        0.5         4
SouthFrontageDrainage 80         0.5         7

[JUNCTIONS]
;;          Invert      Max.      Init.      Surcharge      Poned
;;Name      Elev.      Depth     Depth     Depth          Area
;;-----
D81          988.13     0         0         10             0
D88          983.75     0         0         10             0
D88C         976.41     0         0         10             0
;Hydrodynamic Separator

```

```

WQ2          983.59    0      0      10      0
D88B        976.59    0      0      10      0
;Diversion Manhole
D88A        983.59    0      0      10      0
D174        975.18    0      0      10      0
D15         984.43    0      0      10      0

```

```

[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
              Elev.        Type         Time Series      Gate
;;-----
;Headwall for WQ2
O1            961.29      FREE                NO

```

```

[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve
              Elev.        Depth        Depth        Curve        Params
              Ponded      Evap.        Infiltration
              Area      Frac.
;;-----
UG2_Pipe       976.59      7            0            TABULAR      PipeWQ2
              0            0

```

```

[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
              Node      Node              N            Offset      Offset      Flow      Flow
;;-----
P81            D81        D88          24.5        .015         0          4.15       0          0
P88A          D88A       D88C         111         .015         0          6.07       0          10
P174          D174       O1           292.1       .015         0          0           0          0
WQ2           D88A       WQ2          10          .015         0          0           0          10
WQ2A          WQ2        UG2_Pipe     16          .015         0          7           0          10
P88B          D88B       D88C         12          .015         0          0           0          0
P88           D88        D88A         16          .015         0          0           0          0
P88C          D88C       D174         67          .015         0          0           0          0
P15           D15        D88          72.1        .015         0          0           0          0

```

```

[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
              Node      Node      Type         Height     Coeff.      Gate      Time
;;-----
R1            UG2_Pipe   D88B       SIDE         0          0.65       NO       0
R3            UG2_Pipe   D88B       SIDE         4.8        0.65       NO       0

```

```

[WEIRS]
;;
;;Name          Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
              Node      Node      Type      Height     Coeff.      Gate      Con.     Coeff.
;;-----
R2            D88A       D88C       TRANSVERSE 0          3.33       NO       0         0
R4            UG2_Pipe   D88B       TRANSVERSE 6          3.33       NO       0         0

```

```

[XSECTIONS]
;;
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
;;-----
P81            CIRCULAR   1.5        0          0          0          1
P88A          CIRCULAR   2          0          0          0          1
P174          CIRCULAR   3          0          0          0          1
WQ2           CIRCULAR   1.25       0          0          0          1
WQ2A          CIRCULAR   1.25       0          0          0          1
P88B          CIRCULAR   2          0          0          0          1
P88           CIRCULAR   2          0          0          0          1
P88C          CIRCULAR   2          0          0          0          1
P15           CIRCULAR   1.5        0          0          0          1
R1            CIRCULAR   .083       0          0          0          0
R3            CIRCULAR   .083       0          0          0          0
R2            RECT_OPEN  0.67       2          0          0          0
R4            RECT_OPEN  1          4          0          0          0

```

```

[LOSSES]
;;
;;Link          Inlet      Outlet      Average      Flap Gate
;;-----

```

```

[CURVES]
;;
;;Name          Type      X-Value      Y-Value
;;-----

```

```

;216 LF of 7' dia pipe
PipeWQ2      Storage    0      0
PipeWQ2      0.4375    732
PipeWQ2      0.875     1000
PipeWQ2      1.3125    1180
PipeWQ2      1.75      1309
PipeWQ2      2.1875    1402
PipeWQ2      2.625     1464
PipeWQ2      3.0625    1500
PipeWQ2      3.5       1512
PipeWQ2      3.9375    1500
PipeWQ2      4.375     1464
PipeWQ2      4.8125    1402
PipeWQ2      5.25      1309
PipeWQ2      5.6875    1180
PipeWQ2      6.125     1000
PipeWQ2      6.5625    732
PipeWQ2      7         0

```

```

[TIMESERIES]
;Name      Date      Time      Value
;-----
;1-Year
1-Year      0         0
1-Year      0.5       0.01025
1-Year      1         0.0123
1-Year      1.5       0.01025
1-Year      2         0.0123
1-Year      2.5       0.0123
1-Year      3         0.01435
1-Year      3.5       0.0123
1-Year      4         0.01435
1-Year      4.5       0.0164
1-Year      5         0.01435
1-Year      5.5       0.0164
1-Year      6         0.01845
1-Year      6.5       0.01845
1-Year      7         0.01845
1-Year      7.5       0.02255
1-Year      8         0.02255
1-Year      8.5       0.02665
1-Year      9         0.0287
1-Year      9.5       0.0328
1-Year      10        0.0369
1-Year      10.5      0.04715
1-Year      11        0.06355
1-Year      11.5     0.0984
1-Year      12        0.779
1-Year      12.5     0.1476
1-Year      13        0.07585
1-Year      13.5     0.05535
1-Year      14        0.04305
1-Year      14.5     0.0369
1-Year      15        0.0328
1-Year      15.5     0.0287
1-Year      16        0.0246
1-Year      16.5     0.02255
1-Year      17        0.02255
1-Year      17.5     0.0205
1-Year      18        0.01845
1-Year      18.5     0.0164
1-Year      19        0.0164
1-Year      19.5     0.0164
1-Year      20        0.01435
1-Year      20.5     0.01435
1-Year      21        0.0123
1-Year      21.5     0.01435
1-Year      22        0.0123
1-Year      22.5     0.0123
1-Year      23        0.01025
1-Year      23.5     0.0123
1-Year      24        0.01025

```

;2-Year		
2-Year	0	0
2-Year	0.5	0.0123
2-Year	1	0.01476
2-Year	1.5	0.0123
2-Year	2	0.01476
2-Year	2.5	0.01476
2-Year	3	0.01722
2-Year	3.5	0.01476
2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284

5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284

10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year

50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904

50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832

100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

```
[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

```
[TAGS]
```

```
[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None
```

```
[COORDINATES]
;;Node      X-Coord      Y-Coord
;;-----
D81          1852.033      7618.769
D88          1851.922      6894.690
D88C         -325.060      6894.725
WQ2          1504.888      6488.070
D88B         -149.798      6502.304
D88A         1503.492      6892.320
D174         -830.899      6894.725
D15          1852.033      6269.864
O1           -1191.311      6561.704
UG2_Pipe     823.090       6489.614
```

```
[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----
R1           74.389       6396.555
R3           127.423      6258.914
R2           734.261      7073.347
R4           142.658      6109.524
```

```
[Polygons]
;;Subcatchment X-Coord      Y-Coord
;;-----
MED18-Drainage 1237.501      8965.855
MED18-Drainage 1193.007      8120.471
MED18-Drainage 2772.540      8120.471
MED18-Drainage 2772.540      8954.732
MED18-Drainage 1226.378      8954.732
SouthFrontageDrainage 1168.014      5961.943
SouthFrontageDrainage 1191.234      5294.362
SouthFrontageDrainage 2642.498      5294.362
SouthFrontageDrainage 2630.888      5979.359
SouthFrontageDrainage 1156.404      5967.749
```

```
[SYMBOLS]
;;Gage      X-Coord      Y-Coord
;;-----
1-Year      -3544.855      9370.488
```



10-Year	-3210.543	9372.718
25-Year	-2852.367	9367.527
100-Year	-2400.755	9357.145

# UNDERGROUND SYSTEM NO. 2 - PIPE LAYOUT- 25 YEAR STATUS REPORT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

\*\*\*\*\*  
 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.  
 \*\*\*\*\*

\*\*\*\*\*  
 Analysis Options  
 \*\*\*\*\*  
 Flow Units ..... CFS  
 Process Models:  
   Rainfall/Runoff ..... YES  
   Snowmelt ..... NO  
   Groundwater ..... NO  
   Flow Routing ..... YES  
   Ponding Allowed ..... NO  
   Water Quality ..... NO  
 Infiltration Method ..... CURVE\_NUMBER  
 Flow Routing Method ..... DYNWAVE  
 Starting Date ..... NOV-10-2016 00:00:00  
 Ending Date ..... NOV-12-2016 00:00:00  
 Antecedent Dry Days ..... 0.0  
 Report Time Step ..... 00:00:30  
 Wet Time Step ..... 00:05:30  
 Dry Time Step ..... 01:00:30  
 Routing Time Step ..... 10.00 sec

WARNING 04: minimum elevation drop used for Conduit WQ2

WARNING 04: minimum elevation drop used for Conduit WQ2A

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation .....	0.892	2.933
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.000	0.000
Surface Runoff .....	0.896	2.946
Final Surface Storage ....	0.000	0.000
Continuity Error (%) .....	-0.447	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	0.896	0.292
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	0.896	0.292
Internal Outflow .....	0.000	0.000
Storage Losses .....	0.000	0.000
Initial Stored Volume ....	0.000	0.000
Final Stored Volume .....	0.000	0.000
Continuity Error (%) .....	0.000	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link P88 (20.37%)  
 Link WQ2 (11.18%)  
 Link WQ2A (1.73%)

\*\*\*\*\*  
Highest Flow Instability Indexes  
\*\*\*\*\*  
All links are stable.

\*\*\*\*\*  
Routing Time Step Summary  
\*\*\*\*\*  
Minimum Time Step : 0.95 sec  
Average Time Step : 7.40 sec  
Maximum Time Step : 10.00 sec  
Percent in Steady State : 0.00  
Average Iterations per Step : 2.00

\*\*\*\*\*  
Subcatchment Runoff Summary  
\*\*\*\*\*

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10 <sup>6</sup> gal	Peak Runoff CFS	Runoff Coeff
MED18-Drainage	2.93	0.00	0.00	0.00	2.94	0.17	6.01	1.004
SouthFrontageDrainage	2.93	0.00	0.00	0.00	2.95	0.12	4.34	1.005

\*\*\*\*\*  
Node Depth Summary  
\*\*\*\*\*

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
D81	JUNCTION	0.17	0.91	989.04	0 12:30
D88	JUNCTION	0.20	1.03	984.78	0 12:30
D88C	JUNCTION	0.18	0.79	977.20	0 12:30
WQ2	JUNCTION	0.11	0.63	984.22	0 12:30
D88B	JUNCTION	0.10	0.61	977.20	0 12:30
D88A	JUNCTION	0.12	0.68	984.27	0 12:30
D174	JUNCTION	0.12	0.53	975.71	0 12:30
D15	JUNCTION	0.14	0.74	985.17	0 12:30
O1	OUTFALL	0.12	0.53	961.82	0 12:30
UG2_Pipe	STORAGE	1.64	3.22	979.81	0 14:34

\*\*\*\*\*  
Node Inflow Summary  
\*\*\*\*\*

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10 <sup>6</sup> gal	Total Inflow Volume 10 <sup>6</sup> gal
D81	JUNCTION	6.01	6.01	0 12:30	0.170	0.170
D88	JUNCTION	0.00	10.35	0 12:30	0.000	0.292
D88C	JUNCTION	0.00	8.58	0 12:30	0.000	0.292
WQ2	JUNCTION	0.00	1.80	0 12:30	0.000	0.034
D88B	JUNCTION	0.00	0.05	0 14:34	0.000	0.034
D88A	JUNCTION	0.00	10.35	0 12:30	0.000	0.292
D174	JUNCTION	0.00	8.58	0 12:30	0.000	0.292
D15	JUNCTION	4.34	4.34	0 12:30	0.122	0.122
O1	OUTFALL	0.00	8.58	0 12:30	0.000	0.292
UG2_Pipe	STORAGE	0.00	1.80	0 12:30	0.000	0.034

\*\*\*\*\*  
Node Surcharge Summary  
\*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
UG2_Pipe	1.664	20	0	3.673	45	0 14:34	0.05

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
O1	98.95	0.97	8.58	0.292
System	98.95	0.97	8.58	0.292

\*\*\*\*\*  
Link Flow Summary  
\*\*\*\*\*

Link	Type	Maximum  Flow  CFS	Time of Max Occurrence days hr:min	Maximum  Veloc  ft/sec	Max/ Full Flow	Max/ Full Depth
P81	CONDUIT	6.01	0 12:30	5.37	0.68	0.61
P88A	CONDUIT	4.85	0 12:30	5.17	0.25	0.34
P174	CONDUIT	8.58	0 12:30	10.12	0.07	0.18
WQ2	CONDUIT	1.80	0 12:30	2.78	3.22	0.52
WQ2A	CONDUIT	1.80	0 12:30	3.23	4.08	0.46
P88B	CONDUIT	0.08	0 13:47	1.36	0.00	0.35
P88	CONDUIT	10.35	0 12:30	8.07	0.53	0.43
P88C	CONDUIT	8.58	0 12:30	9.46	0.32	0.33
P15	CONDUIT	4.34	0 12:30	4.02	0.49	0.59
R1	ORIFICE	0.05	0 14:34			1.00
R3	ORIFICE	0.00	0 00:00			0.00
R2	WEIR	3.69	0 12:30			1.00
R4	WEIR	0.00	0 00:00			0.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class --- Dry Dry Dry Crit	Up Down Sub	Time in Flow Class Sup Crit	Flow Class Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change

P81	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.99	0.0001
P88A	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.95	0.0000
P174	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	2.41	0.0000
WQ2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.20	0.0003
WQ2A	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.36	0.0004
P88B	1.00	0.01	0.00	0.00	0.65	0.33	0.00	0.00	0.55	0.0000
P88	1.00	0.01	0.00	0.00	0.26	0.73	0.00	0.00	1.47	0.0000
P88C	1.00	0.01	0.00	0.00	0.00	0.99	0.00	0.00	1.86	0.0000
P15	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.55	0.0000

\*\*\*\*\*  
 Conduit Surcharge Summary  
 \*\*\*\*\*

Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
WQ2	0.01	0.01	0.01	0.60	0.01
WQ2A	0.01	0.01	0.01	0.68	0.01

Analysis begun on: Sun Jan 15 12:25:57 2017  
 Analysis ended on: Sun Jan 15 12:25:58 2017  
 Total elapsed time: 00:00:01

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# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	-----	7.711	9.289	-----	11.29	12.76	14.65	20.02	21.88	UG 2 Area to Detention
3	Reservoir	1	0.041	0.045	-----	1.113	3.543	6.336	13.91	16.55	UG2 Routed

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	14.65	1	12	10,547	-----	-----	-----	UG 2 Area to Detention
3	Reservoir	6.336	1	19	9,069	1	981.76	8,642	UG2 Routed
UG2 Hydraflow StormTech.gpw					Return Period: 25 Year			Tuesday, 01 / 10 / 2017	



# Hydrograph Report

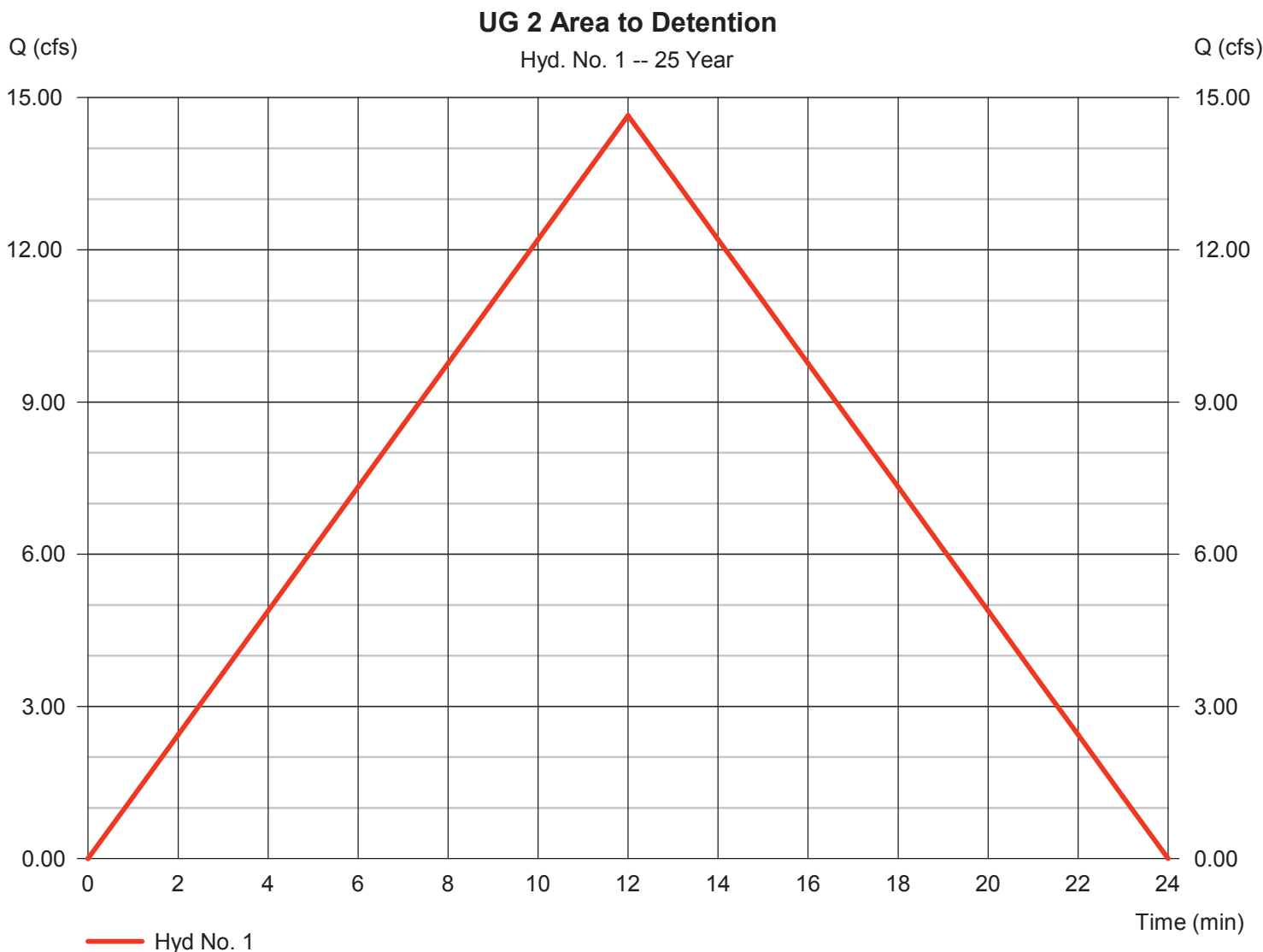
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Tuesday, 01 / 10 / 2017

## Hyd. No. 1

UG 2 Area to Detention

Hydrograph type	= Rational	Peak discharge	= 14.65 cfs
Storm frequency	= 25 yrs	Time to peak	= 12 min
Time interval	= 1 min	Hyd. volume	= 10,547 cuft
Drainage area	= 3.650 ac	Runoff coeff.	= 0.76
Intensity	= 5.281 in/hr	Tc by User	= 12.00 min
IDF Curve	= medina IDF.IDF	Asc/Rec limb fact	= 1/1





# Pond Report

## Pond No. 1 - MC 4500 Chambers UG2

### Pond Data

**UG Chambers** -Invert elev. = 977.34 ft, Rise x Span = 5.00 x 8.33 ft, Barrel Len = 56.33 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes  
**Encasement** -Invert elev. = 976.59 ft, Width = 9.50 ft, Height = 6.75 ft, Voids = 40.00%

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	976.59	n/a	0	0
0.68	977.27	n/a	580	580
1.35	977.94	n/a	1,256	1,836
2.03	978.62	n/a	1,328	3,164
2.70	979.29	n/a	1,301	4,465
3.38	979.97	n/a	1,257	5,722
4.05	980.64	n/a	1,193	6,915
4.72	981.32	n/a	1,101	8,016
5.40	981.99	n/a	961	8,977
6.08	982.66	n/a	677	9,654
6.75	983.34	n/a	580	10,234

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.90	0.00	0.00
Span (in)	= 24.00	0.90	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 976.59	976.59	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.65	0.65	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

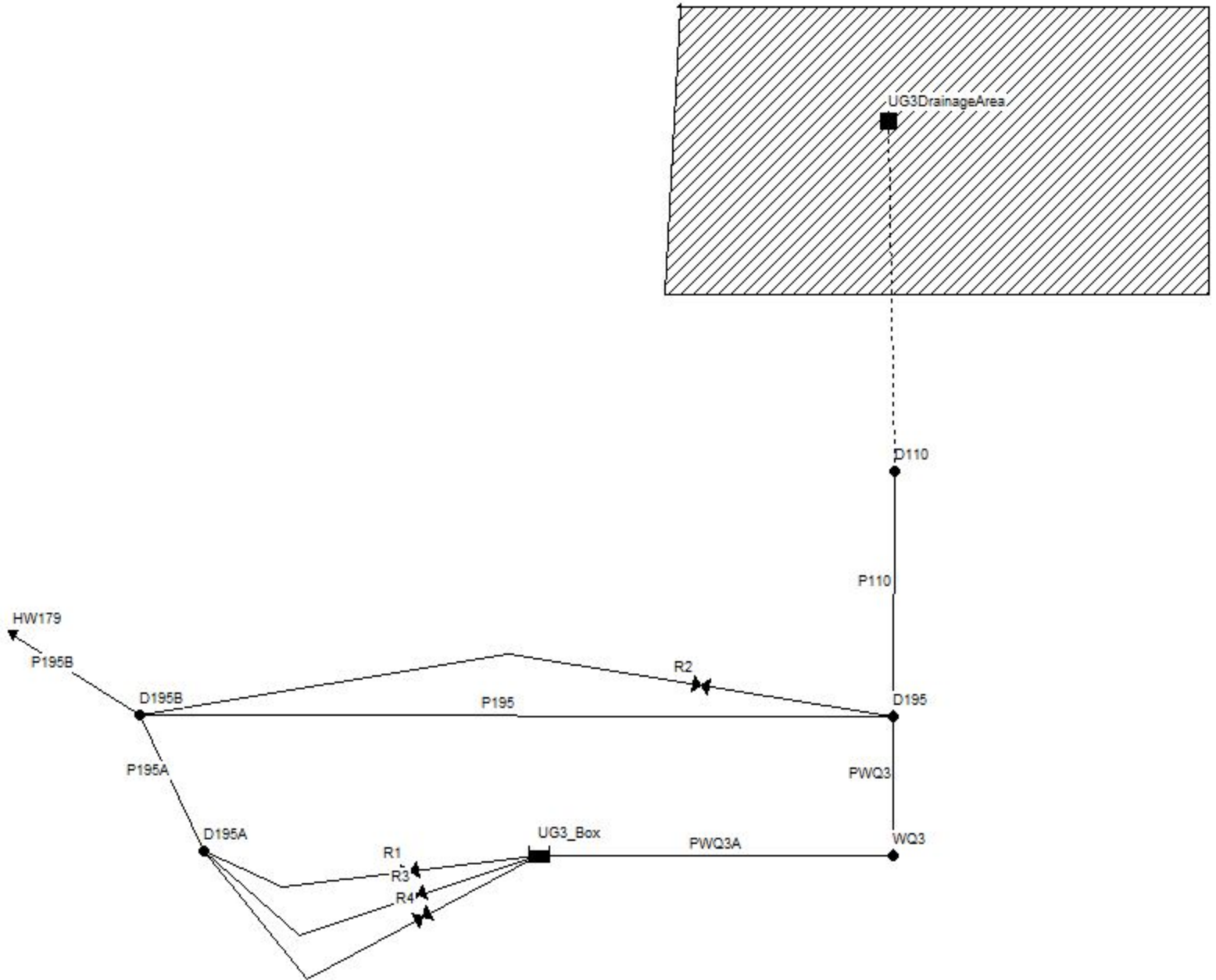
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 981.04	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	976.59	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.68	580	977.27	0.02 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.018
1.35	1,836	977.94	0.03 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.026
2.03	3,164	978.62	0.03 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.032
2.70	4,465	979.29	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.037
3.38	5,722	979.97	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.042
4.05	6,915	980.64	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.046
4.72	8,016	981.32	1.55 oc	0.05 ic	---	---	1.50	---	---	---	---	---	1.547
5.40	8,977	981.99	9.68 oc	0.04 ic	---	---	9.63	---	---	---	---	---	9.673
6.08	9,654	982.66	21.58 oc	0.04 ic	---	---	21.54	---	---	---	---	---	21.58
6.75	10,234	983.34	33.56 ic	0.03 ic	---	---	33.53 s	---	---	---	---	---	33.56

### UNDERGROUND SYSTEM NO. 3



Project: MED-18 - UG3  
 Project Number: 2013013  
 Designer: JAG  
 Date: 01/09/2016

### Water Quality Flow Calculations

$$WQ_f \text{ Required} = C * P * A / 12$$

Runoff Coefficient = C =	0.76
Precipitation Intensity = i =	0.65 in/hr
Area Draining to BMP = A =	4.51 Ac
Required $WQ_f = C * i * A =$	2.228 cfs
Manufactured System Type =	Type 3

### Water Quality Volume Calculations

$$WQ_v \text{ Required} = C * P * A / 12$$

Runoff Coefficient = C <sub>q</sub> =	0.62
Precipitation Depth = P =	0.75 in
Area Draining to BMP = A =	4.51 Ac
Required $WQ_v = C * P * A / 12 =$	0.175 Ac-ft 7613 cf
Additional 20% storage required = $WQ_v * 20\%$	N/A cf
Total Required $WQ_v =$	7613 cf
Total $WQ_v$ Provided =	7613 cf

### Stormtech System Drawdown Calculations

$Z_0$ = Bottom Water Quality Volume Elevation =	988.12 ft
$Z_{WQv}$ = Total Water Quality Volume Elevation =	992.65 ft
$Z_{1/2WQv}$ = Pond Elevation Distance Between $WQ_v$ and half of $WQ_v =$	2.32 ft
Minimum $WQ_v$ Drawdown Time	48.00 hrs
Minimum First 1/2 $WQ_v$ Drawdown Time	16.00 hrs
Average Allowable Release Rate of $WQ_v = Q_{WQv} = WQ_v /$ allowable time	0.044 ft <sup>3</sup> /s
Average Allowable Release Rate of The First Half of $WQ_v =$ $Q_{1/2WQv} = 0.5 * WQ_v /$ allowable time	0.066 ft <sup>3</sup> /s

### Orifice Equation

$Q = A * C * \text{Sqrt}(2 * g * h)$	
Orifice Diameter = D =	1.00 in
C =	0.60
Gravity = g =	32.2 ft/s <sup>2</sup>
$A = \pi / 4 * D^2 =$	0.0055 ft <sup>2</sup>
Average Head on Orifice for $WQ_v = H_{WQv} = ((Z_{WQv} - Z_0) /$ $2) - 1/2D =$	2.2233 ft
Average Head on Orifice for First Half of the $WQ_v =$ $H_{1/2WQv} = ((Z_{WQv} - Z_0) + (Z_{1/2WQv}) / 2) - 1/2D =$	3.3833 ft
Actual Average Discharge Rate of $WQ_v = Q_{WQv} = A * C *$ $\text{Sqrt}(2 * g * H_{WQv}) =$	0.039 ft <sup>3</sup> /s
Actual Average Discharge Rate of First Half of $WQ_v =$ $Q_{1/2WQv} = A * C * \text{Sqrt}(2 * g * H_{1/2WQv}) =$	0.048 ft <sup>3</sup> /s

Actual WQv Drawdown Time =  $WQv / (Q_{WQv} * 3,600) =$

54.00 hrs

**GOOD**

Actual Drawdown Time of the First Half of WQv =  $1/2 * WQv / (Q_{1/2WQv} * 3,600) =$

21.89 hrs

**GOOD**

### Water Quality Summary

Water Quality Volume (cf)	Minimum Drawdown time (hrs)	First Half Minimum Drawdown time (hrs)	Water Quality Elevation (ft)	Orifice Size (in)	Actual Drawdown Time (hrs)	First half Actual Drawdown time (hrs)
7613	48.00	16.00	992.65	1.00	54.00	21.89

## UNDERGROUND SYSTEM NO. 2 - VAULT LAYOUT - DRAWDOWN INPUTS

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:00:30
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING      NO
INERTIAL_DAMPING    PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0
    
```

[EVAPORATION]

```

;;Type      Parameters
;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
UG3DrainageArea	25-Year	D110	.001	100	350	1.0	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
UG3DrainageArea	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

;;Subcatchment	CurveNum	HydCon	DryTime
UG3DrainageArea	3.0	0.5	4

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
;D-110					
D110	995.38	0	0	10	0
;Diversion Manhole					
D195	995.12	0	0	10	0
D195B	985.92	0	0	10	0
;Hydrodynamic Structure					
WQ3	995.12	0	0	10	0

D195A 988.12 0 0 10 0

```
[OUTFALLS]
;;
;;Name      Invert      Outfall      Stage/Table      Tide
            Elev.      Type         Time Series      Gate
-----
;Headwall for WQ3
HW179      985.79      FREE         NO
```

```
[STORAGE]
;;
;;Name      Invert      Max.      Init.      Storage      Curve      Ponded      Evap.
            Elev.      Depth     Depth     Curve        Params     Area        Frac.
            -----
UG3_Box     988.12     7         6         TABULAR      BoxWQ3     0           0
            -----
```

```
[CONDUITS]
;;
;;Name      Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
            Node      Node         Length      N            Offset     Offset     Flow       Flow
            -----
P110      D110      D195        35          .015         0          0          0          0
P195      D195      D195B      122.3       .015         0          2.03       0          10
P195B     D195B     HW179      9.5         .015         0          0          0          0
PWQ3      D195      WQ3        10          .015         0          0          0          10
PWQ3A     WQ3       UG3_Box    16.5        .015         0          7          0          10
P195A     D195A     D195B      10          .015         0          0          0          0
```

```
[ORIFICES]
;;
;;Name      Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
            Node      Node         Type         Height     Coeff.      Gate      Time
            -----
R1          UG3_Box    D195A      BOTTOM        0          0.65       NO       0
R3          UG3_Box    D195A      BOTTOM        5          0.65       NO       0
```

```
[WEIRS]
;;
;;Name      Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
            Node      Node         Type      Height     Coeff.      Gate      Con.     Coeff.
            -----
R2          D195      D195B      TRANSVERSE  0          3.33       NO       0       0
R4          UG3_Box    D195A      TRANSVERSE  6          3.33       NO       0       0
```

```
[XSECTIONS]
;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
            -----
P110      CIRCULAR    2          0          0          0          1
P195      CIRCULAR    2          0          0          0          1
P195B     CIRCULAR    2          0          0          0          1
PWQ3      CIRCULAR    1.5        0          0          0          1
PWQ3A     CIRCULAR    1.5        0          0          0          1
P195A     CIRCULAR    2          0          0          0          1
R1        CIRCULAR    .083       0          0          0          0
R3        CIRCULAR    .125       0          0          0          0
R2        RECT_OPEN   .75        2          0          0          0
R4        RECT_OPEN   1          4          0          0          0
```

```
[LOSSES]
;;Link      Inlet      Outlet      Average      Flap Gate
            -----
```

```
[CURVES]
;;Name      Type      X-Value      Y-Value
            -----
;64x20x6 for WQv
BoxWQ3     Storage   0            1280
BoxWQ3     Storage   7            1280
```

```
[TIMESERIES]
;;Name      Date      Time      Value
            -----
;1-Year
1-Year     0         0         0
1-Year     0.5       0.01025
1-Year     1         0.0123
```



1-Year	1.5	0.01025
1-Year	2	0.0123
1-Year	2.5	0.0123
1-Year	3	0.01435
1-Year	3.5	0.0123
1-Year	4	0.01435
1-Year	4.5	0.0164
1-Year	5	0.01435
1-Year	5.5	0.0164
1-Year	6	0.01845
1-Year	6.5	0.01845
1-Year	7	0.01845
1-Year	7.5	0.02255
1-Year	8	0.02255
1-Year	8.5	0.02665
1-Year	9	0.0287
1-Year	9.5	0.0328
1-Year	10	0.0369
1-Year	10.5	0.04715
1-Year	11	0.06355
1-Year	11.5	0.0984
1-Year	12	0.779
1-Year	12.5	0.1476
1-Year	13	0.07585
1-Year	13.5	0.05535
1-Year	14	0.04305
1-Year	14.5	0.0369
1-Year	15	0.0328
1-Year	15.5	0.0287
1-Year	16	0.0246
1-Year	16.5	0.02255
1-Year	17	0.02255
1-Year	17.5	0.0205
1-Year	18	0.01845
1-Year	18.5	0.0164
1-Year	19	0.0164
1-Year	19.5	0.0164
1-Year	20	0.01435
1-Year	20.5	0.01435
1-Year	21	0.0123
1-Year	21.5	0.01435
1-Year	22	0.0123
1-Year	22.5	0.0123
1-Year	23	0.01025
1-Year	23.5	0.0123
1-Year	24	0.01025

;2-Year		
2-Year	0	0
2-Year	0.5	0.0123
2-Year	1	0.01476
2-Year	1.5	0.0123
2-Year	2	0.01476
2-Year	2.5	0.01476
2-Year	3	0.01722
2-Year	3.5	0.01476
2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808

2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836

5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843

25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year

50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488

50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

[TAGS]

[MAP]

DIMENSIONS 0.000 0.000 10000.000 10000.000  
Units None

[COORDINATES]

;;Node	X-Coord	Y-Coord
D110	1857.620	7608.454
D195	1851.922	6894.690
D195B	-335.916	6895.689
WQ3	1851.922	6489.394
D195A	-149.798	6502.304
HW179	-703.921	7128.336
UG3_Box	823.090	6489.614

[VERTICES]

;;Link	X-Coord	Y-Coord
R1	74.389	6396.555
R3	127.423	6258.914
R2	734.261	7073.347
R4	148.770	6128.533

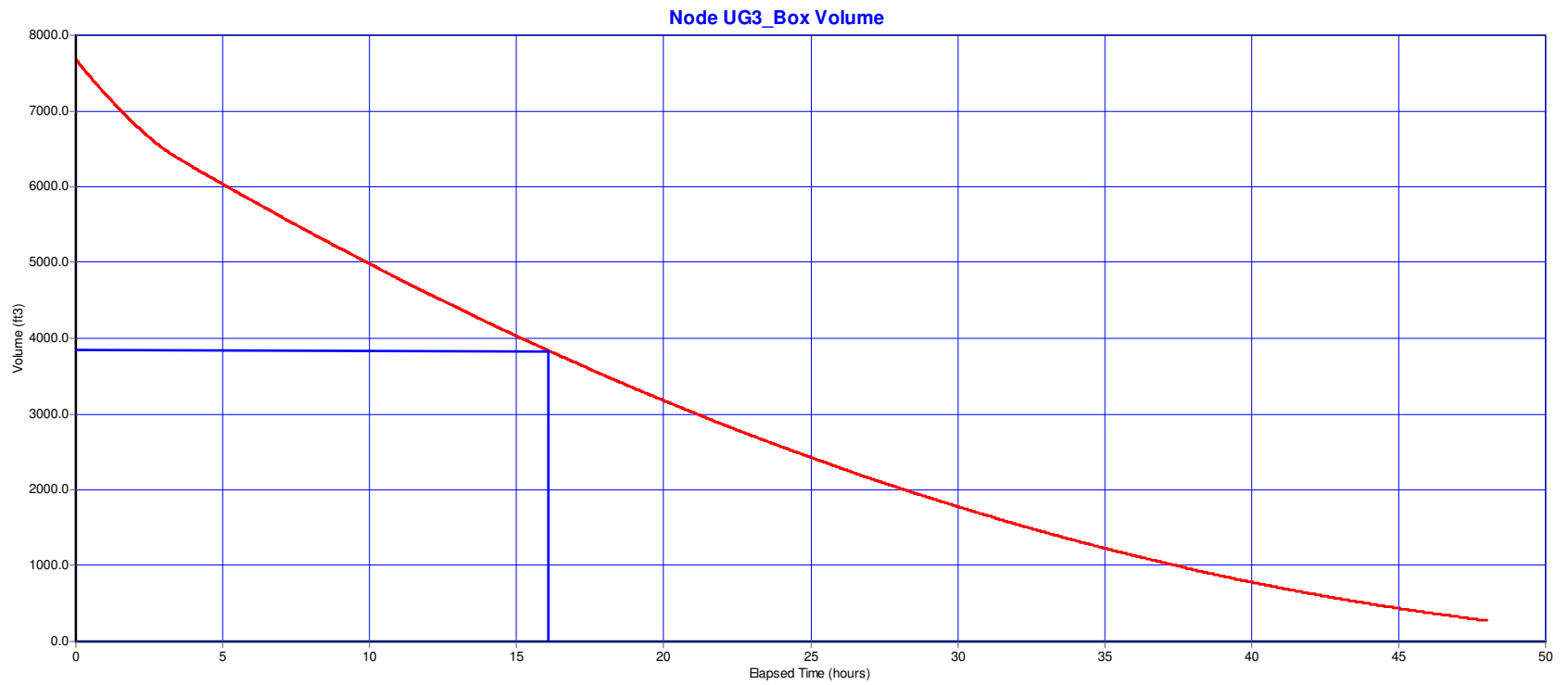
[Polygons]

;;Subcatchment	X-Coord	Y-Coord
UG3DrainageArea	1234.705	8965.517
UG3DrainageArea	1190.211	8120.133
UG3DrainageArea	2769.744	8120.133
UG3DrainageArea	2769.744	8954.394
UG3DrainageArea	1223.582	8954.394

[SYMBOLS]

;;Gage	X-Coord	Y-Coord
1-Year	-3481.793	9510.000
10-Year	-3166.118	9517.080
25-Year	-2817.352	9512.097
100-Year	-2433.708	9512.097

# UNDERGROUND SYSTEM NO. 3 - VAULT LAYOUT - DRAWDOWN GRAPH



## UNDERGROUND SYSTEM NO. 3 - VAULT LAYOUT - 25 YEAR STORM MODEL INPUT

```

[TITLE]

[OPTIONS]
FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:00:30
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING       NO
INERTIAL_DAMPING    PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0

[EVAPORATION]
;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO

[RAINGAGES]
;;          Rain      Time   Snow   Data
;;Name      Type      Intrvl Catch  Source
;;-----
1-Year      CUMULATIVE 0:30   1.0    TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30   1.0    TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30   1.0    TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30   1.0    TIMESERIES 100-Year

[SUBCATCHMENTS]
;;          Total      Pcnt.      Pcnt.      Curb      Snow
;;Name      Raingage      Outlet      Area      Imperv      Width      Slope      Length      Pack
;;-----
UG3DrainageArea 25-Year      D110      4.51      100      350      1.0      0

[SUBAREAS]
;;Subcatchment  N-Imperv  N-Perv  S-Imperv  S-Perv  PctZero  RouteTo  PctRouted
;;-----
UG3DrainageArea .011      .15      .05      .1      100      OUTLET

[INFILTRATION]
;;Subcatchment  CurveNum  HydCon  DryTime
;;-----
UG3DrainageArea 3.0      0.5      4

[JUNCTIONS]
;;          Invert      Max.      Init.      Surcharge  Poned
;;Name      Elev.      Depth     Depth     Depth     Area
;;-----
;D-110
D110      995.38      0      0      10      0
;Diversion Manhole
D195      995.12      0      0      10      0
D195B     985.92      0      0      10      0
;Hydrodynamic Structure
WQ3      995.12      0      0      10      0

```



D195A 988.12 0 0 10 0

```
[OUTFALLS]
;;
;;Name          Invert      Outfall      Stage/Table      Tide
                Elev.        Type         Time Series      Gate
-----
;Headwall for WQ3
HW179          985.79      FREE                NO
```

```
[STORAGE]
;;
;;Name          Invert      Max.         Init.         Storage      Curve          Ponded      Evap.
                Elev.        Depth        Depth        Curve        Params         Area        Frac.
                -----
UG3_Box        988.12      7            0            TABULAR      BoxWQ3         0           0
                -----
                Infiltration
```

```
[CONDUITS]
;;
;;Name          Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
                Node      Node              N           Offset      Offset      Flow      Flow
                -----
P110           D110      D195        35          .015         0           0           0           0
P195           D195      D195B      122.3       .015         0           2.03        0           10
P195B          D195B     HW179      9.5         .015         0           0           0           0
PWQ3           D195      WQ3        10          .015         0           0           0           10
PWQ3A          WQ3       UG3_Box    16.5        .015         0           7           0           10
P195A          D195A     D195B      10          .015         0           0           0           0
```

```
[ORIFICES]
;;
;;Name          Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
                Node      Node        Type         Height     Coeff.      Gate      Time
                -----
R1             UG3_Box    D195A      BOTTOM        0          0.65        NO        0
R3             UG3_Box    D195A      BOTTOM        5          0.65        NO        0
```

```
[WEIRS]
;;
;;Name          Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
                Node      Node        Type      Height     Coeff.      Gate      Con.     Coeff.
                -----
R2             D195      D195B      TRANSVERSE 0          3.33        NO        0         0
R4             UG3_Box    D195A      TRANSVERSE 6          3.33        NO        0         0
```

```
[XSECTIONS]
;;Link          Shape      Geom1      Geom2      Geom3      Geom4      Barrels
                -----
P110           CIRCULAR  2          0          0          0          1
P195           CIRCULAR  2          0          0          0          1
P195B          CIRCULAR  2          0          0          0          1
PWQ3           CIRCULAR  1.5        0          0          0          1
PWQ3A          CIRCULAR  1.5        0          0          0          1
P195A          CIRCULAR  2          0          0          0          1
R1             CIRCULAR  .083       0          0          0          0
R3             CIRCULAR  .125       0          0          0          0
R2             RECT_OPEN .75        2          0          0          0
R4             RECT_OPEN 1          4          0          0          0
```

```
[LOSSES]
;;Link          Inlet      Outlet      Average      Flap Gate
                -----
```

```
[CURVES]
;;Name          Type      X-Value      Y-Value
                -----
;64x20x6 for WQv
BoxWQ3          Storage  0            1280
BoxWQ3          Storage  7            1280
```

```
[TIMESERIES]
;;Name          Date      Time      Value
                -----
;1-Year
1-Year          0         0         0
1-Year          0.5       0.01025
1-Year          1         0.0123
```

1-Year	1.5	0.01025
1-Year	2	0.0123
1-Year	2.5	0.0123
1-Year	3	0.01435
1-Year	3.5	0.0123
1-Year	4	0.01435
1-Year	4.5	0.0164
1-Year	5	0.01435
1-Year	5.5	0.0164
1-Year	6	0.01845
1-Year	6.5	0.01845
1-Year	7	0.01845
1-Year	7.5	0.02255
1-Year	8	0.02255
1-Year	8.5	0.02665
1-Year	9	0.0287
1-Year	9.5	0.0328
1-Year	10	0.0369
1-Year	10.5	0.04715
1-Year	11	0.06355
1-Year	11.5	0.0984
1-Year	12	0.779
1-Year	12.5	0.1476
1-Year	13	0.07585
1-Year	13.5	0.05535
1-Year	14	0.04305
1-Year	14.5	0.0369
1-Year	15	0.0328
1-Year	15.5	0.0287
1-Year	16	0.0246
1-Year	16.5	0.02255
1-Year	17	0.02255
1-Year	17.5	0.0205
1-Year	18	0.01845
1-Year	18.5	0.0164
1-Year	19	0.0164
1-Year	19.5	0.0164
1-Year	20	0.01435
1-Year	20.5	0.01435
1-Year	21	0.0123
1-Year	21.5	0.01435
1-Year	22	0.0123
1-Year	22.5	0.0123
1-Year	23	0.01025
1-Year	23.5	0.0123
1-Year	24	0.01025

;2-Year		
2-Year	0	0
2-Year	0.5	0.0123
2-Year	1	0.01476
2-Year	1.5	0.0123
2-Year	2	0.01476
2-Year	2.5	0.01476
2-Year	3	0.01722
2-Year	3.5	0.01476
2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808

2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123

;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426
5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836

5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year

25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843

25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year

50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808
50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488

50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864
100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

[TAGS]

[MAP]

DIMENSIONS 0.000 0.000 10000.000 10000.000  
Units None

[COORDINATES]

;;Node	X-Coord	Y-Coord
D110	1857.620	7608.454
D195	1851.922	6894.690
D195B	-335.916	6895.689
WQ3	1851.922	6489.394
D195A	-149.798	6502.304
HW179	-703.921	7128.336
UG3_Box	823.090	6489.614

[VERTICES]

;;Link	X-Coord	Y-Coord
R1	74.389	6396.555
R3	127.423	6258.914
R2	734.261	7073.347
R4	148.770	6128.533

[Polygons]

;;Subcatchment	X-Coord	Y-Coord
UG3DrainageArea	1234.705	8965.517
UG3DrainageArea	1190.211	8120.133
UG3DrainageArea	2769.744	8120.133
UG3DrainageArea	2769.744	8954.394
UG3DrainageArea	1223.582	8954.394

[SYMBOLS]

;;Gage	X-Coord	Y-Coord
1-Year	-3481.793	9510.000
10-Year	-3166.118	9517.080
25-Year	-2817.352	9512.097
100-Year	-2433.708	9512.097

# UNDERGROUND SYSTEM NO. 3 - VAULT LAYOUT - 25 YEAR STATUS REPORT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

\*\*\*\*\*  
NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.  
\*\*\*\*\*

\*\*\*\*\*  
Analysis Options  
\*\*\*\*\*  
Flow Units ..... CFS  
Process Models:  
  Rainfall/Runoff ..... YES  
  Snowmelt ..... NO  
  Groundwater ..... NO  
  Flow Routing ..... YES  
  Ponding Allowed ..... NO  
  Water Quality ..... NO  
Infiltration Method ..... CURVE\_NUMBER  
Flow Routing Method ..... DYNWAVE  
Starting Date ..... NOV-10-2016 00:00:00  
Ending Date ..... NOV-12-2016 00:00:00  
Antecedent Dry Days ..... 0.0  
Report Time Step ..... 00:00:30  
Wet Time Step ..... 00:05:30  
Dry Time Step ..... 01:00:30  
Routing Time Step ..... 10.00 sec

WARNING 04: minimum elevation drop used for Conduit PWQ3

WARNING 04: minimum elevation drop used for Conduit PWQ3A

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation .....	1.103	2.933
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.000	0.000
Surface Runoff .....	1.108	2.948
Final Surface Storage ....	0.000	0.000
Continuity Error (%) .....	-0.490	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.108	0.361
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.105	0.360
Internal Outflow .....	0.000	0.000
Storage Losses .....	0.000	0.000
Initial Stored Volume ....	0.000	0.000
Final Stored Volume .....	0.003	0.001
Continuity Error (%) .....	0.003	

\*\*\*\*\*  
Time-Step Critical Elements  
\*\*\*\*\*  
Link P195B (30.99%)  
Link PWQ3 (2.79%)

\*\*\*\*\*



Highest Flow Instability Indexes  
 \*\*\*\*\*  
 All links are stable.

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 0.58 sec  
 Average Time Step : 6.89 sec  
 Maximum Time Step : 10.00 sec  
 Percent in Steady State : 0.00  
 Average Iterations per Step : 2.00

\*\*\*\*\*  
 Subcatchment Runoff Summary  
 \*\*\*\*\*

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
UG3DrainageArea	2.93	0.00	0.00	0.00	2.95	0.36	12.87	1.005

\*\*\*\*\*  
 Node Depth Summary  
 \*\*\*\*\*

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
D110	JUNCTION	0.30	1.31	996.69	0 12:30
D195	JUNCTION	0.13	0.57	995.69	0 12:30
D195B	JUNCTION	0.26	1.00	986.92	0 12:30
WQ3	JUNCTION	0.12	0.53	995.65	0 12:30
D195A	JUNCTION	0.02	0.03	988.15	0 14:31
HW179	OUTFALL	0.25	1.00	986.79	0 12:30
UG3_Box	STORAGE	1.07	2.31	990.43	0 14:31

\*\*\*\*\*  
 Node Inflow Summary  
 \*\*\*\*\*

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
D110	JUNCTION	12.87	12.87	0 12:30	0.361	0.361
D195	JUNCTION	0.00	12.87	0 12:30	0.000	0.361
D195B	JUNCTION	0.00	11.46	0 12:30	0.000	0.360
WQ3	JUNCTION	0.00	1.44	0 12:30	0.000	0.027
D195A	JUNCTION	0.00	0.04	0 14:31	0.000	0.026
HW179	OUTFALL	0.00	11.46	0 12:30	0.000	0.360
UG3_Box	STORAGE	0.00	1.44	0 12:30	0.000	0.027

\*\*\*\*\*  
 Node Surcharge Summary  
 \*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*

Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
UG3_Box	1.375	15	0	2.958	33	0 14:31	0.04

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
HW179	99.18	1.80	11.46	0.360
System	99.18	1.80	11.46	0.360

\*\*\*\*\*  
Link Flow Summary  
\*\*\*\*\*

Link	Type	Maximum  Flow  CFS	Time of Max Occurrence days hr:min	Maximum  Veloc  ft/sec	Max/ Full Flow	Max/ Full Depth
P110	CONDUIT	12.87	0 12:30	8.87	0.76	0.47
P195	CONDUIT	8.53	0 12:30	11.43	0.18	0.29
P195B	CONDUIT	11.46	0 12:30	7.30	0.50	0.50
PWQ3	CONDUIT	1.44	0 12:30	2.43	1.58	0.37
PWQ3A	CONDUIT	1.44	0 12:30	2.86	2.03	0.33
P195A	CONDUIT	0.04	0 14:31	1.82	0.00	0.26
R1	ORIFICE	0.04	0 14:31			
R3	ORIFICE	0.00	0 00:00			
R2	WEIR	2.89	0 12:30			0.77
R4	WEIR	0.00	0 00:00			0.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---	Avg. Froude Number	Avg. Flow Change
		Dry Up Dry Down Dry Crit Sub Sup Up Down Crit Crit		
P110	1.00	0.01 0.00 0.00 0.26 0.73 0.00 0.00	1.47	0.0001
P195	1.00	0.01 0.00 0.00 0.00 0.00 0.00 0.99	2.12	0.0000
P195B	1.00	0.01 0.00 0.00 0.00 0.00 0.99 0.00 0.00	1.43	0.0000
PWQ3	1.00	0.01 0.00 0.00 0.99 0.00 0.00 0.00	0.23	0.0001
PWQ3A	1.00	0.01 0.00 0.00 0.00 0.00 0.00 0.99	0.39	0.0002
P195A	1.00	0.01 0.01 0.00 0.64 0.34 0.00 0.00	0.72	0.0000

\*\*\*\*\*  
Conduit Surchage Summary

\*\*\*\*\*

Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
PWQ3	0.01	0.01	0.01	0.42	0.01
PWQ3A	0.01	0.01	0.01	0.48	0.01

Analysis begun on: Sun Jan 15 12:22:25 2017  
Analysis ended on: Sun Jan 15 12:22:25 2017  
Total elapsed time: < 1 sec

## UNDERGROUND SYSTEM NO. 3 - PIPE LAYOUT - DRAWDOWN INPUTS

```

[TITLE]

[OPTIONS]
FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING        DYNWAVE
START_DATE          11/10/2016
START_TIME          00:00:00
REPORT_START_DATE   11/10/2016
REPORT_START_TIME   00:00:00
END_DATE            11/12/2016
END_TIME            00:00:00
SWEEP_START         01/01
SWEEP_END           12/31
DRY_DAYS            0
REPORT_STEP         00:00:30
WET_STEP            00:05:30
DRY_STEP            01:00:30
ROUTING_STEP        0:00:10
ALLOW_PONDING      NO
INERTIAL_DAMPING    PARTIAL
VARIABLE_STEP       0.75
LENGTHENING_STEP   0
MIN_SURFAREA        0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE   NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS        DEPTH
MIN_SLOPE           0

[EVAPORATION]
;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO

[RAINGAGES]
;;          Rain      Time   Snow   Data
;;Name      Type      Intrvl Catch  Source
;;-----
1-Year      CUMULATIVE 0:30   1.0    TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30   1.0    TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30   1.0    TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30   1.0    TIMESERIES 100-Year

[SUBCATCHMENTS]
;;          Total      Pcnt.      Pcnt.      Curb      Snow
;;Name      Raingage      Outlet      Area      Imperv      Width      Slope      Length      Pack
;;-----
UG3DrainageArea 25-Year      D110      .001      100      350      1.0      0

[SUBAREAS]
;;Subcatchment  N-Imperv  N-Perv  S-Imperv  S-Perv  PctZero  RouteTo  PctRouted
;;-----
UG3DrainageArea .011      .15     .05      .1      100      OUTLET

[INFILTRATION]
;;Subcatchment  CurveNum  HydCon  DryTime
;;-----
UG3DrainageArea 3.0       0.5     4

[JUNCTIONS]
;;          Invert      Max.      Init.      Surcharge  Poned
;;Name      Elev.      Depth     Depth     Depth     Area
;;-----
;D-110
D110        995.38    0         0         10        0
;Diversion Manhole
D195        995.12    0         0         10        0
D195B       985.92    0         0         10        0
;Hydrodynamic Separator
WQ3         995.12    0         0         10        0

```

D195A                    988.12            0            0            10            0

```
[OUTFALLS]
;;
;;Name                    Invert            Outfall            Stage/Table            Tide
;;                            Elev.            Type            Time Series            Gate
-----
;Headwall for WQ3
HW179                    985.79            FREE                                    NO
```

```
[STORAGE]
;;
;;Name                    Invert            Max.            Init.            Storage            Curve                            Pondered            Evap.
;;                            Elev.            Depth            Depth            Curve            Params                            Area            Frac.            Infiltration
-----
UG3_Pipe                    988.12            7            6            TABULAR            PipeWQ3                            0            0
```

```
[CONDUITS]
;;
;;Name                    Inlet                    Outlet                    Length            Manning            Inlet            Outlet            Init.            Max.
;;                            Node                    Node                               N            Offset            Offset            Flow            Flow
-----
;Diversion Manhole
P110                    D110                    D195                    35            .015            0            0            0            0
P195                    D195                    D195B                    122.3            .015            0            2.03            0            10
P195B                    D195B                    HW179                    9.5            .015            0            0            0            0
WQ3                    D195                    WQ3                    10            .015            0            0            0            10
WQ3A                    WQ3                    UG3_Pipe                    16.5            .015            0            7            0            10
P195A                    D195A                    D195B                    10.86            .015            0            0            0            0
```

```
[ORIFICES]
;;
;;Name                    Inlet                    Outlet                    Orifice            Crest            Disch.            Flap            Open/Close
;;                            Node                    Node                    Type            Height            Coeff.            Gate            Time
-----
R1                    UG3_Pipe                    D195A                    BOTTOM            0            0.65            NO            0
R3                    UG3_Pipe                    D195A                    BOTTOM            5.1            0.65            NO            0
```

```
[WEIRS]
;;
;;Name                    Inlet                    Outlet                    Weir            Crest            Disch.            Flap            End            End
;;                            Node                    Node                    Type            Height            Coeff.            Gate            Con.            Coeff.
-----
R2                    D195                    D195B                    TRANSVERSE            0            3.33            NO            0            0
R4                    UG3_Pipe                    D195A                    TRANSVERSE            6            3.33            NO            0            0
```

```
[XSECTIONS]
;;
;;Link                    Shape                    Geom1                    Geom2                    Geom3                    Geom4                    Barrels
-----
P110                    CIRCULAR                    2                    0                    0                    0                    1
P195                    CIRCULAR                    2                    0                    0                    0                    1
P195B                    CIRCULAR                    2                    0                    0                    0                    1
WQ3                    CIRCULAR                    1.5                    0                    0                    0                    1
WQ3A                    CIRCULAR                    1.5                    0                    0                    0                    1
P195A                    CIRCULAR                    2                    0                    0                    0                    1
R1                    CIRCULAR                    .083                    0                    0                    0                    0
R3                    CIRCULAR                    .125                    0                    0                    0                    0
R2                    RECT_OPEN                    .75                    2                    0                    0                    0
R4                    RECT_OPEN                    1                    4                    0                    0                    0
```

```
[LOSSES]
;;
;;Link                    Inlet                    Outlet                    Average            Flap Gate
-----
```

```
[CURVES]
;;
;;Name                    Type                    X-Value                    Y-Value
-----
;219 LF x 7' dia pipe
PipeWQ3                    Storage                    0                    0
PipeWQ3                                            0.4375                    742
PipeWQ3                                            0.875                    1014
PipeWQ3                                            1.3125                    1197
PipeWQ3                                            1.75                    1328
PipeWQ3                                            2.1875                    1421
PipeWQ3                                            2.625                    1484
PipeWQ3                                            3.0625                    1521
PipeWQ3                                            3.5                    1533
```

PipeWQ3	3.9375	1521
PipeWQ3	4.375	1484
PipeWQ3	4.8125	1421
PipeWQ3	5.25	1328
PipeWQ3	5.6875	1197
PipeWQ3	6.125	1014
PipeWQ3	6.5625	742
PipeWQ3	7	0

[TIMESERIES]

;;Name	Date	Time	Value
-----			
;;			
;1-Year			
1-Year		0	0
1-Year		0.5	0.01025
1-Year		1	0.0123
1-Year		1.5	0.01025
1-Year		2	0.0123
1-Year		2.5	0.0123
1-Year		3	0.01435
1-Year		3.5	0.0123
1-Year		4	0.01435
1-Year		4.5	0.0164
1-Year		5	0.01435
1-Year		5.5	0.0164
1-Year		6	0.01845
1-Year		6.5	0.01845
1-Year		7	0.01845
1-Year		7.5	0.02255
1-Year		8	0.02255
1-Year		8.5	0.02665
1-Year		9	0.0287
1-Year		9.5	0.0328
1-Year		10	0.0369
1-Year		10.5	0.04715
1-Year		11	0.06355
1-Year		11.5	0.0984
1-Year		12	0.779
1-Year		12.5	0.1476
1-Year		13	0.07585
1-Year		13.5	0.05535
1-Year		14	0.04305
1-Year		14.5	0.0369
1-Year		15	0.0328
1-Year		15.5	0.0287
1-Year		16	0.0246
1-Year		16.5	0.02255
1-Year		17	0.02255
1-Year		17.5	0.0205
1-Year		18	0.01845
1-Year		18.5	0.0164
1-Year		19	0.0164
1-Year		19.5	0.0164
1-Year		20	0.01435
1-Year		20.5	0.01435
1-Year		21	0.0123
1-Year		21.5	0.01435
1-Year		22	0.0123
1-Year		22.5	0.0123
1-Year		23	0.01025
1-Year		23.5	0.0123
1-Year		24	0.01025
;2-Year			
2-Year		0	0
2-Year		0.5	0.0123
2-Year		1	0.01476
2-Year		1.5	0.0123
2-Year		2	0.01476
2-Year		2.5	0.01476
2-Year		3	0.01722
2-Year		3.5	0.01476

2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123
;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426

5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
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5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
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10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775



;25-Year		
25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year		
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50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808

50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864

100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

[TAGS]

[MAP]  
DIMENSIONS 0.000 0.000 10000.000 10000.000  
Units None

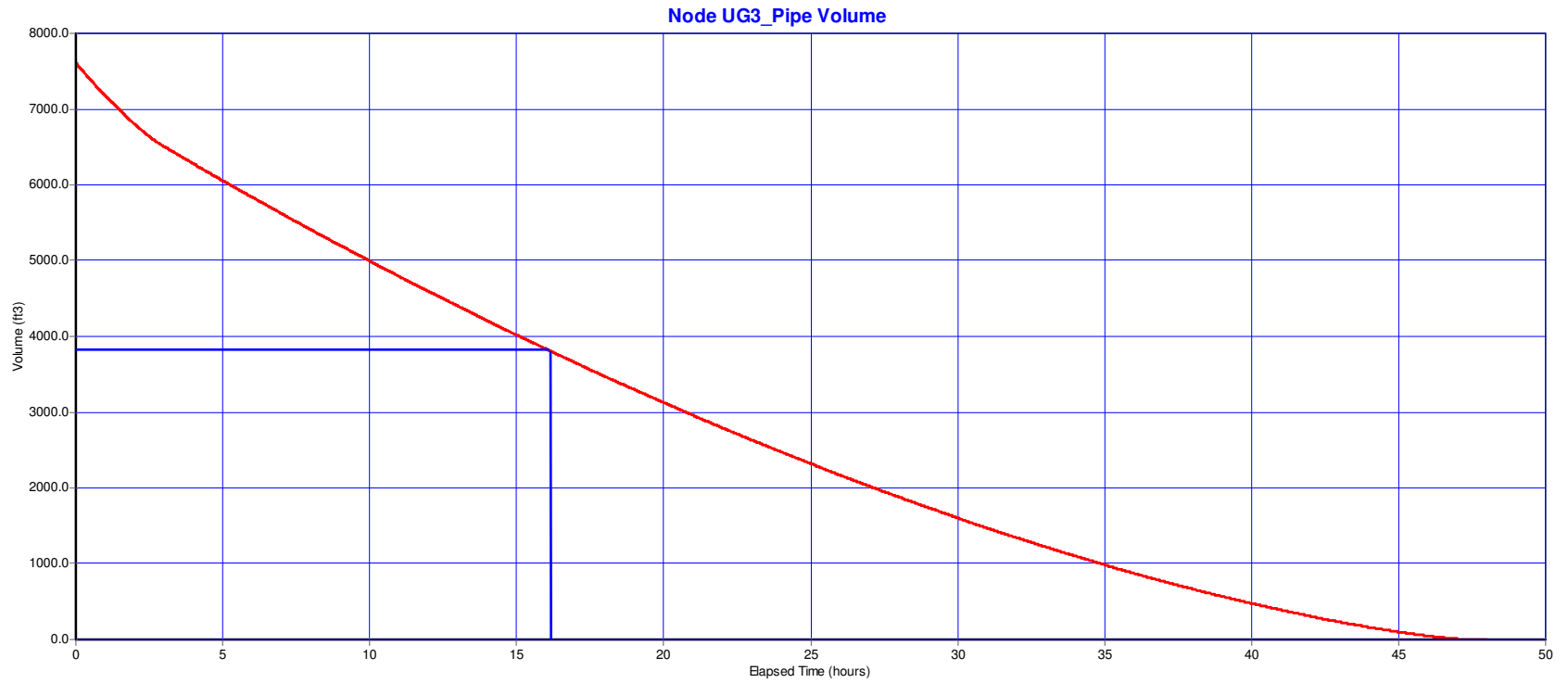
[COORDINATES]  
;;Node X-Coord Y-Coord  
-----  
D110 1857.620 7608.454  
D195 1851.922 6894.690  
D195B -335.916 6895.689  
WQ3 1851.922 6489.394  
D195A -149.798 6502.304  
HW179 -703.921 7128.336  
UG3\_Pipe 823.090 6489.614

[VERTICES]  
;;Link X-Coord Y-Coord  
-----  
R1 74.389 6396.555  
R3 127.423 6258.914  
R2 734.261 7073.347  
R4 153.301 6111.164

[Polygons]  
;;Subcatchment X-Coord Y-Coord  
-----  
UG3DrainageArea 1234.705 8965.517  
UG3DrainageArea 1190.211 8120.133  
UG3DrainageArea 2769.744 8120.133  
UG3DrainageArea 2769.744 8954.394  
UG3DrainageArea 1223.582 8954.394

[SYMBOLS]  
;;Gage X-Coord Y-Coord  
-----  
1-Year -3535.454 9538.993  
10-Year -3272.597 9534.848  
25-Year -2996.016 9543.770  
100-Year -2674.827 9530.387

UNDERGROUND SYSTEM NO. 3 - PIPE LAYOUT - DRAWDOWN GRAPH



## UNDERGROUND SYSTEM NO. 3 - PIPE LAYOUT - 25 YEAR STORM MODEL INPUT

[TITLE]

[OPTIONS]

```

FLOW_UNITS          CFS
INFILTRATION        CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
START_DATE           11/10/2016
START_TIME           00:00:00
REPORT_START_DATE    11/10/2016
REPORT_START_TIME    00:00:00
END_DATE             11/12/2016
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:00:30
WET_STEP             00:05:30
DRY_STEP             01:00:30
ROUTING_STEP         0:00:10
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP    0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
    
```

[EVAPORATION]

```

;;Type      Parameters
;;-----
CONSTANT    0.0
DRY_ONLY    NO
    
```

[RAINGAGES]

```

;;          Rain      Time      Snow      Data
;;Name      Type      Intrvl  Catch     Source
;;-----
1-Year      CUMULATIVE 0:30    1.0      TIMESERIES 1-Year
10-Year     CUMULATIVE 0:30    1.0      TIMESERIES 10-Year
25-Year     CUMULATIVE 0:30    1.0      TIMESERIES 25-Year
100-Year    CUMULATIVE 0:30    1.0      TIMESERIES 100-Year
    
```

[SUBCATCHMENTS]

;;Name	Raingage	Outlet	Total Area	Pcnt. Imperv	Width	Pcnt. Slope	Curb Length	Snow Pack
UG3DrainageArea	25-Year	D110	4.51	100	350	1.0	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
UG3DrainageArea	.011	.15	.05	.1	100	OUTLET	

[INFILTRATION]

;;Subcatchment	CurveNum	HydCon	DryTime
UG3DrainageArea	3.0	0.5	4

[JUNCTIONS]

;;Name	Invert Elev.	Max. Depth	Init. Depth	Surcharge Depth	Ponded Area
;D-110					
D110	995.38	0	0	10	0
;Diversion Manhole					
D195	995.12	0	0	10	0
D195B	985.92	0	0	10	0
;Hydrodynamic Separator					
WQ3	995.12	0	0	10	0

D195A 988.06 0 0 10 0

```
[OUTFALLS]
;;
;;Name      Invert      Outfall      Stage/Table      Tide
            Elev.        Type          Time Series      Gate
-----
;Headwall for WQ3
HW179      985.79      FREE          NO
```

```
[STORAGE]
;;
;;Name      Invert      Max.         Init.         Storage      Curve          Ponded      Evap.
            Elev.        Depth        Depth        Curve        Params         Area        Frac.
            -----
UG3_Pipe    988.12      7            0            TABULAR      PipeWQ3        0           0
```

```
[CONDUITS]
;;
;;Name      Inlet      Outlet      Length      Manning      Inlet      Outlet      Init.      Max.
            Node      Node          N           N           Offset     Offset     Flow      Flow
            -----
;Diversion Manhole
P110      D110      D195        35          .015        0          0          0          0
P195      D195      D195B      122.3       .015        0          2.03       0          10
P195B     D195B     HW179      9.5         .015        0          0          0          0
WQ3       D195      WQ3        10          .015        0          0          0          10
WQ3A     WQ3       UG3_Pipe   16.5        .015        0          7          0          10
P195A     D195A     D195B     10.86       .015        0          0          0          0
```

```
[ORIFICES]
;;
;;Name      Inlet      Outlet      Orifice      Crest      Disch.      Flap      Open/Close
            Node      Node          Type         Height     Coeff.      Gate     Time
            -----
R1          UG3_Pipe   D195A      BOTTOM        0          0.65       NO      0
R3          UG3_Pipe   D195A      BOTTOM        5.1        0.65       NO      0
```

```
[WEIRS]
;;
;;Name      Inlet      Outlet      Weir      Crest      Disch.      Flap      End      End
            Node      Node          Type      Height     Coeff.      Gate     Con.     Coeff.
            -----
R2          D195      D195B     TRANSVERSE  0          3.33       NO      0          0
R4          UG3_Pipe   D195A     TRANSVERSE  6          3.33       NO      0          0
```

```
[XSECTIONS]
;;Link      Shape      Geom1      Geom2      Geom3      Geom4      Barrels
            -----
P110      CIRCULAR   2          0          0          0          1
P195      CIRCULAR   2          0          0          0          1
P195B     CIRCULAR   2          0          0          0          1
WQ3       CIRCULAR   1.5        0          0          0          1
WQ3A     CIRCULAR   1.5        0          0          0          1
P195A     CIRCULAR   2          0          0          0          1
R1        CIRCULAR   .083       0          0          0          0
R3        CIRCULAR   .125       0          0          0          0
R2        RECT_OPEN  .75        2          0          0          0
R4        RECT_OPEN  1          4          0          0          0
```

```
[LOSSES]
;;Link      Inlet      Outlet      Average      Flap Gate
            -----
```

```
[CURVES]
;;Name      Type      X-Value      Y-Value
            -----
;219 LF x 7' dia pipe
PipeWQ3     Storage   0            0
PipeWQ3     Storage   0.4375       742
PipeWQ3     Storage   0.875        1014
PipeWQ3     Storage   1.3125       1197
PipeWQ3     Storage   1.75         1328
PipeWQ3     Storage   2.1875       1421
PipeWQ3     Storage   2.625        1484
PipeWQ3     Storage   3.0625       1521
PipeWQ3     Storage   3.5          1533
```

PipeWQ3	3.9375	1521
PipeWQ3	4.375	1484
PipeWQ3	4.8125	1421
PipeWQ3	5.25	1328
PipeWQ3	5.6875	1197
PipeWQ3	6.125	1014
PipeWQ3	6.5625	742
PipeWQ3	7	0

[TIMESERIES]

;;Name	Date	Time	Value
-----			
;;			
;1-Year			
1-Year		0	0
1-Year		0.5	0.01025
1-Year		1	0.0123
1-Year		1.5	0.01025
1-Year		2	0.0123
1-Year		2.5	0.0123
1-Year		3	0.01435
1-Year		3.5	0.0123
1-Year		4	0.01435
1-Year		4.5	0.0164
1-Year		5	0.01435
1-Year		5.5	0.0164
1-Year		6	0.01845
1-Year		6.5	0.01845
1-Year		7	0.01845
1-Year		7.5	0.02255
1-Year		8	0.02255
1-Year		8.5	0.02665
1-Year		9	0.0287
1-Year		9.5	0.0328
1-Year		10	0.0369
1-Year		10.5	0.04715
1-Year		11	0.06355
1-Year		11.5	0.0984
1-Year		12	0.779
1-Year		12.5	0.1476
1-Year		13	0.07585
1-Year		13.5	0.05535
1-Year		14	0.04305
1-Year		14.5	0.0369
1-Year		15	0.0328
1-Year		15.5	0.0287
1-Year		16	0.0246
1-Year		16.5	0.02255
1-Year		17	0.02255
1-Year		17.5	0.0205
1-Year		18	0.01845
1-Year		18.5	0.0164
1-Year		19	0.0164
1-Year		19.5	0.0164
1-Year		20	0.01435
1-Year		20.5	0.01435
1-Year		21	0.0123
1-Year		21.5	0.01435
1-Year		22	0.0123
1-Year		22.5	0.0123
1-Year		23	0.01025
1-Year		23.5	0.0123
1-Year		24	0.01025
;2-Year			
2-Year		0	0
2-Year		0.5	0.0123
2-Year		1	0.01476
2-Year		1.5	0.0123
2-Year		2	0.01476
2-Year		2.5	0.01476
2-Year		3	0.01722
2-Year		3.5	0.01476

2-Year	4	0.01722
2-Year	4.5	0.01968
2-Year	5	0.01722
2-Year	5.5	0.01968
2-Year	6	0.02214
2-Year	6.5	0.02214
2-Year	7	0.02214
2-Year	7.5	0.02706
2-Year	8	0.02706
2-Year	8.5	0.03198
2-Year	9	0.03444
2-Year	9.5	0.03936
2-Year	10	0.04428
2-Year	10.5	0.05658
2-Year	11	0.07626
2-Year	11.5	0.11808
2-Year	12	0.9348
2-Year	12.5	0.17712
2-Year	13	0.09102
2-Year	13.5	0.06642
2-Year	14	0.05166
2-Year	14.5	0.04428
2-Year	15	0.03936
2-Year	15.5	0.03444
2-Year	16	0.02952
2-Year	16.5	0.02706
2-Year	17	0.02706
2-Year	17.5	0.0246
2-Year	18	0.02214
2-Year	18.5	0.01968
2-Year	19	0.01968
2-Year	19.5	0.01968
2-Year	20	0.01722
2-Year	20.5	0.01722
2-Year	21	0.01476
2-Year	21.5	0.01722
2-Year	22	0.01476
2-Year	22.5	0.01476
2-Year	23	0.0123
2-Year	23.5	0.01476
2-Year	24	0.0123
;5-Year		
5-Year	0	0
5-Year	0.5	0.0153
5-Year	1	0.01836
5-Year	1.5	0.0153
5-Year	2	0.01836
5-Year	2.5	0.01836
5-Year	3	0.02142
5-Year	3.5	0.01836
5-Year	4	0.02142
5-Year	4.5	0.02448
5-Year	5	0.02142
5-Year	5.5	0.02448
5-Year	6	0.02754
5-Year	6.5	0.02754
5-Year	7	0.02754
5-Year	7.5	0.03366
5-Year	8	0.03366
5-Year	8.5	0.03978
5-Year	9	0.04284
5-Year	9.5	0.04896
5-Year	10	0.05508
5-Year	10.5	0.07038
5-Year	11	0.09486
5-Year	11.5	0.14688
5-Year	12	1.1628
5-Year	12.5	0.22032
5-Year	13	0.11322
5-Year	13.5	0.08262
5-Year	14	0.06426



5-Year	14.5	0.05508
5-Year	15	0.04896
5-Year	15.5	0.04284
5-Year	16	0.03672
5-Year	16.5	0.03366
5-Year	17	0.03366
5-Year	17.5	0.0306
5-Year	18	0.02754
5-Year	18.5	0.02448
5-Year	19	0.02448
5-Year	19.5	0.02448
5-Year	20	0.02142
5-Year	20.5	0.02142
5-Year	21	0.01836
5-Year	21.5	0.02142
5-Year	22	0.01836
5-Year	22.5	0.01836
5-Year	23	0.0153
5-Year	23.5	0.01836
5-Year	24	0.0153

;10-Year

10-Year	0	0
10-Year	0.5	0.01775
10-Year	1	0.0213
10-Year	1.5	0.01775
10-Year	2	0.0213
10-Year	2.5	0.0213
10-Year	3	0.02485
10-Year	3.5	0.0213
10-Year	4	0.02485
10-Year	4.5	0.0284
10-Year	5	0.02485
10-Year	5.5	0.0284
10-Year	6	0.03195
10-Year	6.5	0.03195
10-Year	7	0.03195
10-Year	7.5	0.03905
10-Year	8	0.03905
10-Year	8.5	0.04615
10-Year	9	0.0497
10-Year	9.5	0.0568
10-Year	10	0.0639
10-Year	10.5	0.08165
10-Year	11	0.11005
10-Year	11.5	0.1704
10-Year	12	1.349
10-Year	12.5	0.2556
10-Year	13	0.13135
10-Year	13.5	0.09585
10-Year	14	0.07455
10-Year	14.5	0.0639
10-Year	15	0.0568
10-Year	15.5	0.0497
10-Year	16	0.0426
10-Year	16.5	0.03905
10-Year	17	0.03905
10-Year	17.5	0.0355
10-Year	18	0.03195
10-Year	18.5	0.0284
10-Year	19	0.0284
10-Year	19.5	0.0284
10-Year	20	0.02485
10-Year	20.5	0.02485
10-Year	21	0.0213
10-Year	21.5	0.02485
10-Year	22	0.0213
10-Year	22.5	0.0213
10-Year	23	0.01775
10-Year	23.5	0.0213
10-Year	24	0.01775

;25-Year		
25-Year	0	0
25-Year	0.5	0.02135
25-Year	1	0.02562
25-Year	1.5	0.02135
25-Year	2	0.02562
25-Year	2.5	0.02562
25-Year	3	0.02989
25-Year	3.5	0.02562
25-Year	4	0.02989
25-Year	4.5	0.03416
25-Year	5	0.02989
25-Year	5.5	0.03416
25-Year	6	0.03843
25-Year	6.5	0.03843
25-Year	7	0.03843
25-Year	7.5	0.04697
25-Year	8	0.04697
25-Year	8.5	0.05551
25-Year	9	0.05978
25-Year	9.5	0.06832
25-Year	10	0.07686
25-Year	10.5	0.09821
25-Year	11	0.13237
25-Year	11.5	0.20496
25-Year	12	1.6226
25-Year	12.5	0.30744
25-Year	13	0.15799
25-Year	13.5	0.11529
25-Year	14	0.08967
25-Year	14.5	0.07686
25-Year	15	0.06832
25-Year	15.5	0.05978
25-Year	16	0.05124
25-Year	16.5	0.04697
25-Year	17	0.04697
25-Year	17.5	0.0427
25-Year	18	0.03843
25-Year	18.5	0.03416
25-Year	19	0.03416
25-Year	19.5	0.03416
25-Year	20	0.02989
25-Year	20.5	0.02989
25-Year	21	0.02562
25-Year	21.5	0.02989
25-Year	22	0.02562
25-Year	22.5	0.02562
25-Year	23	0.02135
25-Year	23.5	0.02562
25-Year	24	0.02135

;50-Year		
50-Year	0	0
50-Year	0.5	0.0244
50-Year	1	0.02928
50-Year	1.5	0.0244
50-Year	2	0.02928
50-Year	2.5	0.02928
50-Year	3	0.03416
50-Year	3.5	0.02928
50-Year	4	0.03416
50-Year	4.5	0.03904
50-Year	5	0.03416
50-Year	5.5	0.03904
50-Year	6	0.04392
50-Year	6.5	0.04392
50-Year	7	0.04392
50-Year	7.5	0.05368
50-Year	8	0.05368
50-Year	8.5	0.06344
50-Year	9	0.06832
50-Year	9.5	0.07808

50-Year	10	0.08784
50-Year	10.5	0.11224
50-Year	11	0.15128
50-Year	11.5	0.23424
50-Year	12	1.8544
50-Year	12.5	0.35136
50-Year	13	0.18056
50-Year	13.5	0.13176
50-Year	14	0.10248
50-Year	14.5	0.08784
50-Year	15	0.07808
50-Year	15.5	0.06832
50-Year	16	0.05856
50-Year	16.5	0.05368
50-Year	17	0.05368
50-Year	17.5	0.0488
50-Year	18	0.04392
50-Year	18.5	0.03904
50-Year	19	0.03904
50-Year	19.5	0.03904
50-Year	20	0.03416
50-Year	20.5	0.03416
50-Year	21	0.02928
50-Year	21.5	0.03416
50-Year	22	0.02928
50-Year	22.5	0.02928
50-Year	23	0.0244
50-Year	23.5	0.02928
50-Year	24	0.0244

;100-Year

100-Year	0	0
100-Year	0.5	0.0276
100-Year	1	0.03312
100-Year	1.5	0.0276
100-Year	2	0.03312
100-Year	2.5	0.03312
100-Year	3	0.03864
100-Year	3.5	0.03312
100-Year	4	0.03864
100-Year	4.5	0.04416
100-Year	5	0.03864
100-Year	5.5	0.04416
100-Year	6	0.04968
100-Year	6.5	0.04968
100-Year	7	0.04968
100-Year	7.5	0.06072
100-Year	8	0.06072
100-Year	8.5	0.07176
100-Year	9	0.07728
100-Year	9.5	0.08832
100-Year	10	0.09936
100-Year	10.5	0.12696
100-Year	11	0.17112
100-Year	11.5	0.26496
100-Year	12	2.0976
100-Year	12.5	0.39744
100-Year	13	0.20424
100-Year	13.5	0.14904
100-Year	14	0.11592
100-Year	14.5	0.09936
100-Year	15	0.08832
100-Year	15.5	0.07728
100-Year	16	0.06624
100-Year	16.5	0.06072
100-Year	17	0.06072
100-Year	17.5	0.0552
100-Year	18	0.04968
100-Year	18.5	0.04416
100-Year	19	0.04416
100-Year	19.5	0.04416
100-Year	20	0.03864

100-Year	20.5	0.03864
100-Year	21	0.03312
100-Year	21.5	0.03864
100-Year	22	0.03312
100-Year	22.5	0.03312
100-Year	23	0.0276
100-Year	23.5	0.03312
100-Year	24	0.0276

[REPORT]  
INPUT NO  
CONTROLS NO  
SUBCATCHMENTS ALL  
NODES ALL  
LINKS ALL

[TAGS]

[MAP]  
DIMENSIONS 0.000 0.000 10000.000 10000.000  
Units None

[COORDINATES]  
;;Node X-Coord Y-Coord  
-----  
D110 1857.620 7608.454  
D195 1851.922 6894.690  
D195B -335.916 6895.689  
WQ3 1851.922 6489.394  
D195A -149.798 6502.304  
HW179 -703.921 7128.336  
UG3\_Pipe 823.090 6489.614

[VERTICES]  
;;Link X-Coord Y-Coord  
-----  
R1 74.389 6396.555  
R3 127.423 6258.914  
R2 734.261 7073.347  
R4 153.301 6111.164

[Polygons]  
;;Subcatchment X-Coord Y-Coord  
-----  
UG3DrainageArea 1234.705 8965.517  
UG3DrainageArea 1190.211 8120.133  
UG3DrainageArea 2769.744 8120.133  
UG3DrainageArea 2769.744 8954.394  
UG3DrainageArea 1223.582 8954.394

[SYMBOLS]  
;;Gage X-Coord Y-Coord  
-----  
1-Year -3535.454 9538.993  
10-Year -3272.597 9534.848  
25-Year -2996.016 9543.770  
100-Year -2674.827 9530.387

# UNDERGROUND SYSTEM NO. 3 - PIPE LAYOUT - 25 YEAR STATUS REPORT

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)

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\*\*\*\*\*  
 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.  
 \*\*\*\*\*

\*\*\*\*\*  
 Analysis Options  
 \*\*\*\*\*  
 Flow Units ..... CFS  
 Process Models:  
   Rainfall/Runoff ..... YES  
   Snowmelt ..... NO  
   Groundwater ..... NO  
   Flow Routing ..... YES  
   Ponding Allowed ..... NO  
   Water Quality ..... NO  
 Infiltration Method ..... CURVE\_NUMBER  
 Flow Routing Method ..... DYNWAVE  
 Starting Date ..... NOV-10-2016 00:00:00  
 Ending Date ..... NOV-12-2016 00:00:00  
 Antecedent Dry Days ..... 0.0  
 Report Time Step ..... 00:00:30  
 Wet Time Step ..... 00:05:30  
 Dry Time Step ..... 01:00:30  
 Routing Time Step ..... 10.00 sec

WARNING 04: minimum elevation drop used for Conduit WQ3

WARNING 04: minimum elevation drop used for Conduit WQ3A

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation .....	1.103	2.933
Evaporation Loss .....	0.000	0.000
Infiltration Loss .....	0.000	0.000
Surface Runoff .....	1.108	2.948
Final Surface Storage ....	0.000	0.000
Continuity Error (%) .....	-0.490	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow .....	0.000	0.000
Wet Weather Inflow .....	1.108	0.361
Groundwater Inflow .....	0.000	0.000
RDII Inflow .....	0.000	0.000
External Inflow .....	0.000	0.000
External Outflow .....	1.108	0.361
Internal Outflow .....	0.000	0.000
Storage Losses .....	0.000	0.000
Initial Stored Volume ....	0.000	0.000
Final Stored Volume .....	0.000	0.000
Continuity Error (%) .....	0.000	

\*\*\*\*\*  
 Time-Step Critical Elements  
 \*\*\*\*\*  
 Link P195B (31.06%)  
 Link WQ3 (2.76%)

\*\*\*\*\*

Highest Flow Instability Indexes  
 \*\*\*\*\*  
 All links are stable.

\*\*\*\*\*  
 Routing Time Step Summary  
 \*\*\*\*\*  
 Minimum Time Step : 0.58 sec  
 Average Time Step : 6.88 sec  
 Maximum Time Step : 10.00 sec  
 Percent in Steady State : 0.00  
 Average Iterations per Step : 2.00

\*\*\*\*\*  
 Subcatchment Runoff Summary  
 \*\*\*\*\*

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
UG3DrainageArea	2.93	0.00	0.00	0.00	2.95	0.36	12.87	1.005

\*\*\*\*\*  
 Node Depth Summary  
 \*\*\*\*\*

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min
D110	JUNCTION	0.30	1.31	996.69	0 12:30
D195	JUNCTION	0.13	0.57	995.69	0 12:30
D195B	JUNCTION	0.26	1.00	986.92	0 12:29
WQ3	JUNCTION	0.12	0.53	995.65	0 12:30
D195A	JUNCTION	0.02	0.04	988.10	0 14:19
HW179	OUTFALL	0.25	1.00	986.79	0 12:29
UG3_Pipe	STORAGE	1.29	2.67	990.79	0 14:19

\*\*\*\*\*  
 Node Inflow Summary  
 \*\*\*\*\*

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
D110	JUNCTION	12.87	12.87	0 12:30	0.361	0.361
D195	JUNCTION	0.00	12.87	0 12:30	0.000	0.361
D195B	JUNCTION	0.00	11.46	0 12:30	0.000	0.361
WQ3	JUNCTION	0.00	1.44	0 12:30	0.000	0.027
D195A	JUNCTION	0.00	0.05	0 14:19	0.000	0.027
HW179	OUTFALL	0.00	11.47	0 12:29	0.000	0.361
UG3_Pipe	STORAGE	0.00	1.44	0 12:30	0.000	0.027

\*\*\*\*\*  
 Node Surcharge Summary  
 \*\*\*\*\*

No nodes were surcharged.

\*\*\*\*\*

Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

Storage Unit	Average Volume 1000 ft3	Avg Pcmt Full	E&I Pcmt Loss	Maximum Volume 1000 ft3	Max Pcmt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
UG3_Pipe	1.236	15	0	2.886	35	0 14:19	0.05

\*\*\*\*\*  
Outfall Loading Summary  
\*\*\*\*\*

Outfall Node	Flow Freq. Pcmt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
HW179	90.87	1.97	11.47	0.361
System	90.87	1.97	11.47	0.361

\*\*\*\*\*  
Link Flow Summary  
\*\*\*\*\*

Link	Type	Maximum  Flow  CFS	Time of Max Occurrence days hr:min	Maximum  Veloc  ft/sec	Max/ Full Flow	Max/ Full Depth
P110	CONDUIT	12.87	0 12:30	8.87	0.76	0.47
P195	CONDUIT	8.53	0 12:30	11.43	0.18	0.29
P195B	CONDUIT	11.47	0 12:29	7.30	0.50	0.50
WQ3	CONDUIT	1.44	0 12:30	2.43	1.58	0.37
WQ3A	CONDUIT	1.44	0 12:30	2.86	2.03	0.33
P195A	CONDUIT	0.05	0 14:19	1.87	0.00	0.26
R1	ORIFICE	0.05	0 14:19			
R3	ORIFICE	0.00	0 00:00			
R2	WEIR	2.89	0 12:30			0.77
R4	WEIR	0.00	0 00:00			0.00

\*\*\*\*\*  
Flow Classification Summary  
\*\*\*\*\*

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---	Avg. Froude Number	Avg. Flow Change
		Dry Dry Dry Crit Sup Crit Up Down Crit		
P110	1.00	0.01 0.00 0.00 0.26 0.73 0.00 0.00	1.47	0.0001
P195	1.00	0.01 0.00 0.00 0.00 0.00 0.00 0.99	2.12	0.0000
P195B	1.00	0.01 0.00 0.00 0.08 0.91 0.00 0.00	1.34	0.0000
WQ3	1.00	0.01 0.00 0.00 0.99 0.00 0.00 0.00	0.23	0.0001
WQ3A	1.00	0.01 0.00 0.00 0.00 0.00 0.00 0.99	0.39	0.0002
P195A	1.00	0.01 0.08 0.00 0.65 0.26 0.00 0.00	0.59	0.0000

\*\*\*\*\*  
Conduit Surcharge Summary

\*\*\*\*\*

Conduit	Hours Full			Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
WQ3	0.01	0.01	0.01	0.42	0.01
WQ3A	0.01	0.01	0.01	0.48	0.01

Analysis begun on: Sun Jan 15 12:14:11 2017  
Analysis ended on: Sun Jan 15 12:14:12 2017  
Total elapsed time: 00:00:01



# Hydraflow Table of Contents

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<b>25 - Year</b>	
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Hydrograph No. 1, Rational, UG 3 Area to Detention.....	3
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# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	-----	12.53	14.78	-----	17.73	19.87	22.99	25.46	27.88	UG 3 Area to Detention
3	Reservoir	1	7.608	10.63	-----	14.92	17.91	21.96	24.55	26.99	UG3 Routed

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

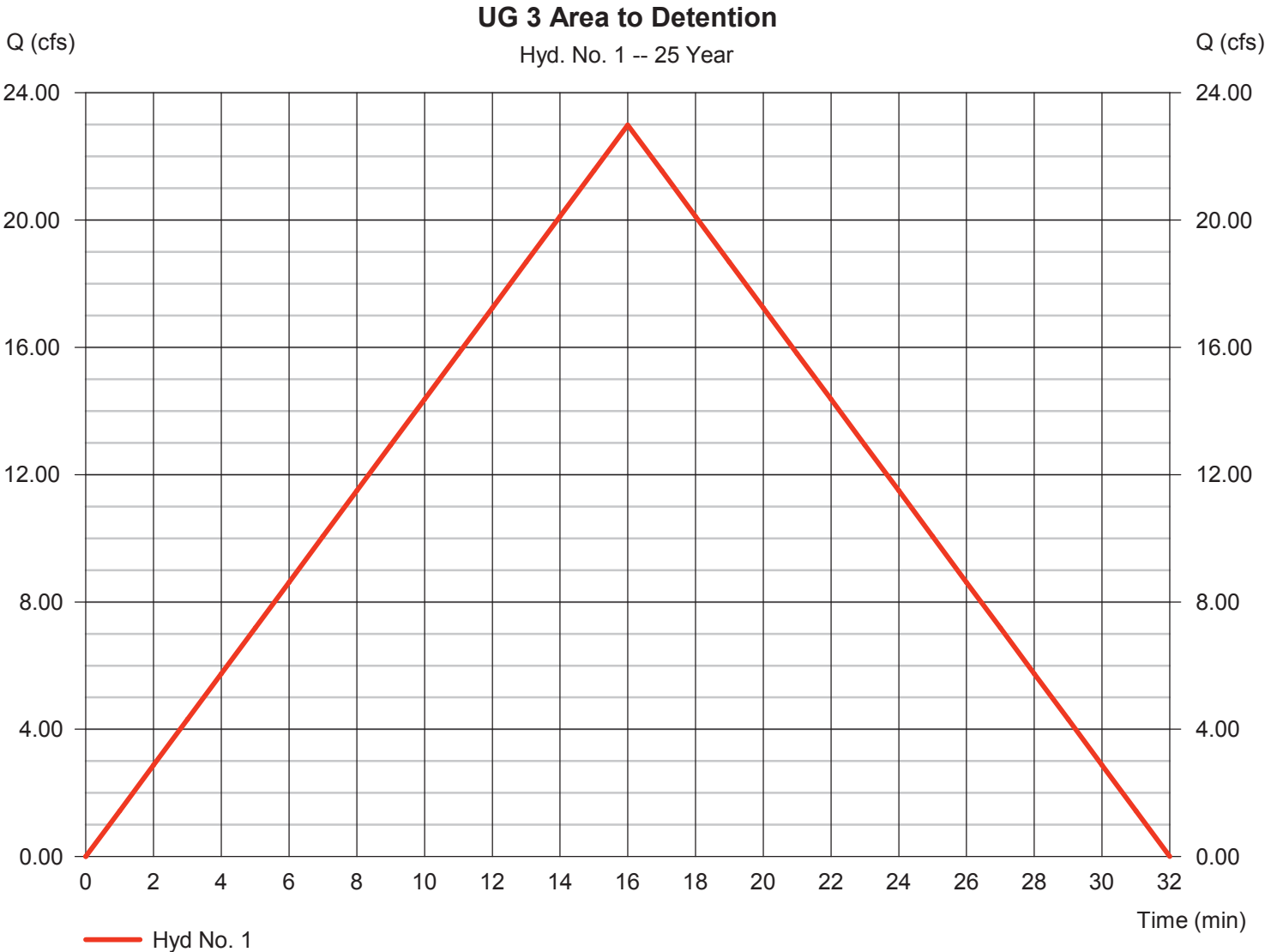
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	22.99	1	16	22,069	-----	-----	-----	UG 3 Area to Detention
3	Reservoir	21.96	1	17	21,447	1	994.03	9,385	UG3 Routed
UG3 Hydraflow StormTech.gpw					Return Period: 25 Year			Friday, 01 / 13 / 2017	

# Hydrograph Report

## Hyd. No. 1

UG 3 Area to Detention

Hydrograph type	= Rational	Peak discharge	= 22.99 cfs
Storm frequency	= 25 yrs	Time to peak	= 16 min
Time interval	= 1 min	Hyd. volume	= 22,069 cuft
Drainage area	= 6.320 ac	Runoff coeff.	= 0.62
Intensity	= 5.867 in/hr	Tc by User	= 16.00 min
IDF Curve	= medina IDF.IDF	Asc/Rec limb fact	= 1/1





# Pond Report

## Pond No. 1 - MC 4500 Chambers UG3

### Pond Data

**UG Chambers** -Invert elev. = 988.87 ft, Rise x Span = 5.00 x 8.33 ft, Barrel Len = 56.33 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes  
**Encasement** -Invert elev. = 988.12 ft, Width = 9.39 ft, Height = 6.75 ft, Voids = 40.00%

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	988.12	n/a	0	0
0.68	988.79	n/a	571	571
1.35	989.47	n/a	1,246	1,817
2.03	990.15	n/a	1,318	3,134
2.70	990.82	n/a	1,290	4,425
3.38	991.49	n/a	1,247	5,671
4.05	992.17	n/a	1,183	6,854
4.72	992.84	n/a	1,091	7,945
5.40	993.52	n/a	951	8,897
6.08	994.20	n/a	669	9,566
6.75	994.87	n/a	571	10,137

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	1.00	0.00	0.00
Span (in)	= 24.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 988.12	988.12	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.65	0.65	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

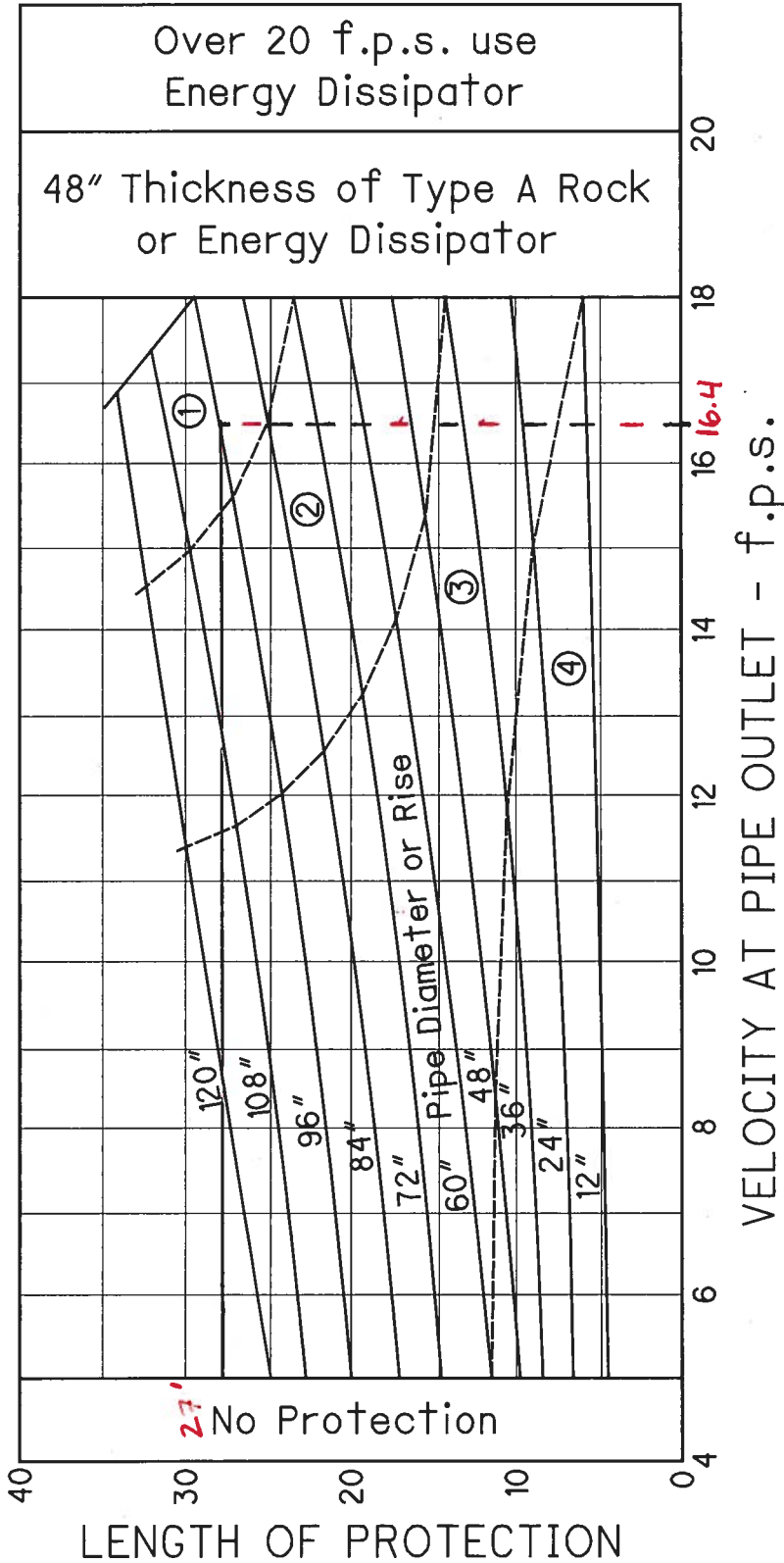
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 992.62	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	988.12	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.68	571	988.79	0.02 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.022
1.35	1,817	989.47	0.03 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.032
2.03	3,134	990.15	0.04 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.040
2.70	4,425	990.82	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.046
3.38	5,671	991.49	0.05 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.052
4.05	6,854	992.17	0.06 ic	0.06 ic	---	---	0.00	---	---	---	---	---	0.057
4.72	7,945	992.84	1.50 oc	0.06 ic	---	---	1.42	---	---	---	---	---	1.479
5.40	8,897	993.52	11.43 oc	0.05 ic	---	---	11.37	---	---	---	---	---	11.42
6.08	9,566	994.20	26.37 oc	0.04 ic	---	---	26.33	---	---	---	---	---	26.37
6.75	10,137	994.87	35.92 ic	0.03 ic	---	---	35.90 s	---	---	---	---	---	35.92

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1
	REFERENCE SECTION 1107.2



**LEGEND**

①	48" of 18" rock
②	36" of 18" rock
③	30" of 12" rock
④	18" of 6" rock

**ROCK TYPE**

A	48" of 18" rock
B	36" of 18" rock
C	30" of 12" rock

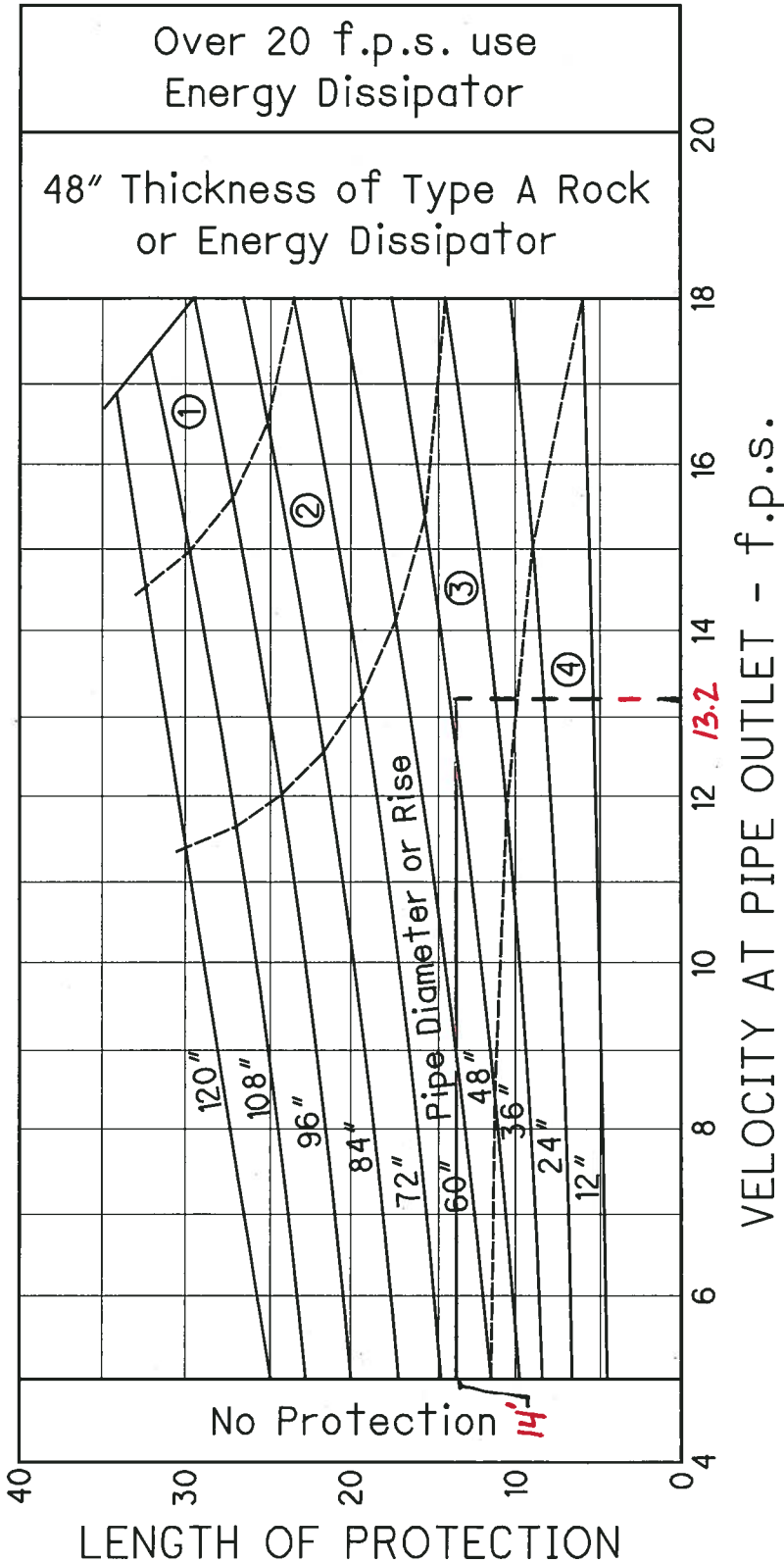
**NOTES**

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1
	REFERENCE SECTION 1107.2



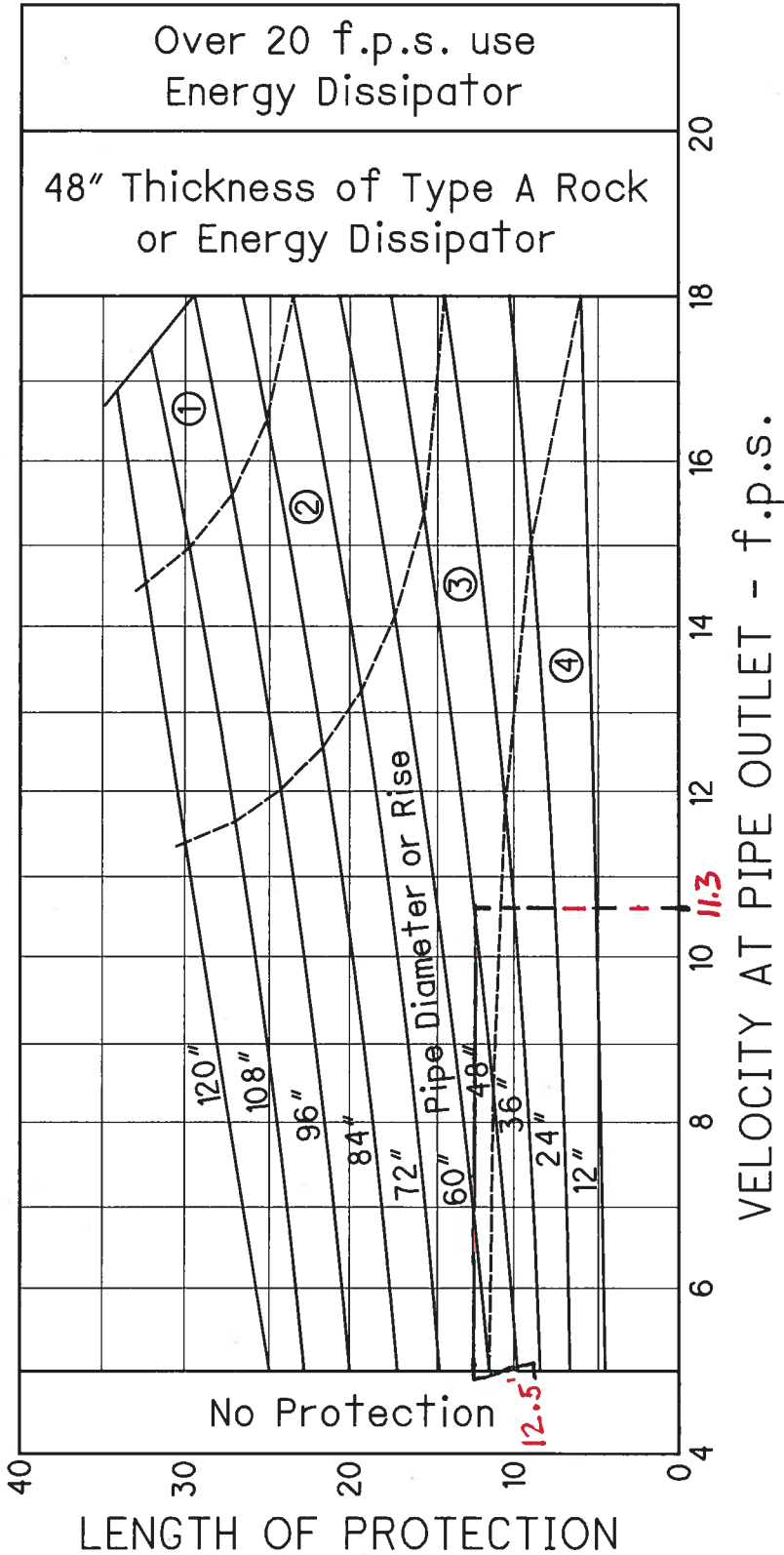
ROCK TYPE	LEGEND
A	48" of 18" rock
A	36" of 18" rock
B	30" of 12" rock
C	18" of 6" rock

NOTES

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.  
 The width of protection shall be the width of the headwall, with 4' being the minimum.  
 (Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)



ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1
	REFERENCE SECTION 1107.2



ROCK TYPE	LEGEND
A	① 48" of 18" rock
A	② 36" of 18" rock
B	③ 30" of 12" rock
C	④ 18" of 6" rock

NOTES

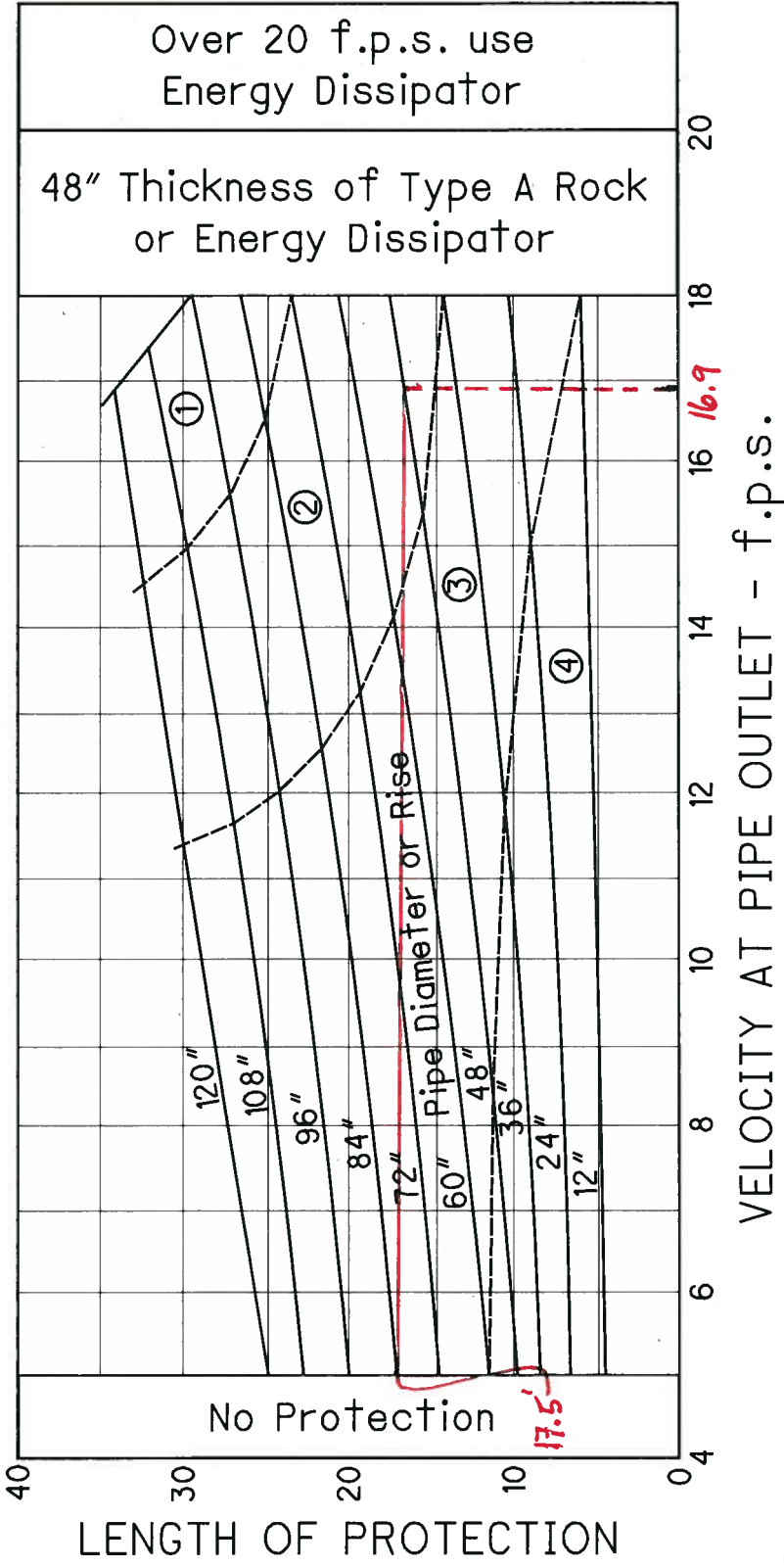
Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

# CULVERT #5 STA. 189+24.99 S.R. 18

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1
	REFERENCE SECTION 1107.2



ROCK TYPE	LEGEND
A	① 48" of 18" rock
A	② 36" of 18" rock
B	③ 30" of 12" rock
C	④ 18" of 6" rock

### NOTES

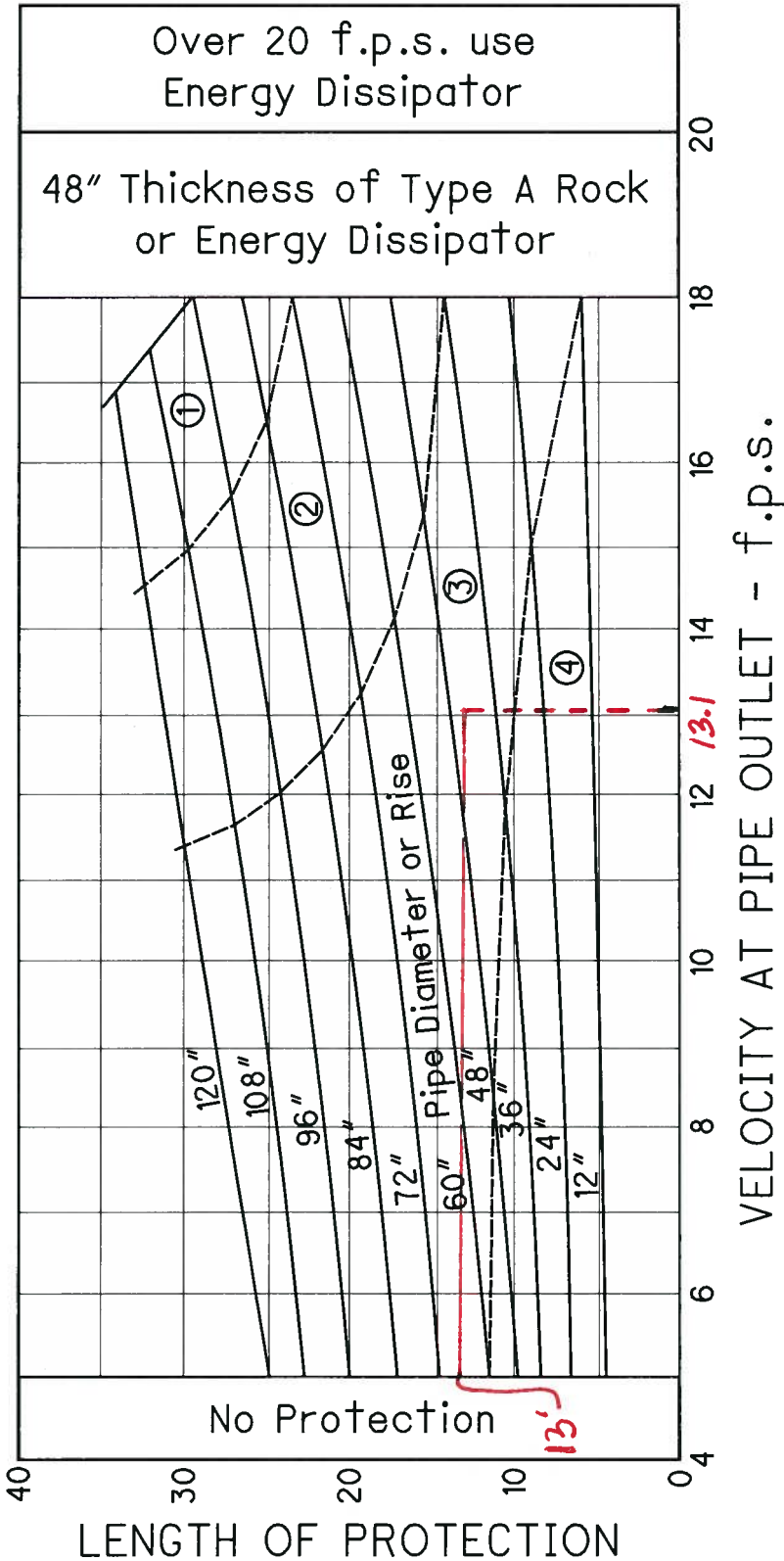
Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

# CULVERT #6 STA. 911+39.85 RIVER STYX

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1
	REFERENCE SECTION 1107.2



LEGEND	ROCK TYPE
① 48" of 18" rock	A
② 36" of 18" rock	A
③ 30" of 12" rock	B
④ 18" of 6" rock	C

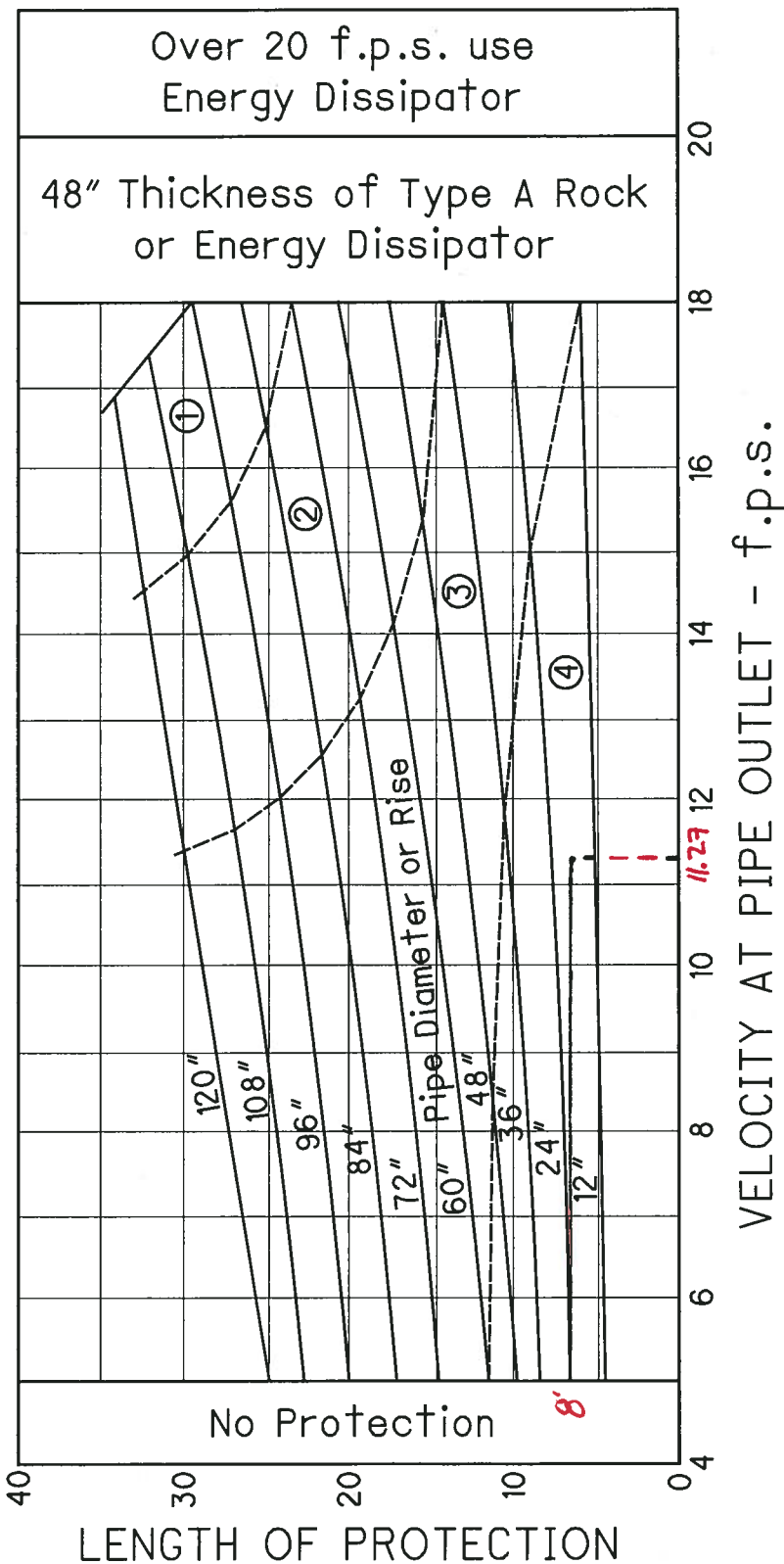
### NOTES

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1 <hr/> REFERENCE SECTION 1107.2
--	---



- ROCK TYPE**
- LEGEND**
- ① 48" of 18" rock
  - ② 36" of 18" rock
  - ③ 30" of 12" rock
  - ④ 18" of 6" rock
- W/ AGGREGATE FILTER*

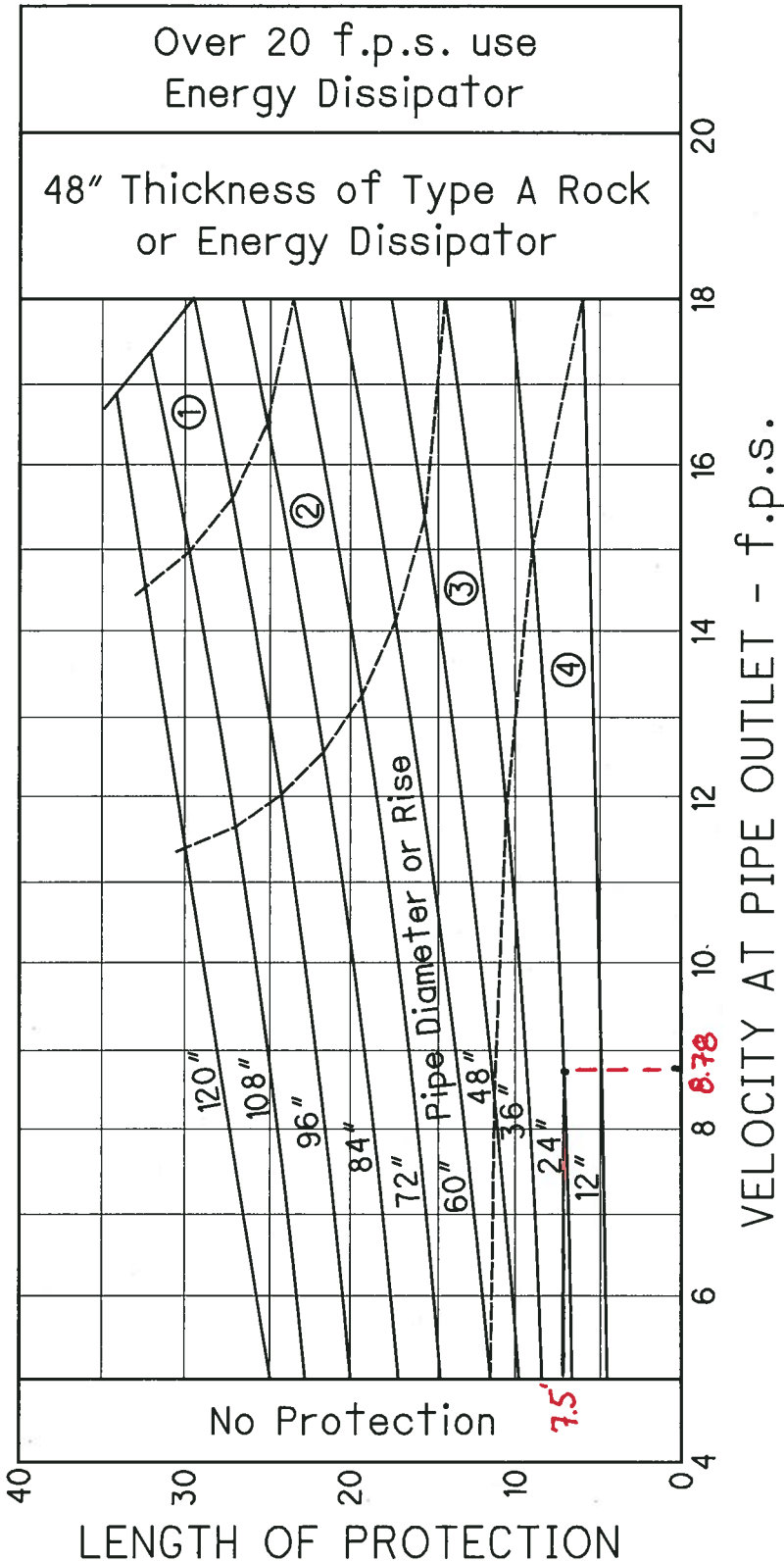
**NOTES**

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1 <hr/> REFERENCE SECTION 1107.2
--	---



LEGEND	ROCK TYPE
① 48" of 18" rock	A
② 36" of 18" rock	A
③ 30" of 12" rock	B
④ 18" of 6" rock	C

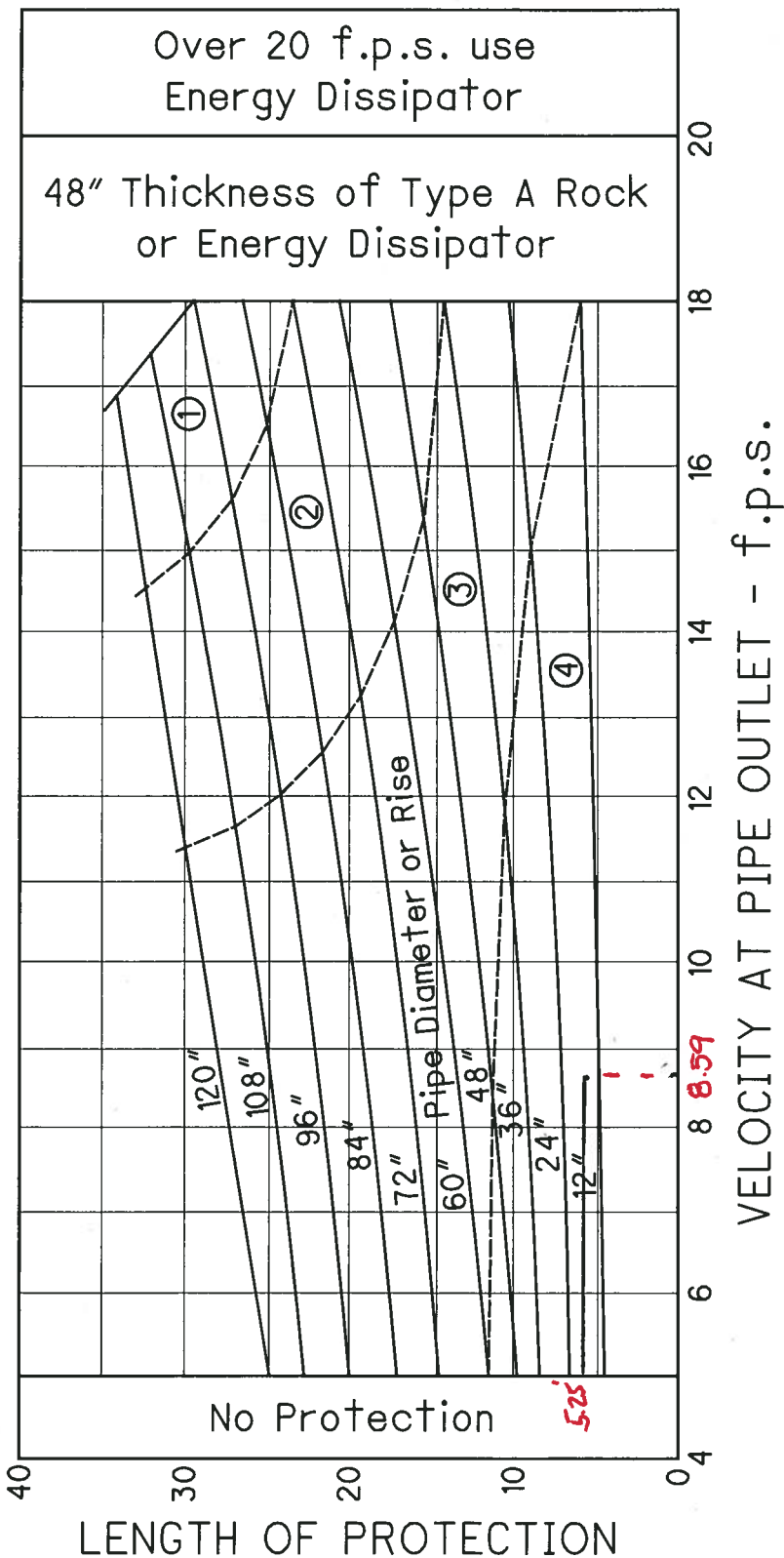
NOTES

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1 <hr/> REFERENCE SECTION 1107.2
--	---

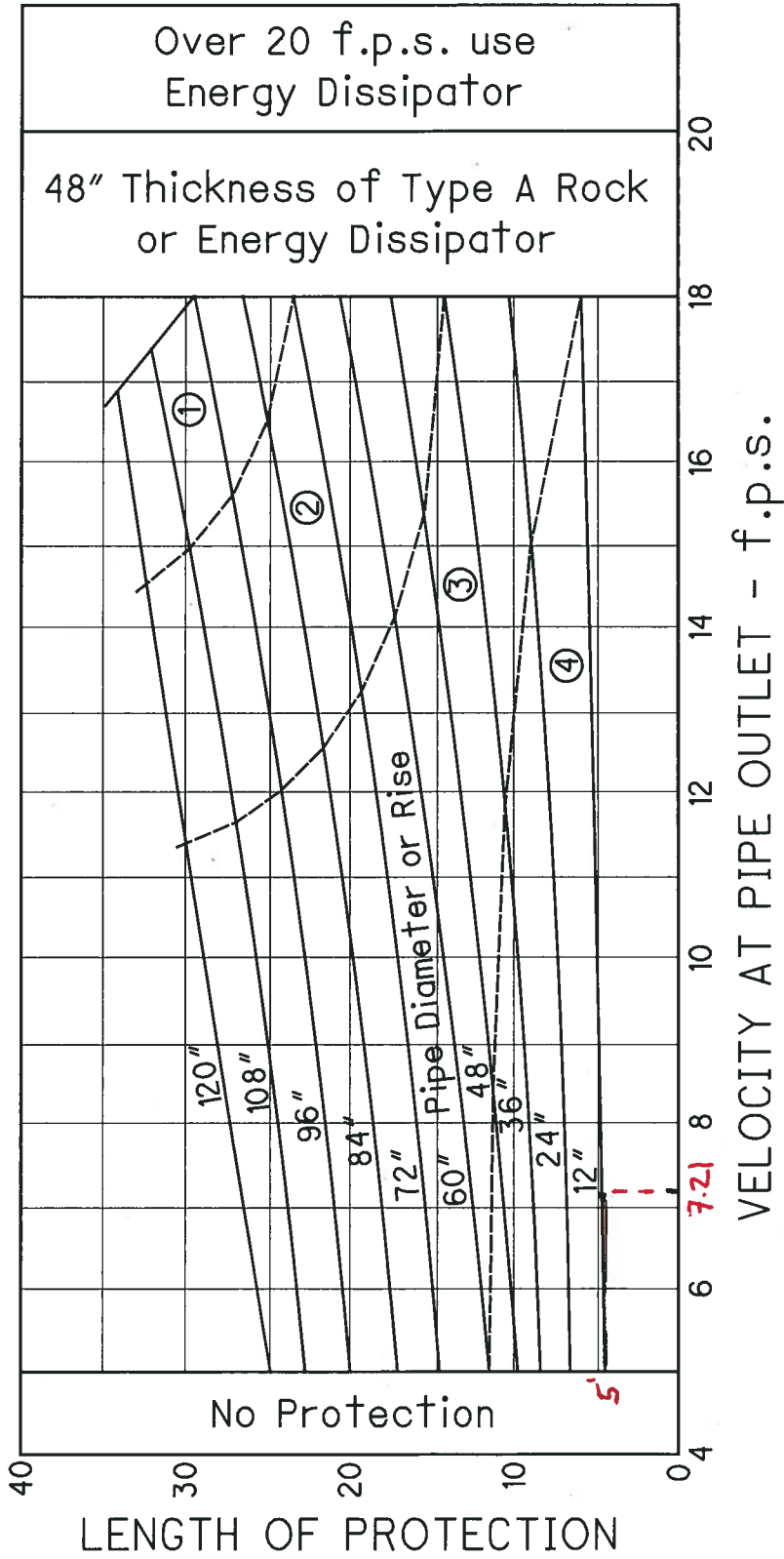


ROCK TYPE	LEGEND
A	① 48" of 18" rock
A	② 36" of 18" rock
B	③ 30" of 12" rock
C	④ 18" of 6" rock

NOTES

- Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.
- The width of protection shall be the width of the headwall, with 4' being the minimum.
- (Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1
	REFERENCE SECTION 1107.2



- ROCK TYPE**
- A
  - A
  - B
  - C
- LEGEND**
- ① 48" of 18" rock
  - ② 36" of 18" rock
  - ③ 30" of 12" rock
  - ④ 18" of 6" rock

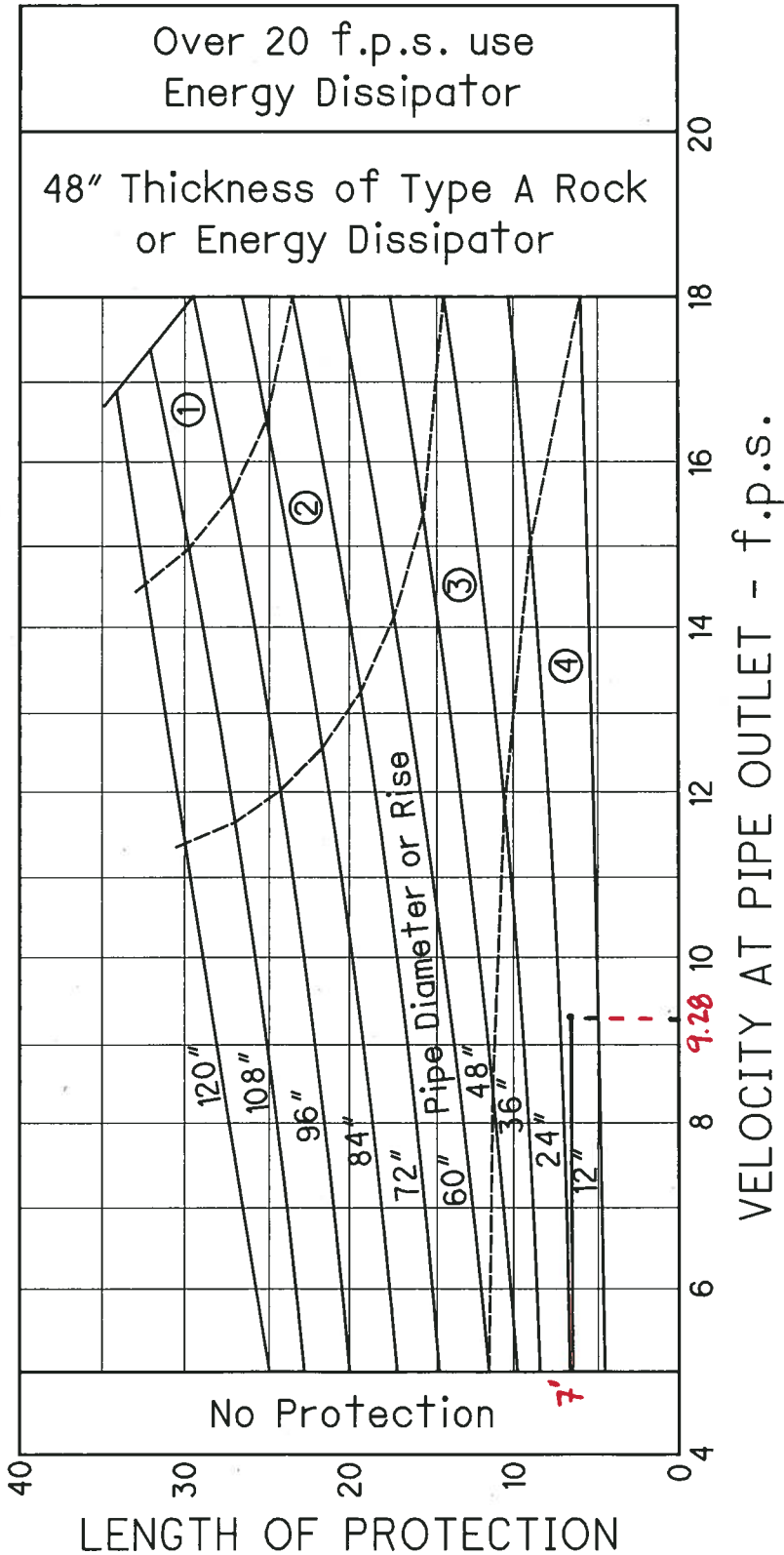
**NOTES**

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1 <hr/> REFERENCE SECTION 1107.2
--	---



LEGEND	ROCK TYPE
① 48" of 18" rock	A
② 36" of 18" rock	A
③ 30" of 12" rock	B
④ 18" of 6" rock	C

NOTES

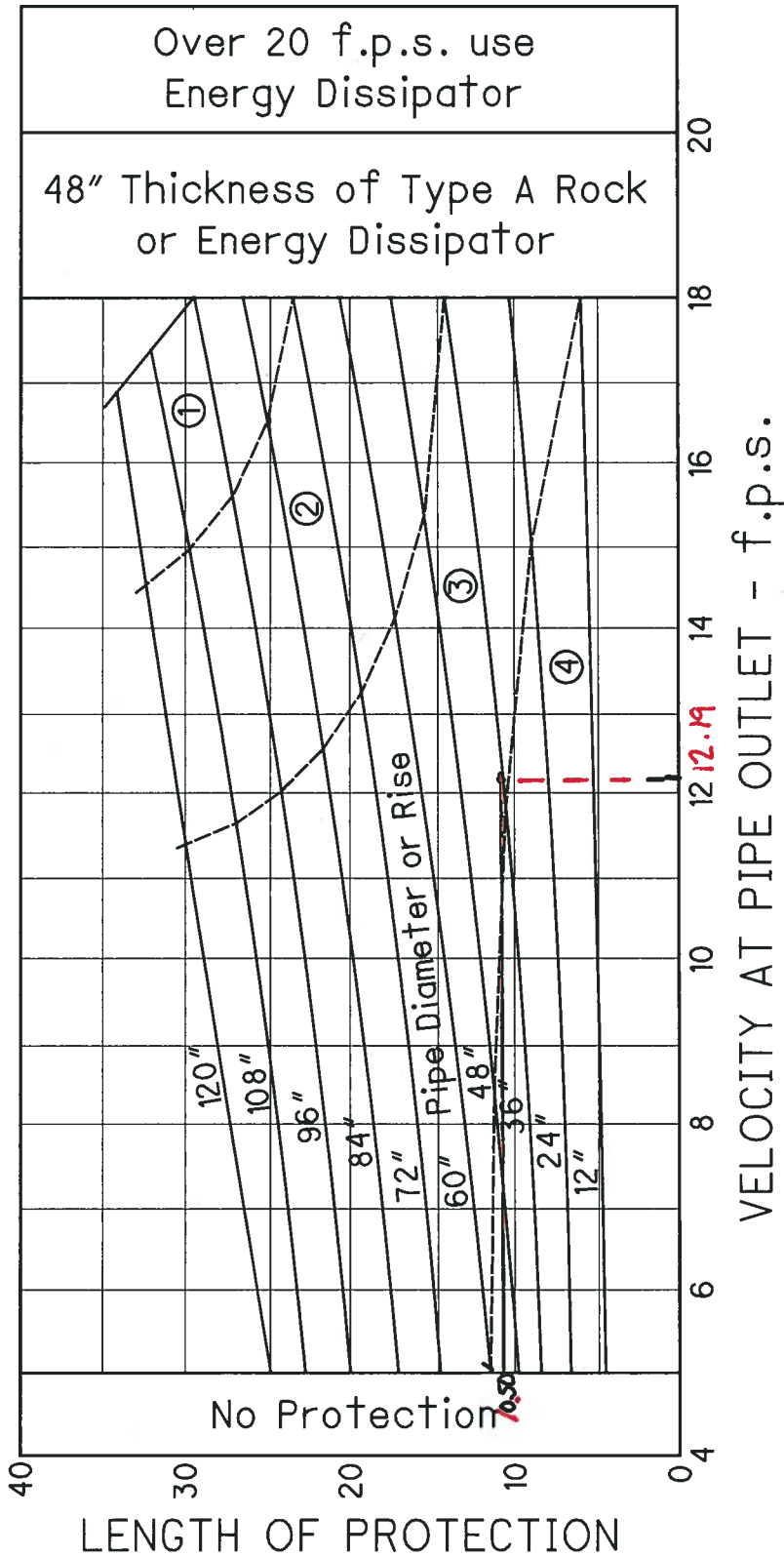
Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)



ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1 <hr/> REFERENCE SECTION 1107.2
--	---



- ROCK TYPE**
- LEGEND**
- ① 48" of 18" rock
  - ② 36" of 18" rock
  - ③ 30" of 12" rock
  - ④ 18" of 6" rock

**NOTES**

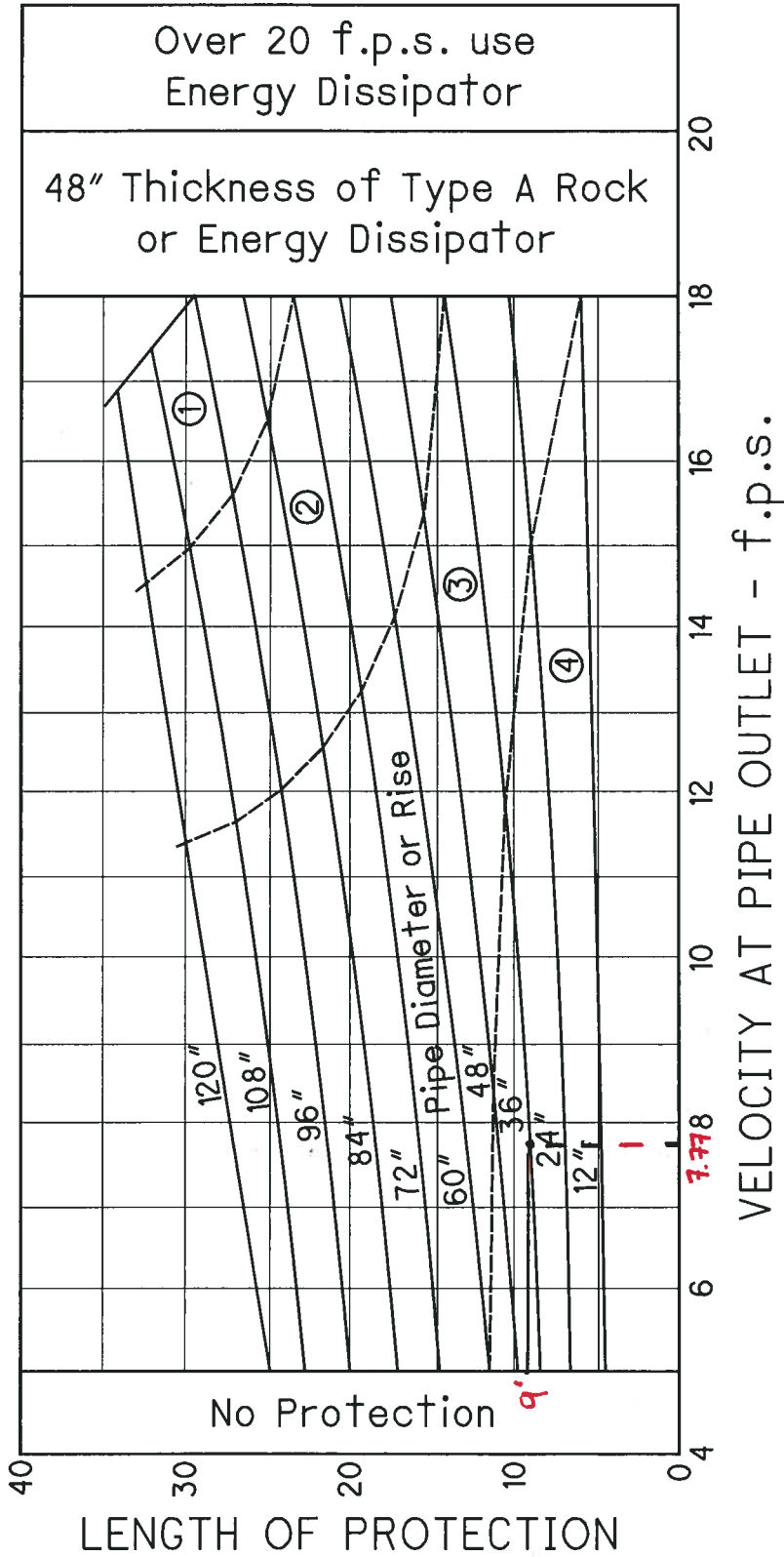
Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

*W/ AGGREGATE FILTER*

ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS	1107-1 <hr/> REFERENCE SECTION 1107.2
--	---



ROCK TYPE	LEGEND
A	① 48" of 18" rock
A	② 36" of 18" rock
B	③ 30" of 12" rock
C	④ 18" of 6" rock

**NOTES**

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

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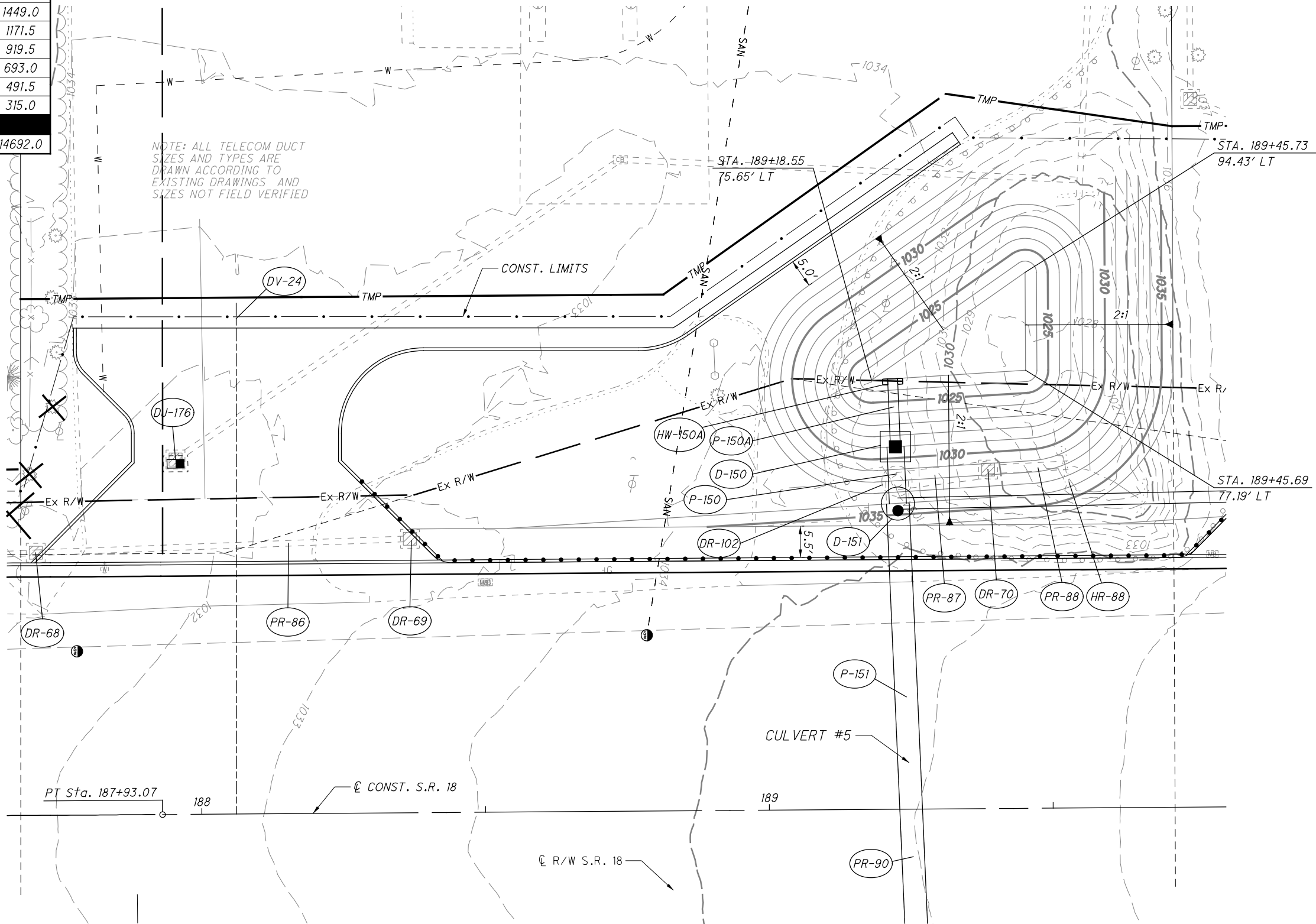
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## APPENDIX H – DETENTION POND STORAGE

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DETENTION POND #1 VOLUME				
ELEV	EXISTING		PROPOSED	
	SF	CFT	SF	CFT
1033	2856	2639.0	3247.0	3034.0
1032	2422	2223.0	2821.0	2611.5
1031	2024	1817.0	2402.0	2205.5
1030	1610	1415.5	2009.0	1801.5
1029	1221	872.0	1594.0	1449.0
1028	523	357.0	1304.0	1171.5
1027	191		1039	919.5
1026			800	693.0
1025			586	491.5
1024			397	315.0
1023			233	
TOTAL	9323.5		TOTAL	14692.0

NOTE: ALL TELECOM DUCT SIZES AND TYPES ARE DRAWN ACCORDING TO EXISTING DRAWINGS AND SIZES NOT FIELD VERIFIED



**GRADING PLAN  
DETENTION POND #1**

**MED-18-12.99**

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# APPENDIX I – CULVERT PHOTOS, INSPECTION REPORTS & VIDEO INSPECTION SURVEY

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CULVERT #1





CULVERT #1





CULVERT #1







CULVERT #1





CULVERT #1



CULVERT #2



CULVERT #2



CULVERT #2



CULVERT #2



CULVERT #2





CULVERT #3







CULVERT #4



CULVERT #4



CULVERT #5





CULVERT #5





CULVERT #5





CULVERT #5





CULVERT #6





CULVERT #6





CULVERT #6







CULVERT #6



CULVERT #6



# STATE OF OHIO DEPARTMENT OF TRANSPORTATION BRIDGE INSPECTION FIELD REPORT

Structure File Number: 5200695

Inventory Bridge Number: MED 00018 13.300 N

Bridge Type: 1 - CONCRETE/9 - CULVERT/5 - FILLED

Sufficiency Rating: 95.1

Date Built: 7/1/1935

District: 03 Place Code (FIPS): MEDINA

SR 18 over DITCH

Type of Service on: HIGHWAY

### APPROACH ITEMS

- c1. Approach Wearing Surface (EA)
- c2. Approach Slabs (SF)
- c3. Relief Joint (LF)
- c4. Embankment (EA) d
- c5. Guardrail (EA)
- N36. Safety Features  
Tr, Gr, Tm
- c6. Approach Summary

QTY.	condition state				TR	cr
	1	2	3	4		
2					1	
2					2	
2					2	
					36)B	N
					36)C	1
					36)D	1
					(9-0)	5

### SUBSTRUCTURE ITEMS

- c33. Abutment Walls (LF)
- c34. Abutment Caps (LF)
- c35. Abut. Columns/Bents (EA)
- c36. Pier Walls (LF)
- c37. Pier Caps (LF)
- c38. Pier Columns/Bents (EA)
- c39. Backwalls (LF)
- c40. Wingwalls (EA)
- c42. Scour (EA) d
- c43. Slope Protection (EA) d
- N60. Substructure Summary

QTY.	condition state				TR	cr
	1	2	3	4		
					(9-0)	N

### DECK ITEMS

- c7.1 Floor/Slab (SF)
- c7.2 Edge of Floor/Slab (LF)
- c8. Wearing Surface (SF)
- c9. Curb/Sidewalk/Walkway (LF)
- c10. Median (LF)
- c11. Railing (LF)
- N36. Safety Features: Rail
- c12. Drainage (EA) d
- c13. Expansion Joint (LF) d
- N58. Deck Summary

QTY.	condition state				TR	cr
	1	2	3	4		
					36)A	N
					0.0	
					(9-0)	N

### CULVERT ITEMS

- c44. General (LF)
- c45. Alignment (LF) d
- c46. Shape (LF) d
- c47. Seams (LF) d
- c48. Headwall/Endwall (LF)
- c49. Scour (LF) d
- c50. Abutments (LF)
- N62. Culvert Summary

QTY.	condition state				TR	cr
	1	2	3	4		
78					1	
78					1	
0.0					1	
2					1	
2					2	
					(9-0)	6

### SUPERSTRUCTURE ITEMS

- c14. Alignment (EA) d
- c15.1 Beams/Girders (LF)
- c15.2 Slab (SF)
- c16. Diaphragm/X-Frames (EA)
- c17. Stringers (LF)
- c18. Floorbeams (LF)
- c19. Truss Verticals (EA)
- c20. Truss Diagonals (EA)
- c21. Truss Upper Chord (EA)
- c22. Truss Lower Chord (EA)
- c23. Truss Gusset Plate (EA) d
- c24. Lateral Bracing (EA)
- c25. Sway Bracing (EA)
- c26. Bearing Devices (EA) d
- c27. Arch (LF)
- c28. Arch Column/Hanger (EA)
- c29. Arch Spandrel Walls (LF)
- c30. Prot. Coating System (LF) d
- c31. Pins/Hangers/Hinges (EA) d
- c32. Fatigue (LF) d
- N59. Superstructure Summary

QTY.	condition state				TR	cr
	1	2	3	4		
					(9-0)	N

### CHANNEL ITEMS

- c51. Alignment (LF) d
- c52. Protection (LF) d
- c53. Hydraulic Opening (EA) d
- c54. Navigation Lights (EA) d
- N61. Channel Summary

QTY.	condition state				TR	cr
	1	2	3	4		
200.0					2	
200.0					2	
1					2	
					(9-0)	5

### SIGN/UTILITY ITEMS

- c55. Signs (EA) d
- c56. Sign Supports (EA) d
- c57. Utilities (LF) d
- General Appraisal
- N41. Operating Status

QTY.	condition state				TR	cr
	1	2	3	4		
					(9-0)	6
						A

Inspector Name: Meggyesy, Steve  
 Inspection Date/Type: 12/09/2014 Routine  
 PE Number: \_\_\_\_\_  
 Reviewer Name: Wengerd, Marin  
 Review Date: 12/17/2014  
 PE Number: 55992

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
BRIDGE INSPECTION FIELD REPORT

Structure File Number 5200695

Inventory Bridge Number MED 00018 13 300 N

Bridge Type 1 - CONCRETE/9 - CULVERT/5 -  
FILLED

Sufficiency Rating 95.1

Date Built 7/1/1935

District 03 Place Code (FIPS) MEDINA

SR 18 over DITCH

Type of Service on HIGHWAY

Inspection Procedures

Comments

APPROACH

c1. Approach Wearing Surface

55.) A few scattered trans. cracks - 2013 new asphalt resurfacing w/proj.

c4. Embankment

59.) RT.: Previous erosion / GULLIES IN FRONT OF & UNDER RAIL REPAIRED PLUS REAR RT. EROSION BEHIND HEADWALL w/ REPAIR; FWD.LT.& RT SIDES W/ SLUMPING EMBANKMENT (\*SEE #c5).

c5. Guardrail

57.) RT.: '02-'03 Repaired EROSION AROUND G/R POSTS, POSTS LEANING OUTWARD (\*See #c4) - HEIGHT VARIES; FWD.LT. POSTS LEANING OUTWARD & SLIGHT DIP IN G/R (\*SEE #c4); AREAS W/ MINOR COLLISION DAMAGE.

CULVERT

c44. General

43.) TOP: SCATTERED TINY HAIRLINES; SIDES: SCATTERED VERTICAL HAIRLINES, HEAVY EFFL. & LIGHT RUST STAINS; BOTTOM: MINOR TO MODERATE SCALE THROUGHOUT; TOP @ INLET: ONE SMALL SPALLED AREA (RUSTY RESTEEL W/ MINIMAL COVER).

c48. Headwall/Endwall

47.) A FEW HAIRLINES W/ EFFL.

c49. Scour

48.) 4-SIDED CIP BOX, FWD.RT.(INLET): SCOUR HOLE @ INLET W/ FACE OF CUT-OFF WALL EXPOSED (2'+/- FILLS IN W/ SILT & GRAVEL, THEN WASHES OUT - \*SEE #c51); Scour hole developing near end of box @ outlet.

CHANNEL

c51. Alignment

51.) REAR RT.(INLET): SANDBAR & SLUMPING EMBANKMENT DIRECTING

**STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
BRIDGE INSPECTION FIELD REPORT**

Structure File Number: 5200695      Inventory Bridge Number: MED 00018 13 300 N      Bridge Type: 1 - CONCRETE/9 - CULVERT/5 -  
Sufficiency Rating: 95.1      Date Built: 7/1/1935      FILLED  
District: 03      Place Code (FIPS): MEDINA      SR 18 over DITCH      Type of Service on: HIGHWAY

FLOW @ FWD. RT. CORNER OF HEADWALL (\*SEE #c49,#c53).

c52. Protection

52.) EROSION OF UPSTREAM EMBANKMENT plus erosion @ outlet (\*See #c53).

c53. Hydraulic Opening

53.) \*SEE #c51; High water level reaching 50%+ capacity; LARGE CONCRETE  
BLOCK & STONE IN CENTER OF CHANNEL @ INLET(\*SEE #c49).

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

CULVERT INSPECTION REPORT

CR-86 07-13

**520180045**

CULVERT FILE NUMBER 520180045 CULVERT NUMBER MED SR 18 0045 - 13.73 DISTRICT 3  
 CO ROUTE ID SLM

SPAN 48 SHAPE 7 MATERIAL 1 LENGTH 175

ROADWAY ID 0 ENTRY CLASS A NUMBER OF CELLS 1

LATITUDE 41.13766768 LONGITUDE -81.82725918

FEATURE INTERSECTION: \_\_\_\_\_

CULVERT				
1. General	7	2. Culvert Alignment	7	
3. Shape		4. Seams or Joints	7	
5. Slab		6. Abutments		
7. Headwalls*	8	8. End Structure		
CHANNEL				
9. Channel Alignment	7	10. Protection	8	
11. Culvert Waterway Blockage	9	12. Scour*	6	
APPROACHES				
13. Pavement	8	14. Guardrail	8	
15. Embankment	7			
16. Level of Inspection	X	<b>GENERAL APPRAISAL &amp; OPERATIONAL STATUS</b>	7	A

\*Only a bold box for structures that are Headwall or Scour critical. These items should not govern the GA if they are not determined to be critical upon the judgment of the inspector.

COMMENTS (use back of form if additional space if needed):

scour on the outlet side but hasn't affected the culvert

INSPECTED BY: BAW DATE: 5/19/2014

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

CULVERT INSPECTION REPORT

CR-86 07-13

**520180046**

CULVERT FILE NUMBER 520180046 CULVERT NUMBER MED SR 18 0046 - 14.60 DISTRICT 3  
CO ROUTE ID SLM

SPAN 72 SHAPE 7 MATERIAL 1 LENGTH 105

ROADWAY ID 0 ENTRY CLASS A NUMBER OF CELLS 1

LATITUDE 41.13633198 LONGITUDE -81.81017967

FEATURE INTERSECTION: east of river stvx

CULVERT				
1. General	7	2. Culvert Alignment	7	
3. Shape		4. Seams or Joints	7	
5. Slab		6. Abutments		
7. Headwalls*		8. End Structure		
CHANNEL				
9. Channel Alignment	3	10. Protection		
11. Culvert Waterway Blockage	7	12. Scour*	6	
APPROACHES				
13. Pavement	8	14. Guardrail		
15. Embankment	8			
16. Level of Inspection	X	GENERAL APPRAISAL & OPERATIONAL STATUS	7	A

\*Only a bold box for structures that are Headwall or Scour critical. These items should not govern the GA if they are not determined to be critical upon the judgment of the inspector.

COMMENTS (use back of form if additional space if needed):

inlet channel isn't hitting the pipe straight. looks like a pile of dirt 3/4 of the in is blocking 1/8 of the pipe

INSPECTED BY: BAW DATE: 5/19/2014

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

CULVERT INSPECTION REPORT

CR-86 07-13

**520180026**

CULVERT FILE NUMBER \_\_\_\_\_ CULVERT NUMBER MED SR 18 0026 - 15.00 DISTRICT 3  
CO ROUTE ID SLM

SPAN 36 SHAPE 1 MATERIAL 1 LENGTH 140

ROADWAY ID 0 ENTRY CLASS A NUMBER OF CELLS 1

LATITUDE 41.13617763 LONGITUDE -81.80465323

FEATURE INTERSECTION: \_\_\_\_\_

CULVERT				
1. General	7	2. Culvert Alignment	7	
3. Shape	8	4. Seams or Joints	7	
5. Slab		6. Abutments		
7. Headwalls*	8	8. End Structure		
CHANNEL				
9. Channel Alignment	8	10. Protection		
11. Culvert Waterway Blockage	4	12. Scour*	8	
APPROACHES				
13. Pavement	7	14. Guardrail		
15. Embankment	7			
16. Level of Inspection	X	GENERAL APPRAISAL & OPERATIONAL STATUS	7	A

\*Only a bold box for structures that are Headwall or Scour critical. These items should not govern the GA if they are not determined to be critical upon the judgment of the inspector.

COMMENTS (use back of form if additional space if needed):

inlet looks to be in front of speedway. catch basin completely covered with washed out berm

INSPECTED BY: BAW DATE: 5/19/2014

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



**DYNAMERICAN**  
1011 Lake Road  
Medina, Ohio 44321  
1-800-362-8490 330-666-8863  
Fax # 330-665-1075

**C.C.T.V. INSPECTION SURVEY**  
**MEDINA STORM**

**GPD GROUP**  
**MEDINA OHIO**  
**MEDINA COUNTY**  
DISC 1

STORM SEWER SURVEY

10/20/15

DYNAMERICAN  
 3427 Sawmill Rd.  
 Copley, OH 44321  
 Phone: 330-666-8863  
 tw.dynamerican@frontier.com



Project Summary

**GPD MEDINA STORM**

Main ID	Date	Address	Start MH	Finish MH	Pipe	Asset length	Surveyed Length
SBMH1-HW1	10/20/2015	CULVERT 4	SBMH1	HW1	RCP	350.6	350.6
SB1-RSCB1	10/20/2015	CULVERT 4	SBMH1	RSCB1	RCP	108.9	108.9
CB1-18-01	10/20/2015	CULVERT 4	RSCB1	18-01	RCP	46.9	46.9
18-01-18-02	10/20/2015	CULVERT 4	18-01	18-02	RCP	214.5	214.5
1802-1803	10/20/2015	CULVERT 4	1802	1803	RCP	35.1	35.1
1803-1802	10/20/2015	CULVERT 4	1803	1802	RCP	88.3	88.3
1804-1805	10/20/2015	SR18	1804	1805	PE	39.1	39.1
1804-1806	10/20/2015	SR18	1804	1806	PE	362.2	362.2
1806-1807	10/20/2015	SR18	1806	1807	RCP	277.1	277.1

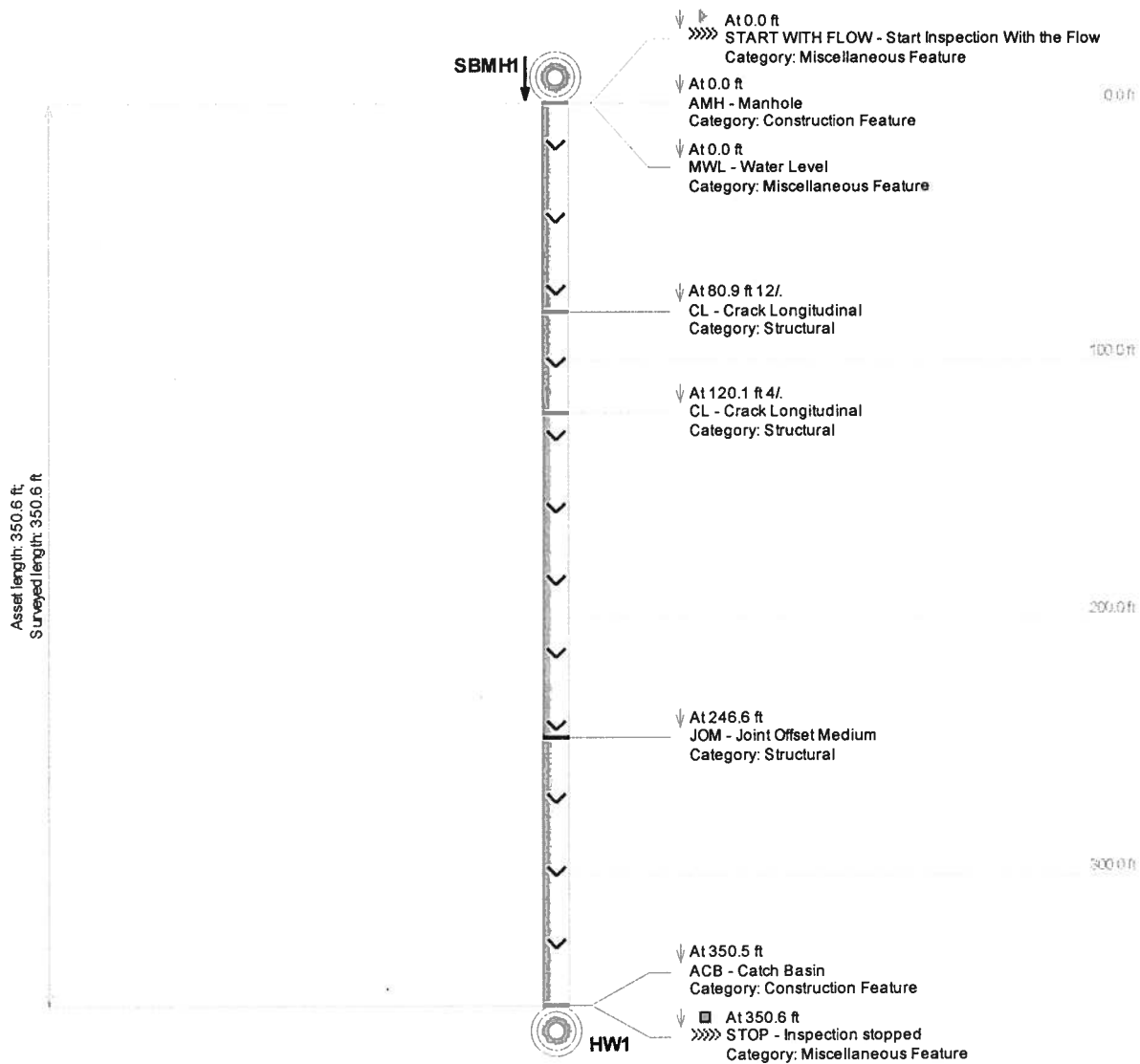
DYNAMERICAN  
 3427 Sawmill Rd.  
 Copley, OH 44321  
 Phone: 330-666-8863  
 tw.dynamerican@frontier.com



Main ID	Date	Address	Start MH	Finish MH	Pipe	Asset length	Surveyed Length
1807-1807	10/20/2015	SR18	1807	1808	RCP	206.2	206.2
IN1-OUT1	10/20/2015	CULVERT 3	OUT1	IN1	RCP	172.5	172.5
1811-1812	10/20/2015	GLENSHIRE	1811	1812	RCP	91.1	91.1
1812-1813	10/20/2015	GLENSHIRE	1812	1813	RCP	63.8	63.8
1813-1814	10/20/2015	GLENSHIRE	1813	1814	RCP	84.3	84.3
<b>Number of inspections: 14</b>						<b>Subtotal</b>	<b>2,140.6 ft</b>
						<b>Total</b>	<b>2,140.6 ft</b>

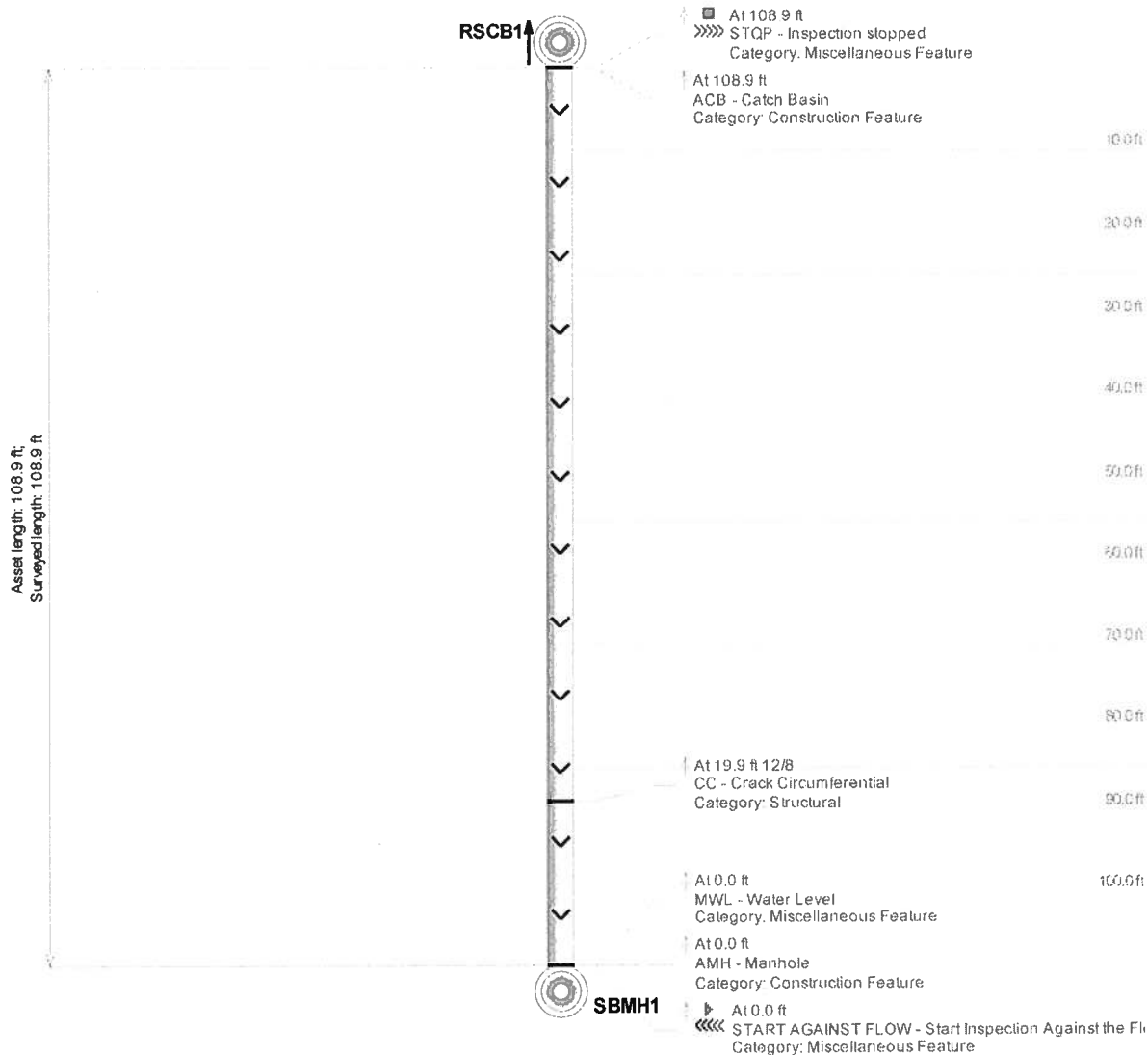
## Main Inspection with Pipe-Run Graph

Project Name:		Pipeline segment ref:		Locality:		Location (street name and number):	
GPD MEDINA STORM		SBMH1-HW1		MEDINA		CULVERT 4	
Start date/time:		Width:	Height:	Material:	Location code:		
10/20/2015			36	RCP			
Direction:		Length surveyed:		Weather:	Media label:		
Downstream		350.6			CT1		



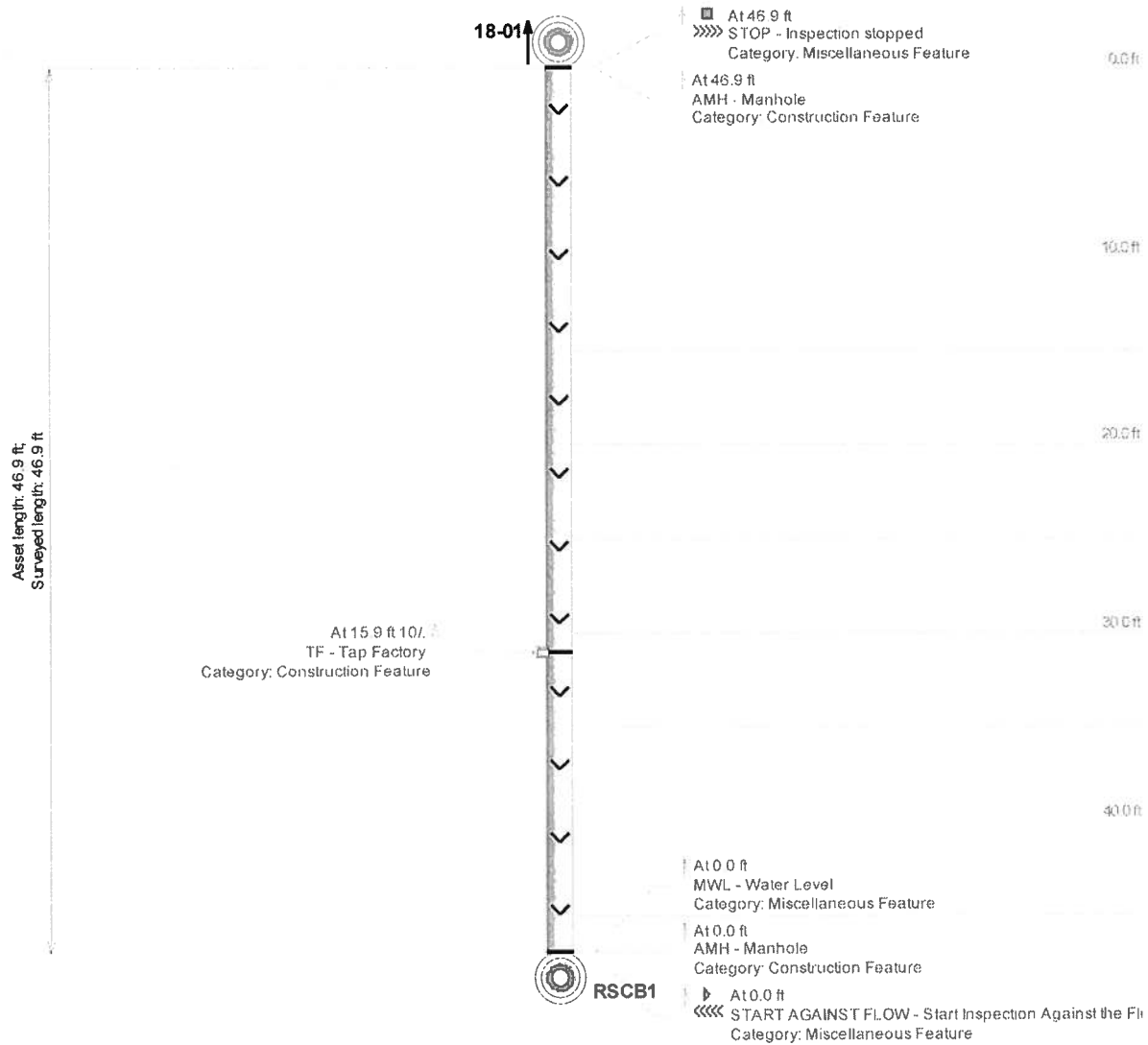
## Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	SB1-RSCB1	MEDINA	CULVERT 4
Start date/time:	Width:	Height:	Material:
10/20/2015	6	3	RCP
Direction:	Length surveyed:	Weather:	Media label:
UPSTREAM	108.9		CT1



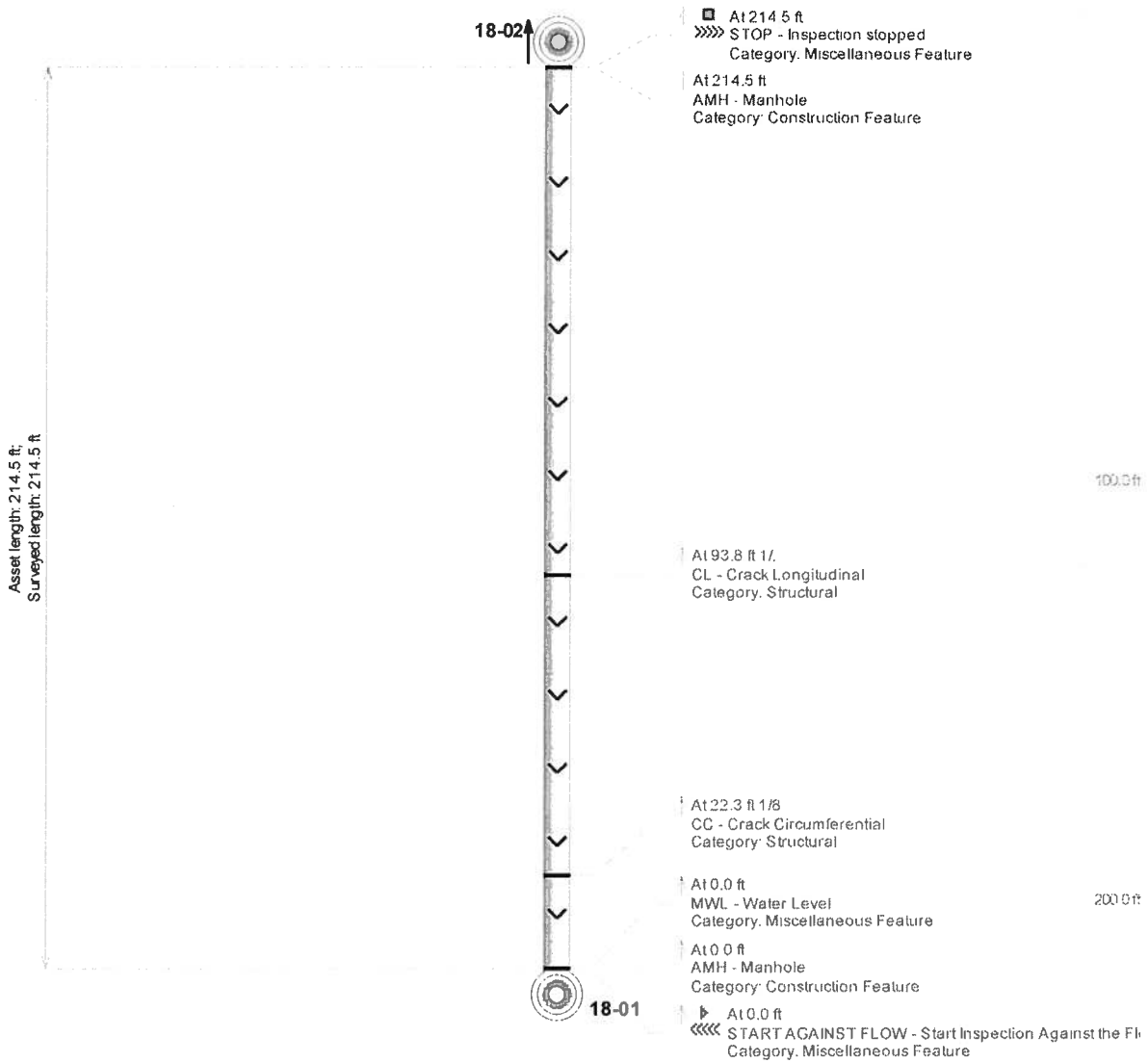
## Main Inspection with Pipe-Run Graph

Project Name:		Pipeline segment ref:		Locality:		Location (street name and number):	
GPD MEDINA STORM		CB1-18-01		MEDINA		CULVERT 4	
Start date/time:		Width:	Height:	Material:	Location code:		
10/20/2015			36	RCP			
Direction:		Length surveyed:		Weather:	Media label:		
UPSTREAM		46.9			CT1		



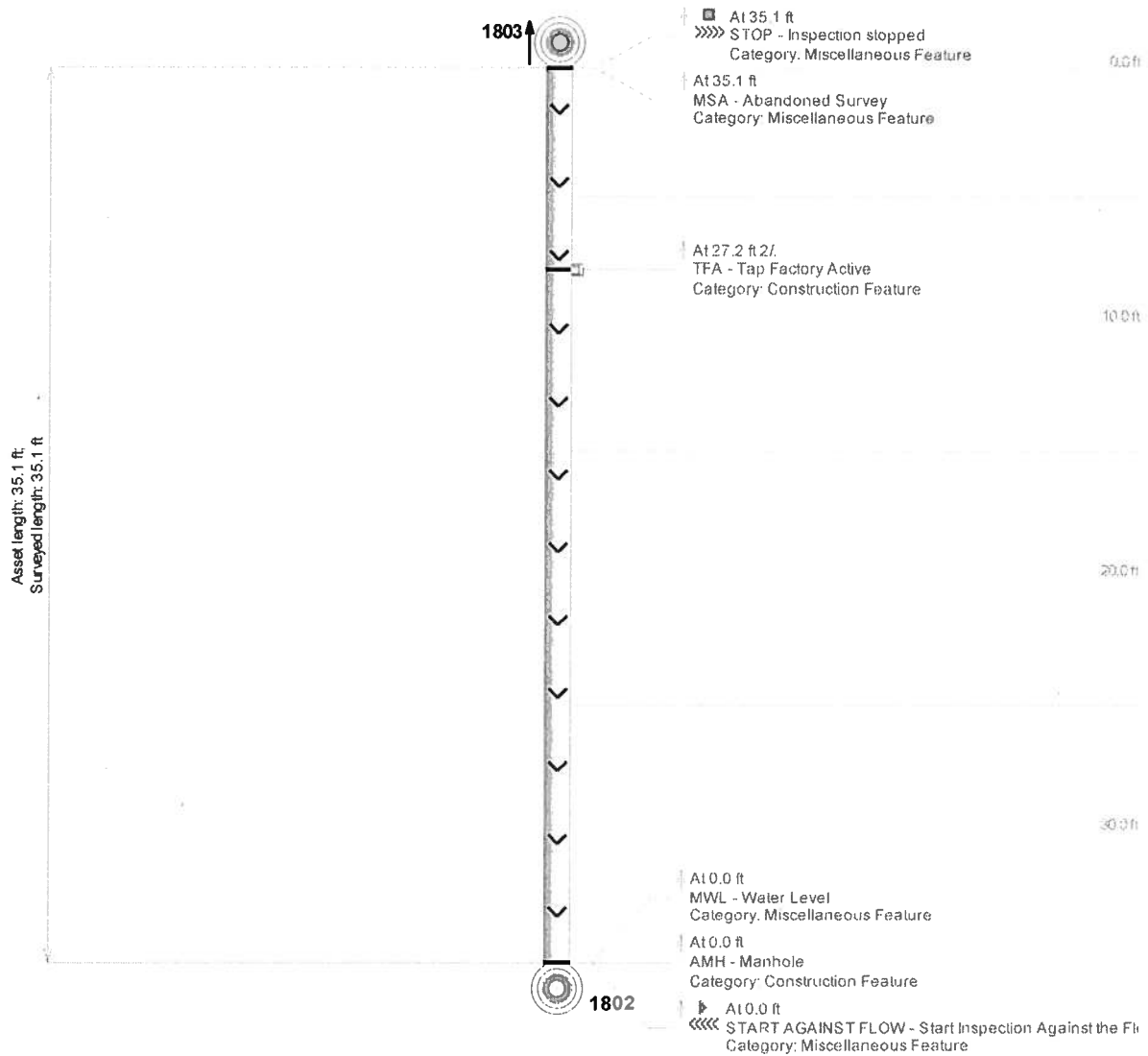
## Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	18-01-18-02	MEDINA	CULVERT 4
Start date/time:	Width:	Height:	Material:
10/20/2015		36	RCP
Location code:	Direction:	Length surveyed:	Weather:
	UPSTREAM	214.5	
Media label:			
CT1			



## Main Inspection with Pipe-Run Graph

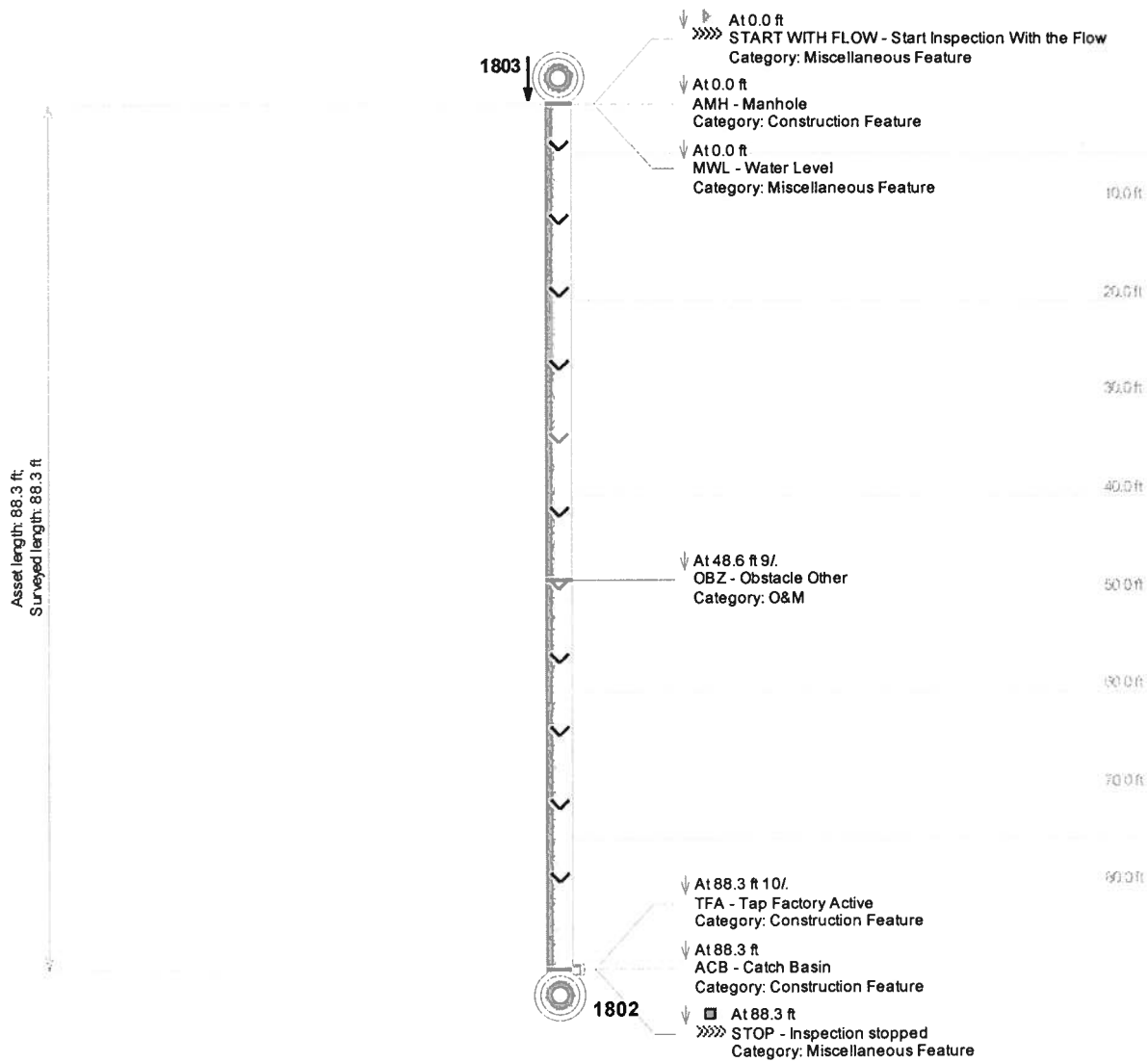
Project Name: <b>GPD MEDINA STORM</b>	Pipeline segment ref: <b>1802-1803</b>	Locality: <b>MEDINA</b>	Location (street name and number): <b>CULVERT 4</b>
Start date/time: <b>10/20/2015</b>	Width: <b>36</b>	Height: <b>RCP</b>	Location code: <b>CT1</b>
Direction: <b>UPSTREAM</b>	Length surveyed: <b>35.1</b>	Weather:	Media label: <b>CT1</b>





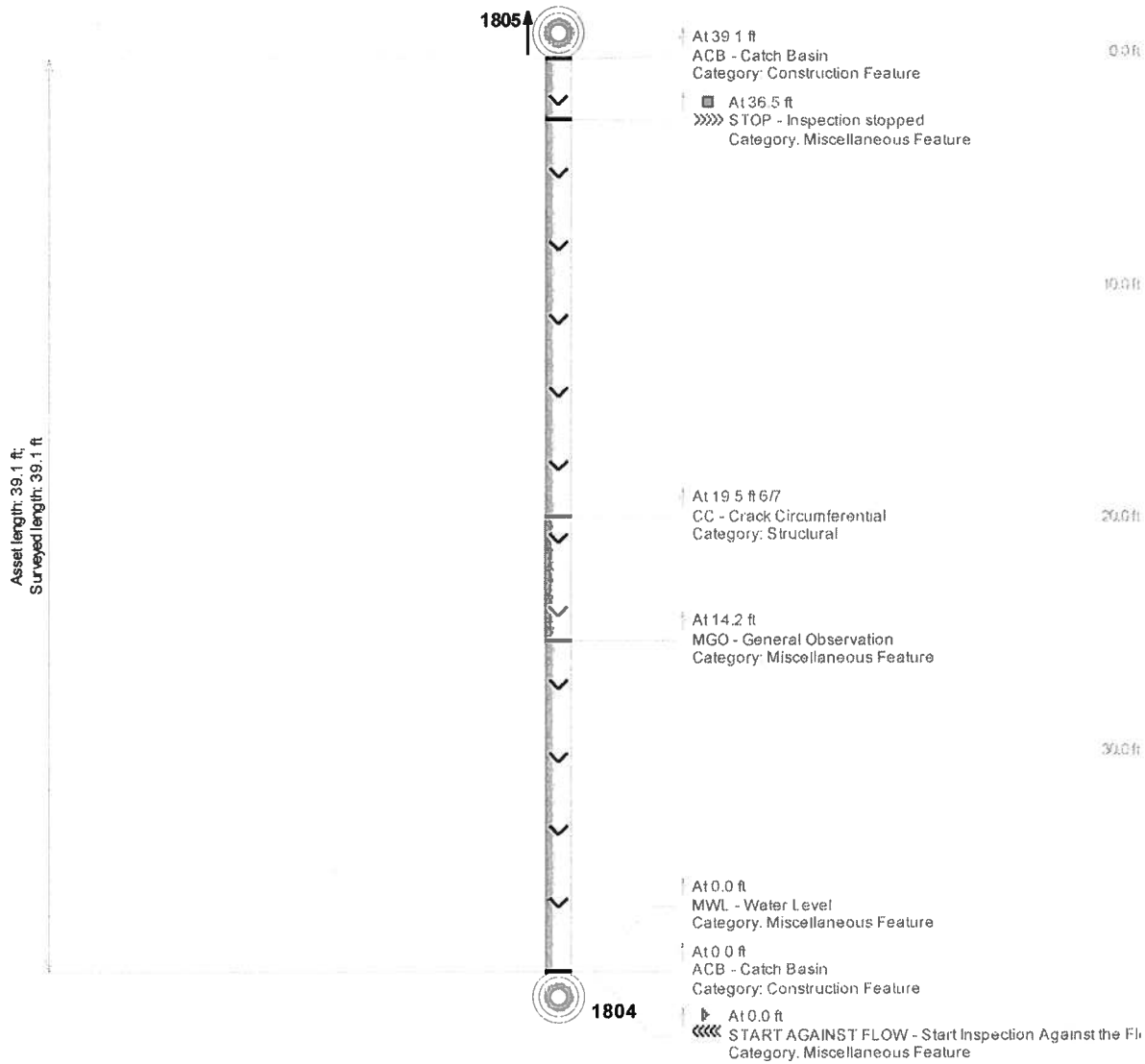
## Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	1803-1802	MEDINA	CULVERT 4
Start date/time:	Width:	Height:	Material:
10/20/2015	6	3	RCP
Location code:	Direction:	Length surveyed:	Weather:
	Downstream	88.3	
Media label:			
CT1			



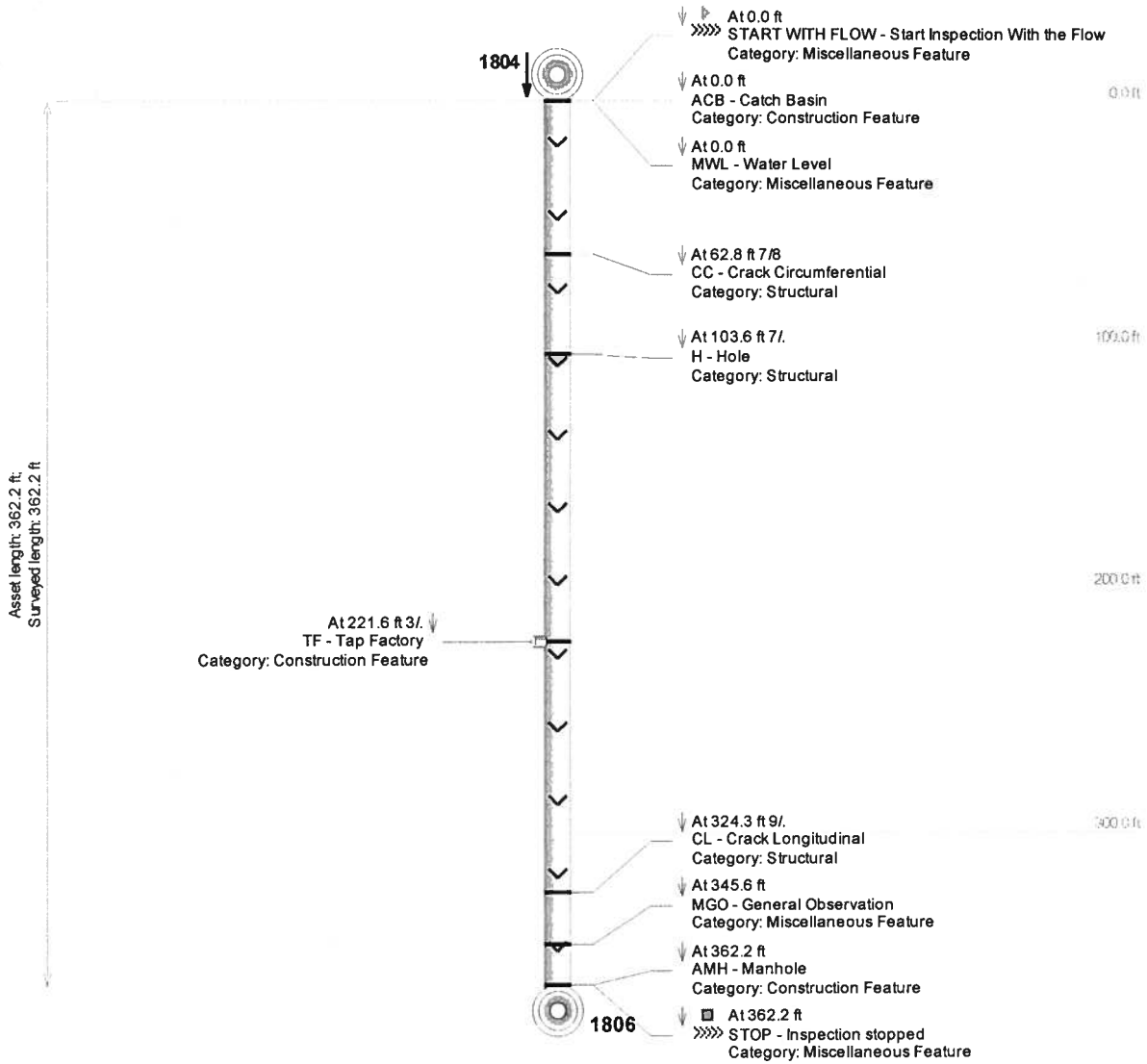
## Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	1804-1805	MEDINA	SR18
Start date/time:	Width:	Height:	Material:
10/20/2015		36	PE
Direction:	Length surveyed:	Weather:	Media label:
UPSTREAM	39.1		CT1



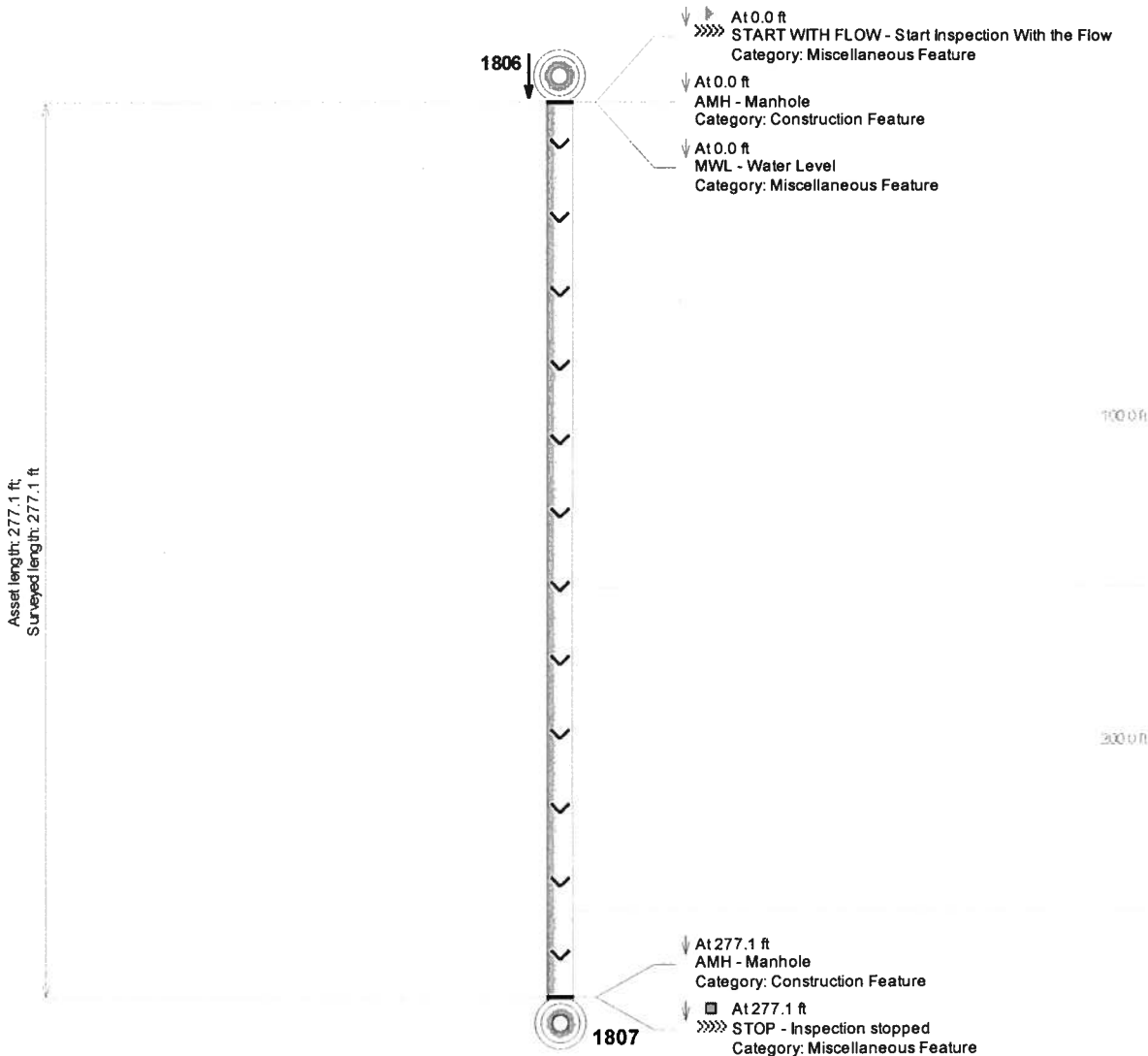
## Main Inspection with Pipe-Run Graph

Project Name:		Pipeline segment ref:		Locality:		Location (street name and number):	
GPD MEDINA STORM		1804-1806		MEDINA		SR18	
Start date/time:		Width:	Height:	Material:	Location code:		
10/20/2015			36	PE			
Direction:		Length surveyed:		Weather:	Media label:		
Downstream		362.2			CT1		



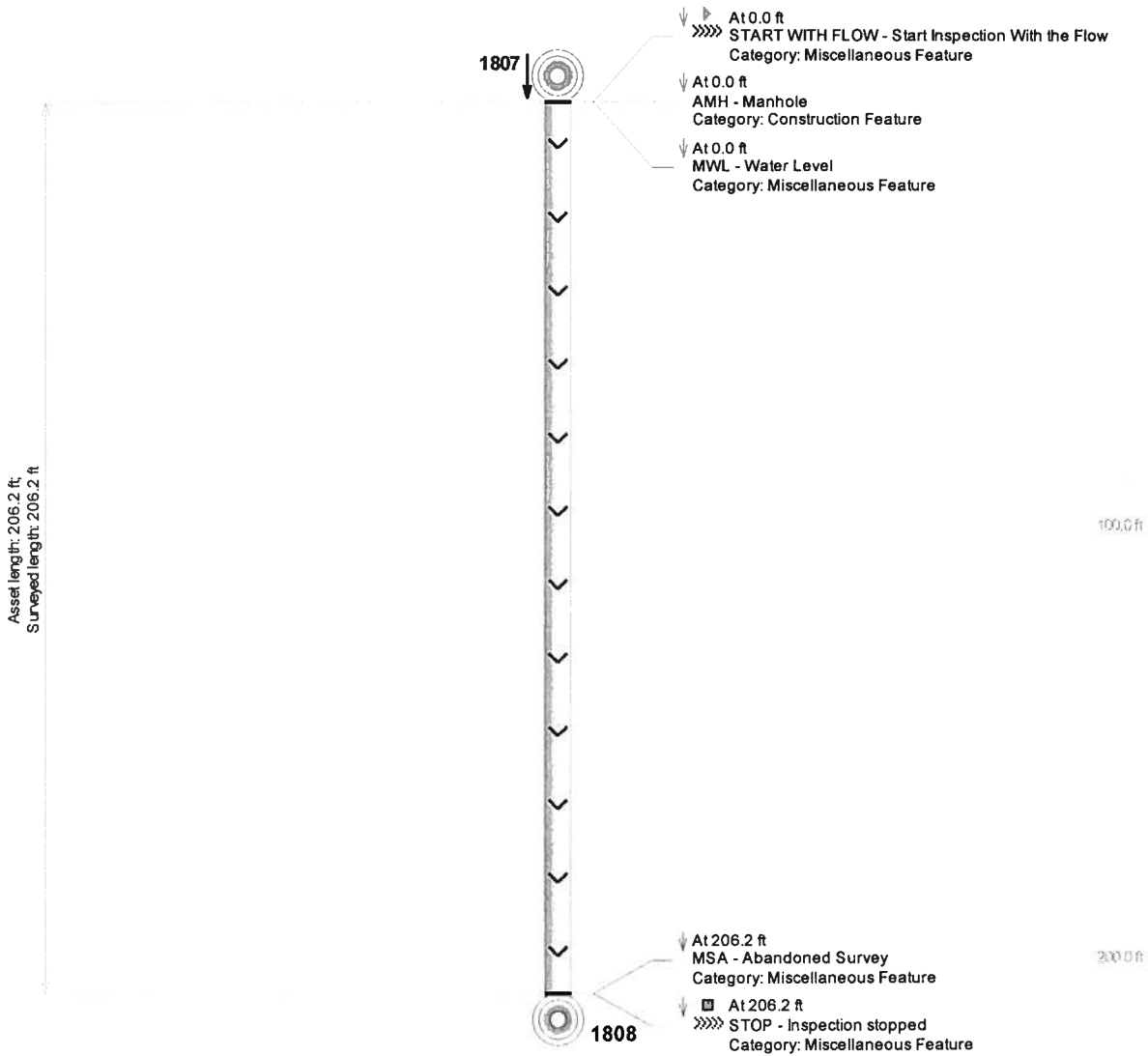
## Main Inspection with Pipe-Run Graph

Project Name:		Pipeline segment ref:		Locality:		Location (street name and number):	
GPD MEDINA STORM		1806-1807		MEDINA		SR18	
Start date/time:		Width:	Height:	Material:	Location code:		
10/20/2015			42	RCP			
Direction:		Length surveyed:		Weather:	Media label:		
Downstream		277.1			CT1		



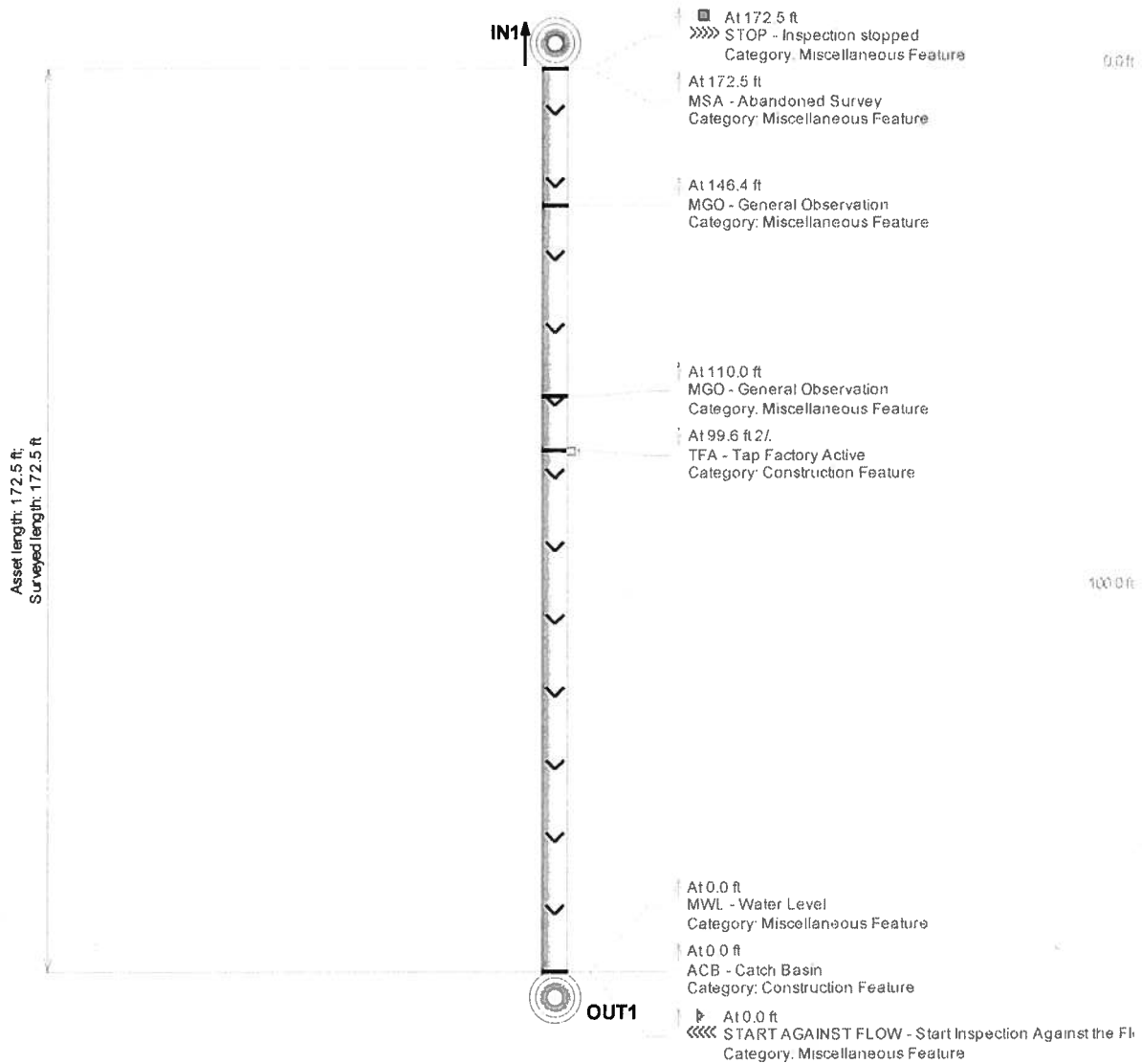
## Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	1807-1807	MEDINA	SR18
Start date/time:	Width:	Height:	Material:
10/20/2015		48	RCP
Direction:	Length surveyed:	Weather:	Media label:
Downstream	206.2		CT1



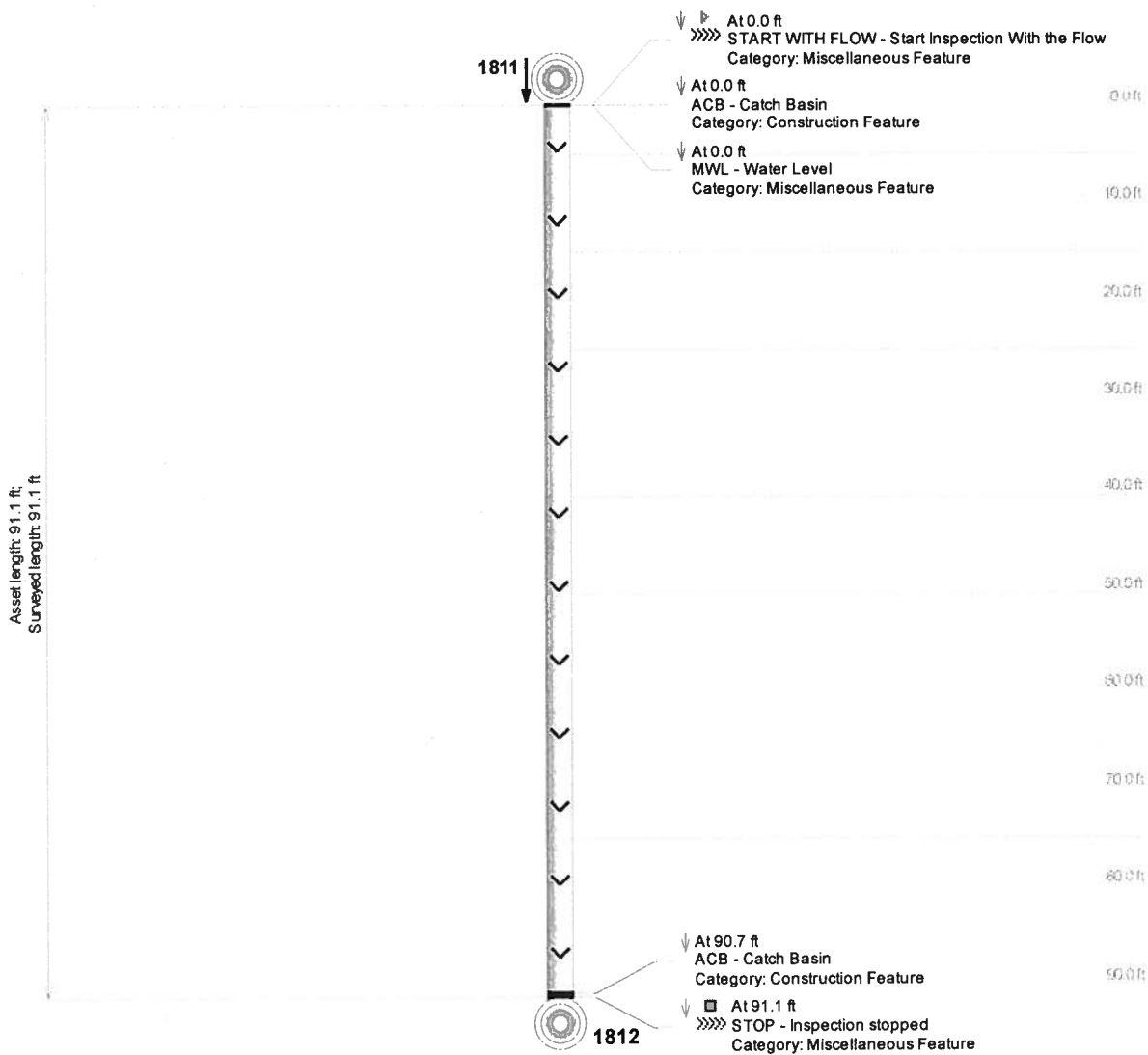
## Main Inspection with Pipe-Run Graph

Project Name:		Pipeline segment ref:		Locality:		Location (street name and number):	
GPD MEDINA STORM		IN1-OUT1		MEDINA		CULVERT 3	
Start date/time:		Width:	Height:	Material:	Location code:		
10/20/2015		4	4	RCP			
Direction:		Length surveyed:		Weather:	Media label:		
UPSTREAM		172.5			CT1		



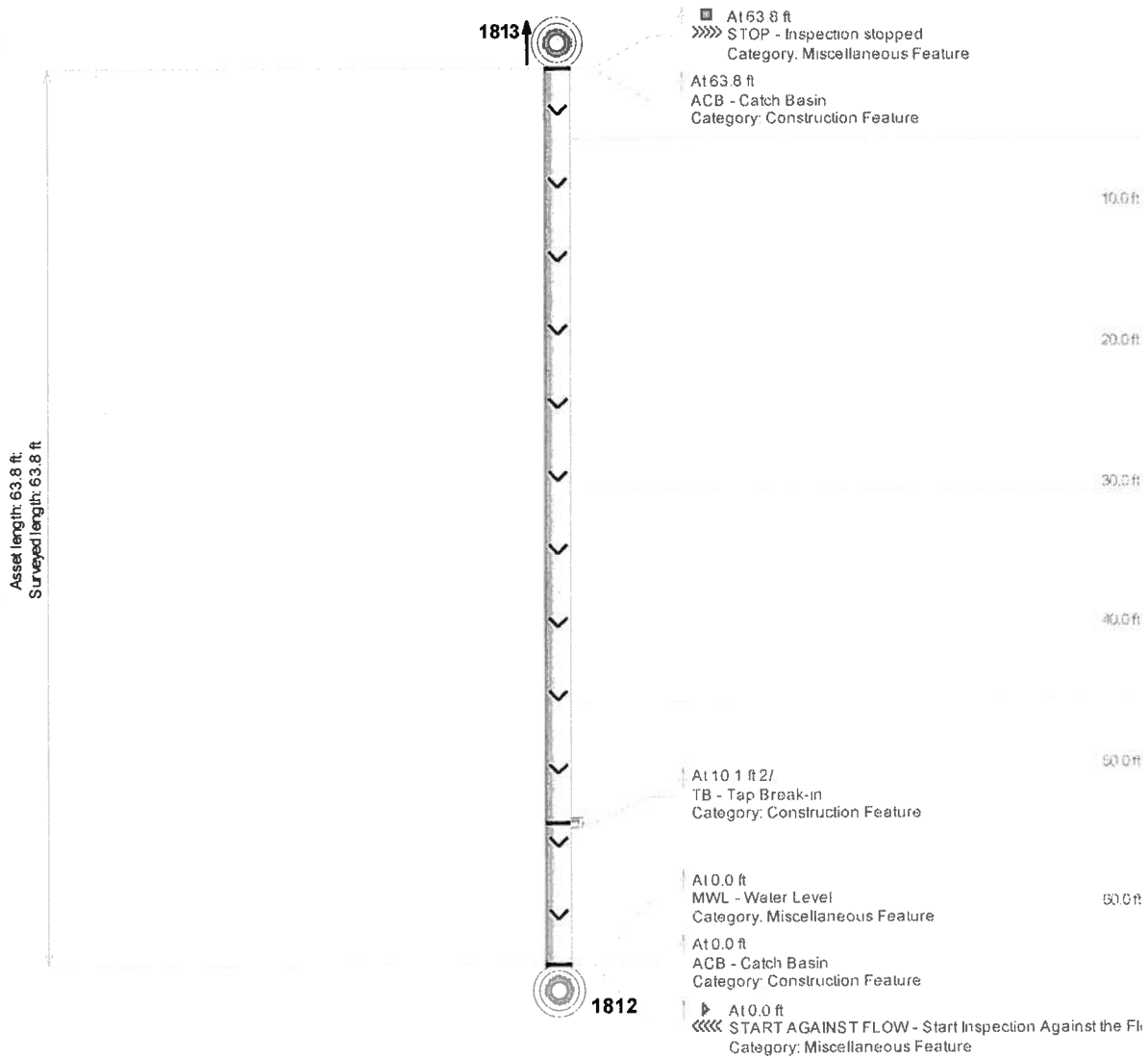
## Main Inspection with Pipe-Run Graph

Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	1811-1812	MEDINA	GLENSHIRE
Start date/time:	Width:	Height:	Material:
10/20/2015		33	RCP
Direction:	Length surveyed:	Weather:	Media label:
Downstream	91.1		CT1



## Main Inspection with Pipe-Run Graph

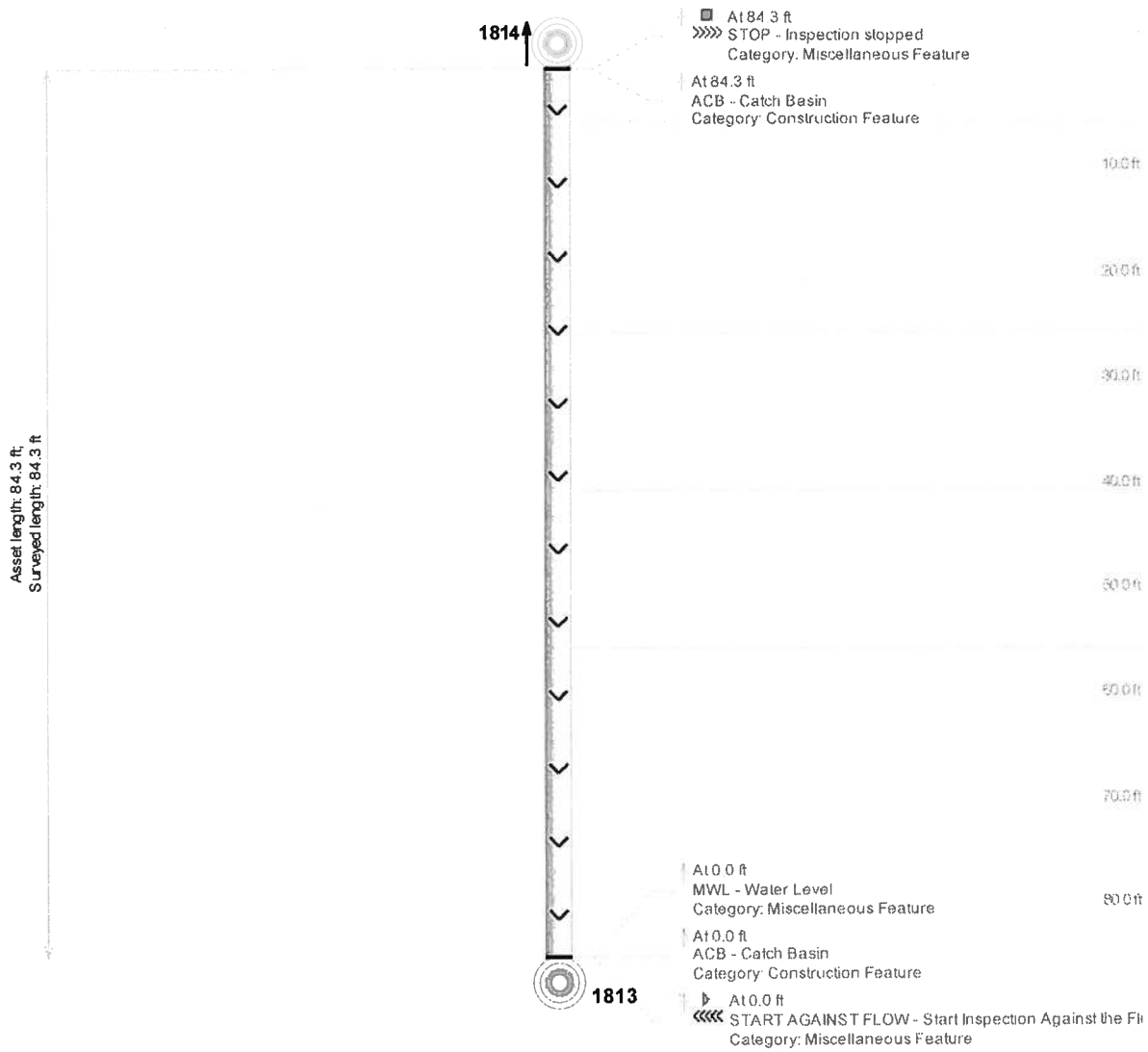
Project Name:	Pipeline segment ref:	Locality:	Location (street name and number):
GPD MEDINA STORM	1812-1813	MEDINA	GLENSHIRE
Start date/time:	Width:	Height:	Material:
10/20/2015		33	RCP
Direction:	Length surveyed:	Weather:	Media label:
UPSTREAM	63.8		CT1





## Main Inspection with Pipe-Run Graph

Project Name:		Pipeline segment ref:		Locality:		Location (street name and number):	
GPD MEDINA STORM		1813-1814		MEDINA		GLENSHIRE	
Start date/time:		Width:	Height:	Material:	Location code:		
10/20/2015			33	RCP			
Direction:		Length surveyed:		Weather:		Media label:	
UPSTREAM		84.3				CT1	



---

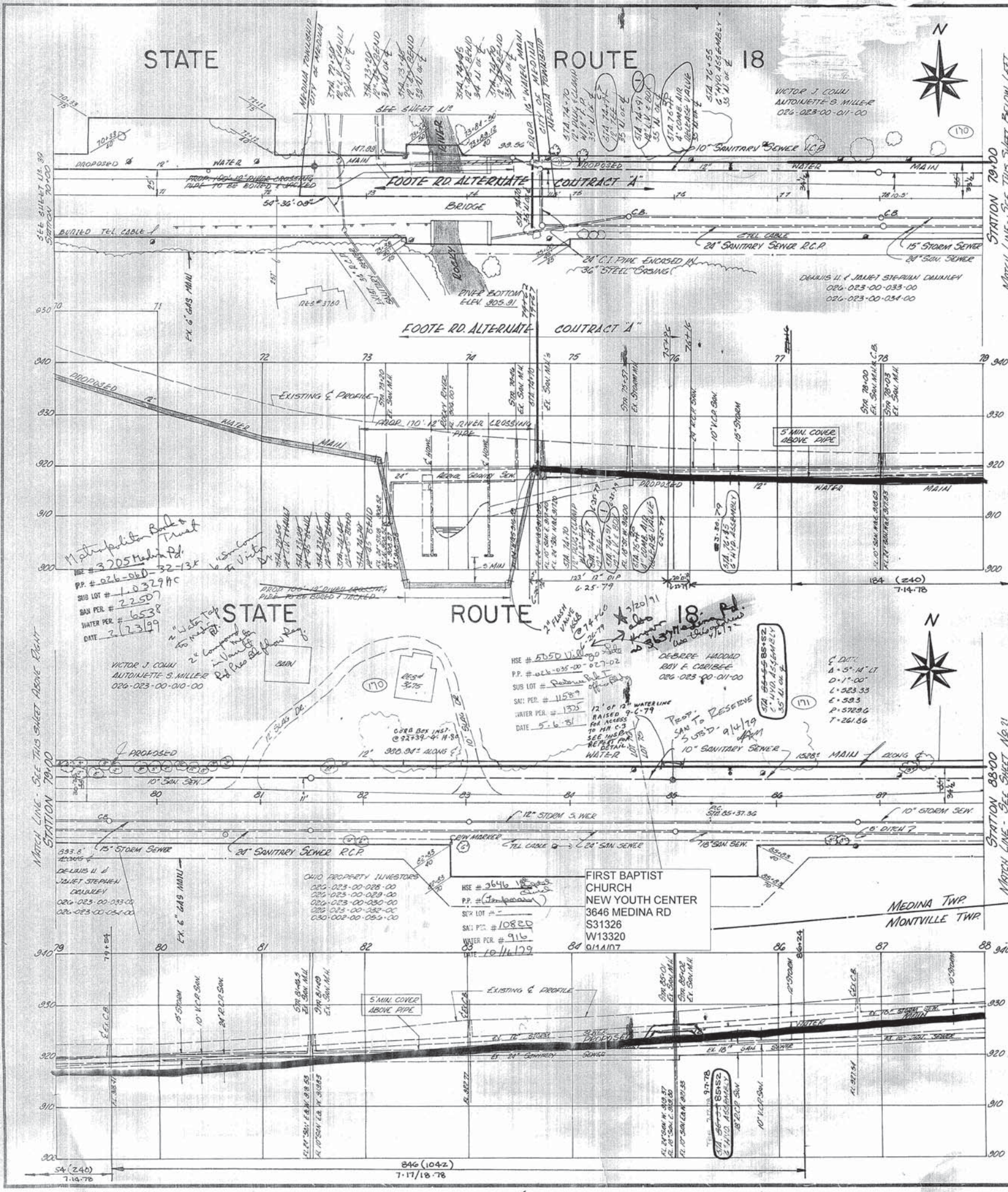
## APPENDIX J – RECORD DRAWINGS

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Ohio Department of Transportation - District 3  
Final Drainage Design Report  
MED-18-12.99





QUANTITIES FROM STA. 72+00 TO STA. 88+00

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITIES	FINAL QUANTITIES
A-4	18" WATER MAIN	L.F.	1330	
A-9	18" L.V. BOX	E.A.	1	
A-11	4" COMB. AIR RELEASE VALVE	E.A.	1	
A-12	12" Tee	E.A.	1	
A-33	18" PLUG & CLAMP W/18" P.	E.A.	1	
A-35	6" HYDRANT ASSEMBLY	E.A.	2	
A-42	TYPE B COLLAR	E.A.	1	
<b>FOOTE ROAD ALTERNATE</b>				
	18" WATER MAIN	L.F.	500	
	18" L.V. BOX	L.F.	70	
	18" PLUG & CLAMP W/18" P.	L.F.	100	
	12" Tee	L.F.	1	
	18" L.V. BOX	L.F.	1	
	18" PLUG & CLAMP W/18" P.	L.F.	1	

CONNECTION SCHEDULE

NO.	DATE	BY
1	8-27-95	U

REVISIONS

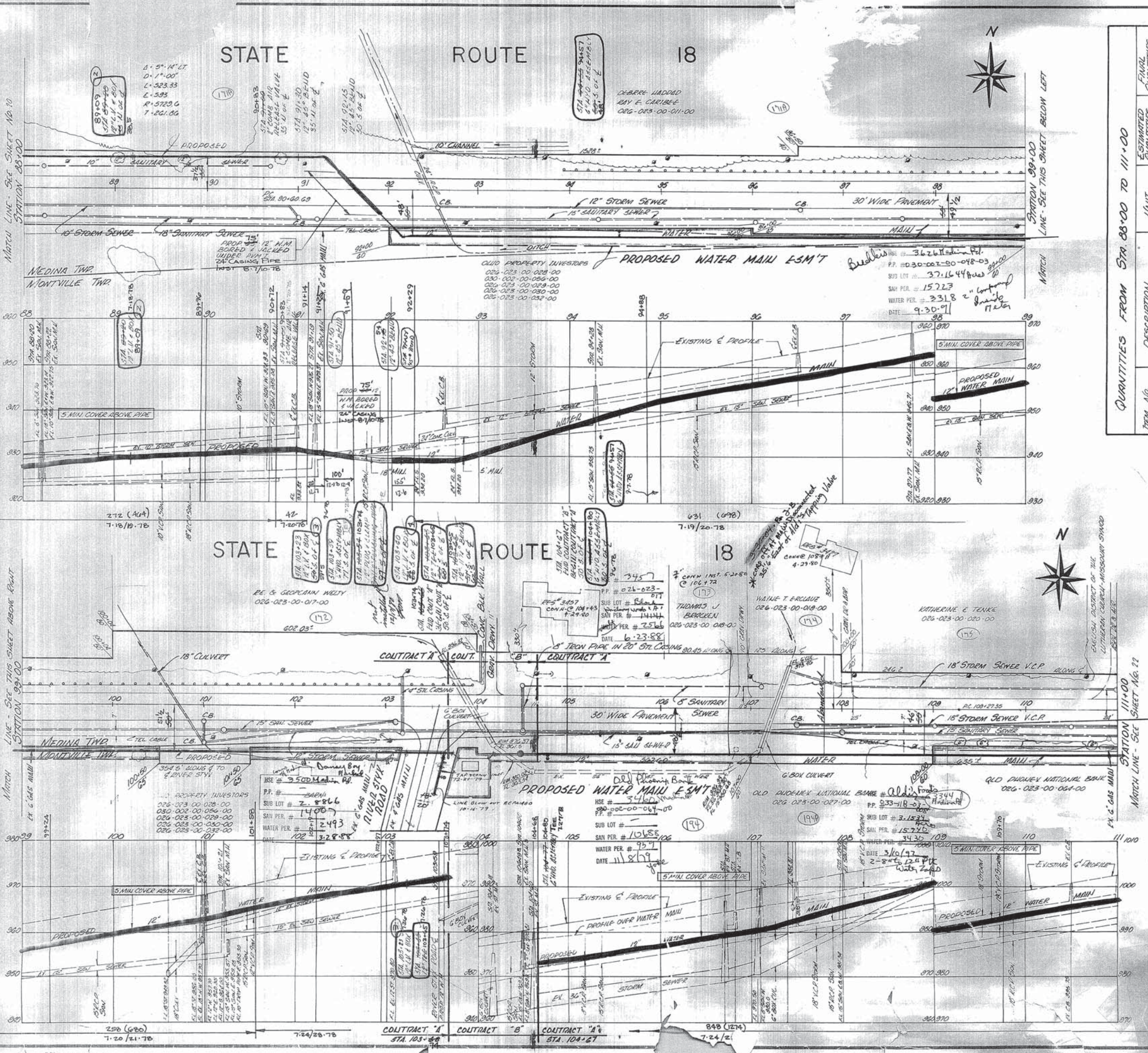
REV. NO.	DATE	DESCRIPTION



Richard T. Halishak & Associates, Inc.  
 Professional Bldg. - Suite Q - 120 W. Washington Street  
 Medina, Ohio 44256 - 225-0088  
 Chief - Municipal & Sanitary Consulting Engineers



COUNTY OF MEDINA  
 SEWER DISTRICT NO. 500  
 WATER IMPROVEMENT 500-W7  
 STATE ROUTE 18  
 PLAN AND PROFILE  
 FROM STA. 72+00 TO STA. 88+00  
 PROJECT NO. 1118-4  
 SHEET NO. 20 OF 21  
 5-500/00-7



Match Line - See Sheet No. 10  
STATION 88+00

Match Line - See This Sheet Above Right  
STATION 99+00

Match Line - See This Sheet Below Left  
STATION 99+00  
LINE - SEE THIS SHEET BELOW LEFT

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITIES	FINAL QUANTITIES
A-4	12" WATER MAIN	L.F.	2710	
A-5	12" WATER MAIN-BORE-HOLE	L.F.	63	
A-9	12" L.V. & BOX	EA	3	
A-13	2" COMB. A.P. VALVE	EA	1	
A-16	12" TEE	EA	1	
A-27	12" 45° BEND	EA	2	
A-28	12" 1/4" BEND	EA	1	
A-33	12" PLUG & CLAMP W/2" F.P.	EA	1	
A-35	6" HYD. ASSEMBLY	EA	3	
A-36	TYPE A COM. I.	EA	2	

A	105+00	LI
B	107+00	LI

REV. NO.	DATE	REVISIONS



**Richard T. Halishak & Associates, Inc.**  
 Suite Q 120 W. Washington Street  
 Medina, Ohio 44256  
 526-3128 725-0901  
 Fax 526-3128  
 Civil • Municipal • Sanitary Consulting Engineers

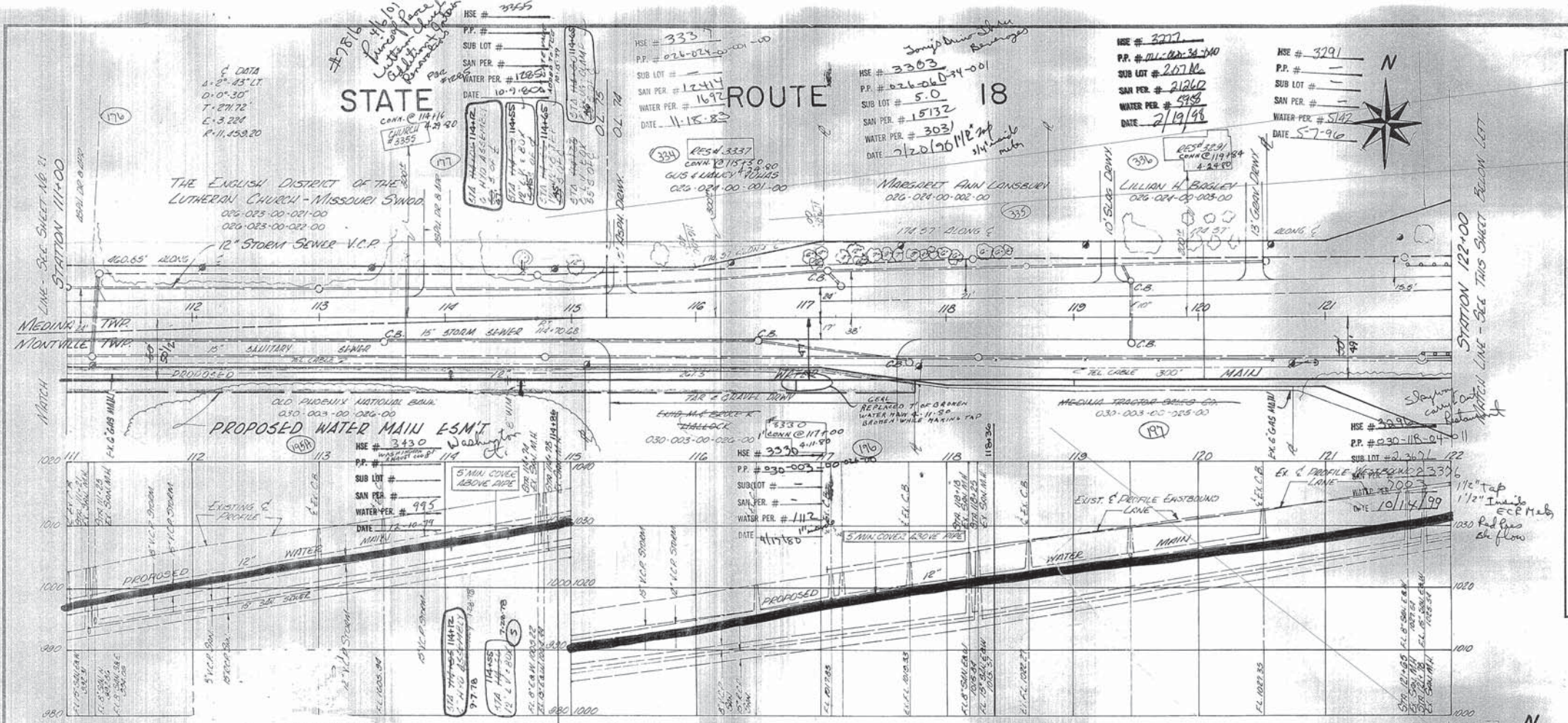


**COUNTY OF MEDINA**  
**SEWER DISTRICT NO. 500**  
**WATER IMPROVEMENT 500-W7**  
 STATE ROUTE 18  
 PLAN AND PROFILE  
 FROM STA. 88+00 TO STA. 111+00

PROJECT NO. 1118-4  
 SHEET NO. 21 OF

6-500/8-7

SCALE 1" = 50' HORIZ., 1" = 10' VERT.  
 DRAWN BY: J.S.  
 CHECKED BY: J.S.  
 DATE: 12/77



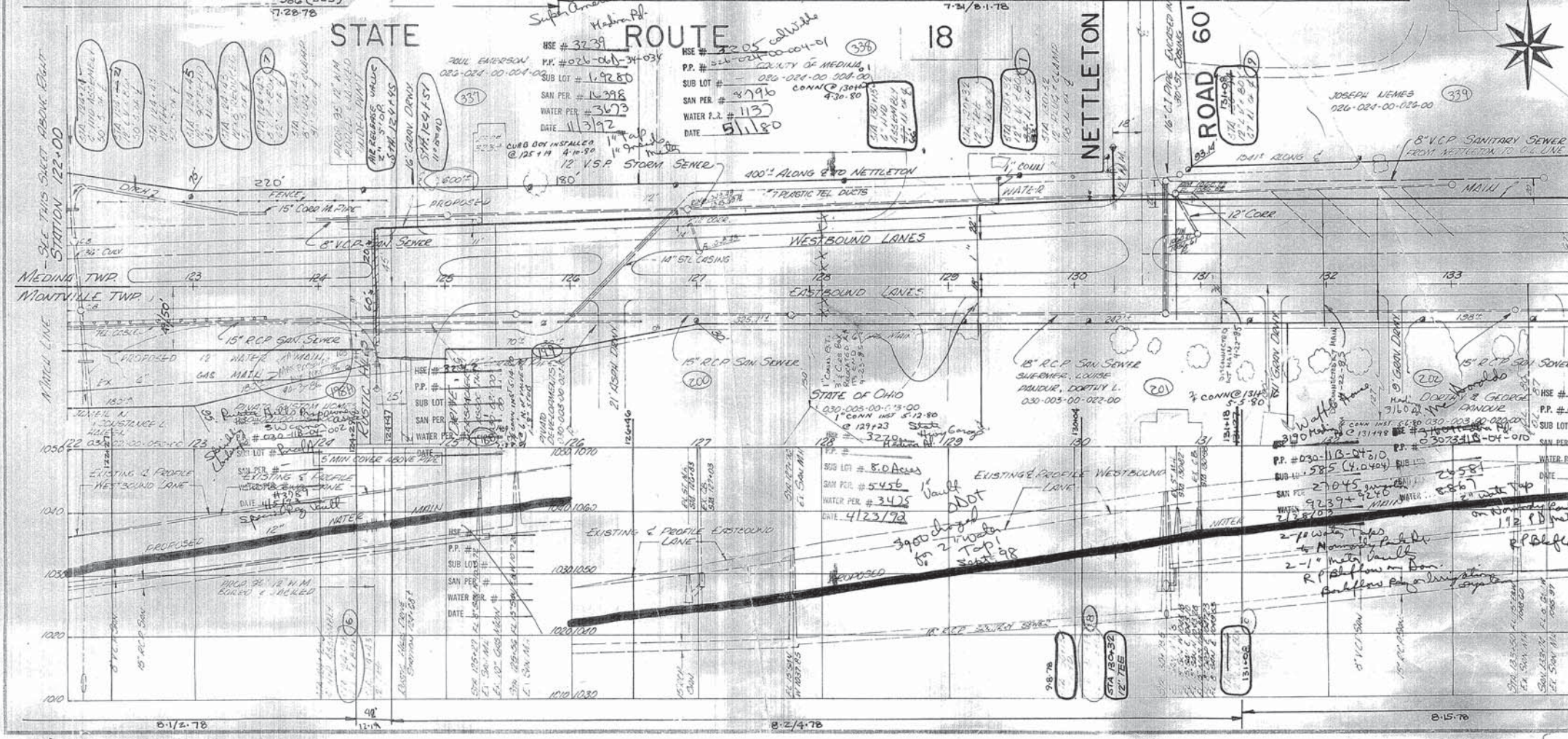
3337 MEDINA RD  
NEW FRONT BLDG  
S30321  
W12087  
3/06/06

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITIES	FINAL QUANTITIES
A-4	12" WATER MAIN	L.F.	2445	
A-5	18" WATER MAIN BONED & WASHED	L.F.	95	
A-6	8" WATER MAIN	L.F.	40	
A-9	12" L.V. BOX	E.A.	4	
A-10	8" L.V. BOX	E.A.	2	
A-12	12" TEE	E.A.	2	
A-17	12" 12" TEE	E.A.	1	
A-22	12" 8" REDUCED	E.A.	1	
A-26	18" 90° BEND	E.A.	1	
A-33	18" DUG CLEAN W/PT & B	E.A.	1	
A-34	8" DUG CLEAN W/PT & B	E.A.	2	
A-35	6" HYDRANT 159464	E.A.	3	
A-38	TYPE A COLL.	E.A.	7	
A-41	TYPE B COLL.	E.A.	1	
A-42	TYPE B COLL.	E.A.	3	

CONNECTION SCHEDULE

A 116+20 LI	B 116+80 S
A 116+20 LI	B 116+00 S
A 120+05 LI	A 125+80 S
B 125+30 LI	A 128+00 S
B 129+40 LI (17)	A 130+60 S
	A 132+40 S

KINDERCARE DAYCARE  
3330 MEDINA RD  
S31434  
W13453  
11/30/07  
3.71  
11/30/07  
EXIST WATER CONN FOR MEDINA TOWING TO BE ABANDONED  
NEW 6" X 12" PVC SHORT TAP TO BE MADE



130+30  
8/2-  
8/2-8/4

BIL JACK FOODS  
UPSIZE WAT  
W11823  
2" TAP  
2" COMP METER  
RFBKFLOW  
11/07/05

REVISIONS

REV. NO.	DATE	DESCRIPTION
1		
2		
3		

SCALE: 1" = 50' HOR. 1" = 10' VERT. DATE: 12/17/07

BY: [Signature] CHECKED BY: [Signature]

Richard T. Halishak & Associates, Inc.  
Professional Bldg. Suite C, 120 W. Washington St.,  
Medina, Ohio 44136 Phone: 225-0888 Fax: 225-4128

**RTH**

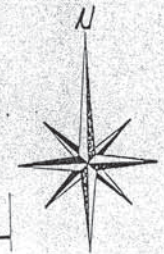
COUNTY OF MEDINA  
SEWER DISTRICT NO. 500  
WATER IMPROVEMENT 500-W7

STATE ROUTE 18  
PLAN AND PROFILE  
FROM STA. 111+00 TO STA. 134+00

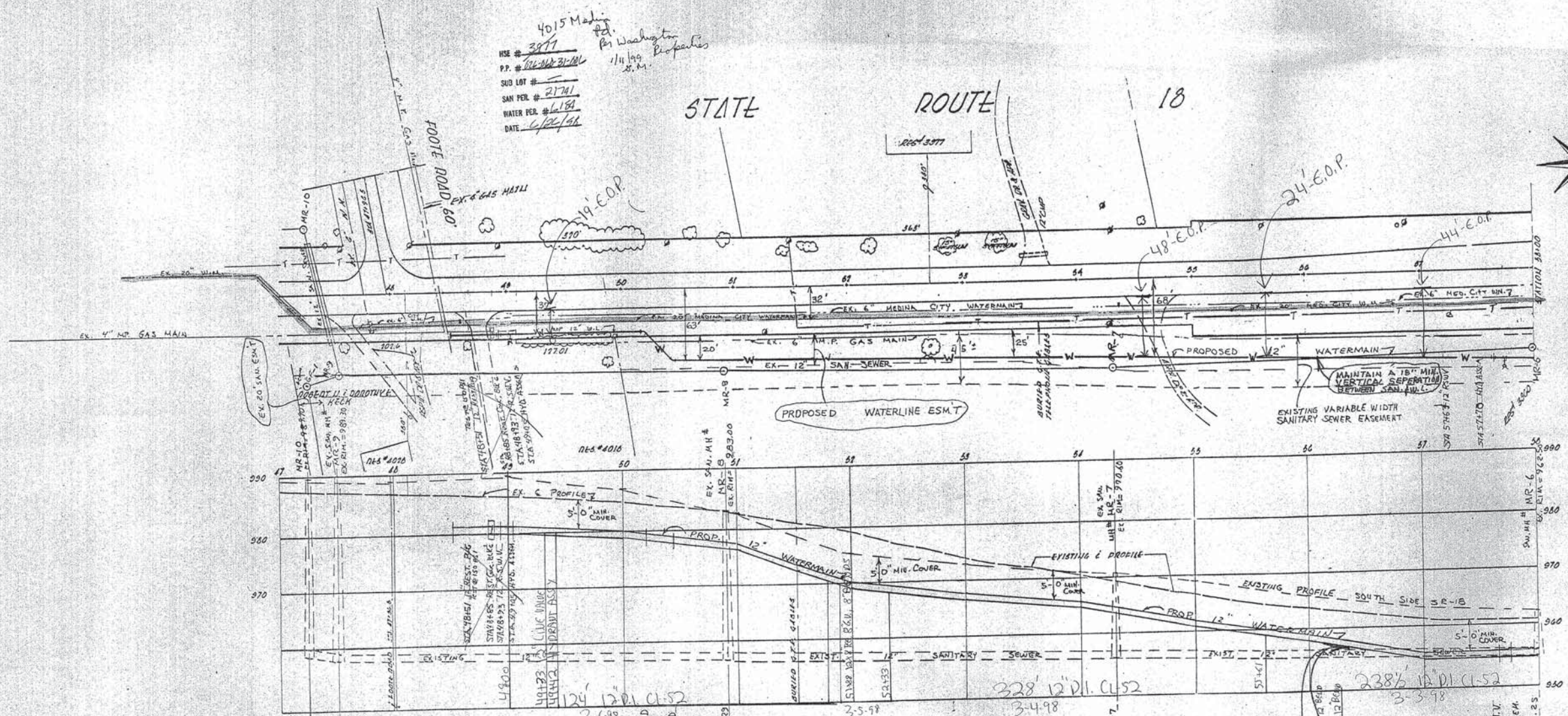
PROJECT NO. 1118-4  
SHEET NO. 22 OF

W-500/00-7

4015 Madia  
 P.C. # 3977  
 P.P. # 216-248-31-24  
 SUD LOT #  
 SAN PER. # 21741  
 WATER PER. # 6184  
 DATE 6/20/91  
 For Washington Properties  
 S.M.



STATE ROUTE 18



WATER MAINS  
 STOP BEFORE  
 DRIVEWAY OF 4018 MEDINA RD

NOTE: MAINTAIN A MINIMUM OF 18" VERTICAL SEPARATION BETWEEN THE EXISTING 12" SAN. & THE PROPOSED 12" WATERLINE.

- NOTE: (1) All Ductile Iron Pipe must be Polywrapped.  
 (2) All Fittings and Appurtenances must be Polywrapped.

- CAUTION -  
 5'-0" minimum of undisturbed earth from the face of the pole to the trench wall MUST be maintained or the pole must be held by the effected utility. (cost of holding to be paid for by contractor) - TYPICAL -

MAINTAIN MINIMUM OF 5'-0" COVER/DEPTH BELOW GROUND AT WATERMAIN. -TYPICAL-  
 (should the pavement centerline profile be LOWER than the profile over the proposed watermain, then bury the watermain a minimum of 5'-0" below the elevation of the pavement centerline)

LEGEND

U	UTILITY POLE	W	WATER VALVE	C	CATCH BASIN
S	SIGN	H	HYDRANT	U/S	UTILITY/SIGNAL BOX
M/P	MAIL/PAPER BOX	G	GAS LINE MARKER	P	PHONE BOX
X-F	FENCE	G/M	GAS VALVE/METER	S	SURVEY MONUMENT
G	GAS	GL	GAS LINE	W	WOODED AREA
		B	BODY OF WATER		
		UPL	UNDERGROUND PHONE LINE		

PLAN PREPARED BY  
 MEDINA COUNTY SANITARY ENGINEER  
 781 WEST SMITH ROAD  
 MEDINA, OHIO (216)723-9578

COUNTY OF MEDINA  
 WATER 1997

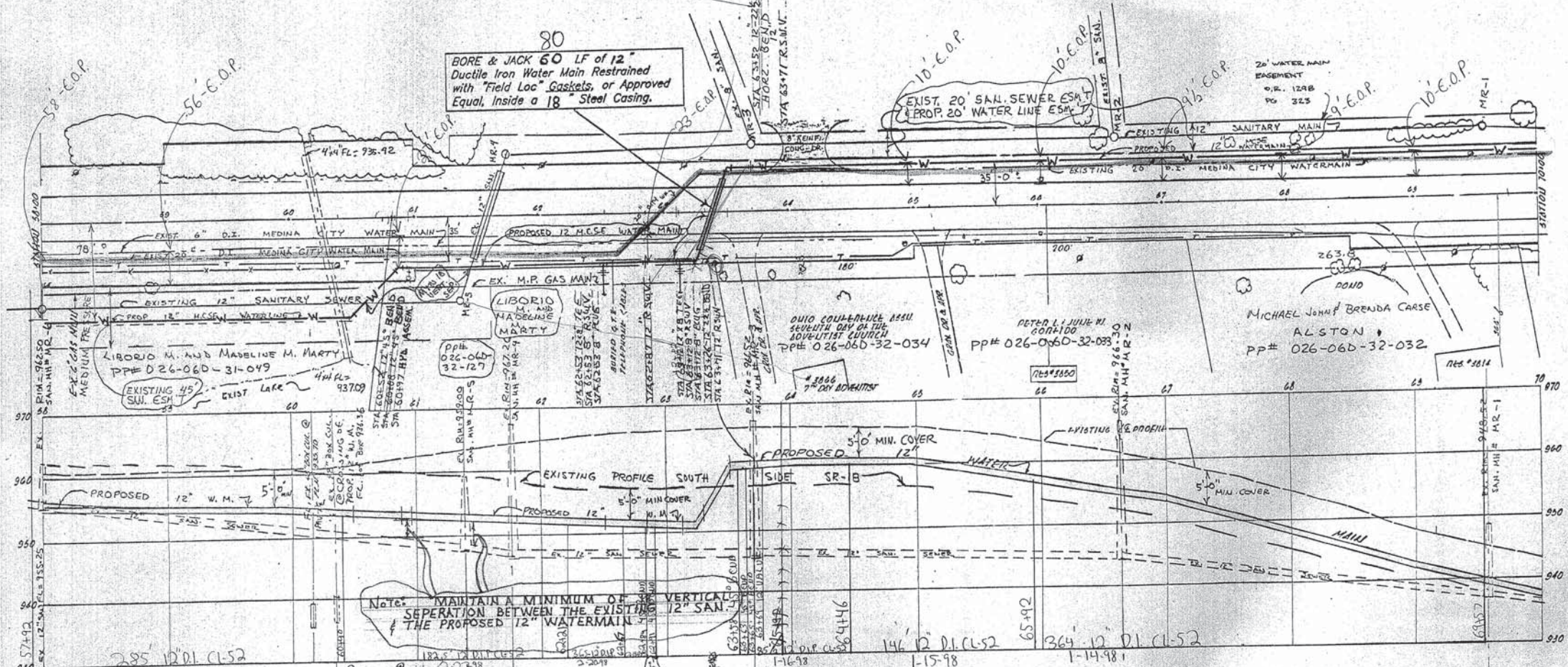
MEDINA ROAD S.R. 18

NO.	DATE	DESCRIPTION	BY

SCALES: PLAN: 1"=30', PROFILE: HORZ.: 1"=50', VERT.: 1"= 10'  
 DATE: MAY 1997 PROJ. NO. W-500/00-7.1.17 SHEET 10 OF 16

M.C.S.E. CAD File Name: SR 18.DWG

# STATE ROUTE 18



80  
**BORE & JACK 60 LF of 12" Ductile Iron Water Main Restrained with "Field Loc" Gaskets, or Approved Equal, Inside a 18" Steel Casing.**

**NOTE: MAINTAIN A MINIMUM OF SEPARATION BETWEEN THE EXISTING 12" SANITARY SEWER AND THE PROPOSED 12" WATERMAIN**

**NOTE: (1) All Ductile Iron Pipe must be Polywrapped.  
 (2) All Fittings and Appurtenances must be Polywrapped.**

- CAUTION -  
 5'-0" minimum of undisturbed earth from the face of the pole to the trench wall **MUST** be maintained or the pole must be held by the effected utility. (cost of holding to be paid for by contractor) - TYPICAL -

MAINTAIN MINIMUM OF 5'-0" COVER/DEPTH BELOW GROUND AT WATERMAIN - TYPICAL -  
 (Should the pavement centerline profile be LOWER than the profile over the proposed watermain, then bury the watermain a minimum of 5'-0" below the elevation of the pavement centerline)

**LEGEND**

UTILITY POLE	WATER VALVE	CATCH BASIN
SIGN	HYDRANT	UTILITY/SIGNAL BOX
WALL/PAPER BOX	GAS LINE MARKER	PHONE BOX
FENCE	GAS VALVE/METER	SURVEY MONUMENT
GAS	GAS LINE	WOODED AREA
BODY OF WATER	UNDERGROUND PHONE LINE	

- PLAN PREPARED BY -  
**MEDINA COUNTY SANITARY ENGINEER**  
 701 WEST SMITH ROAD  
 MEDINA, OHIO (216)723-9578

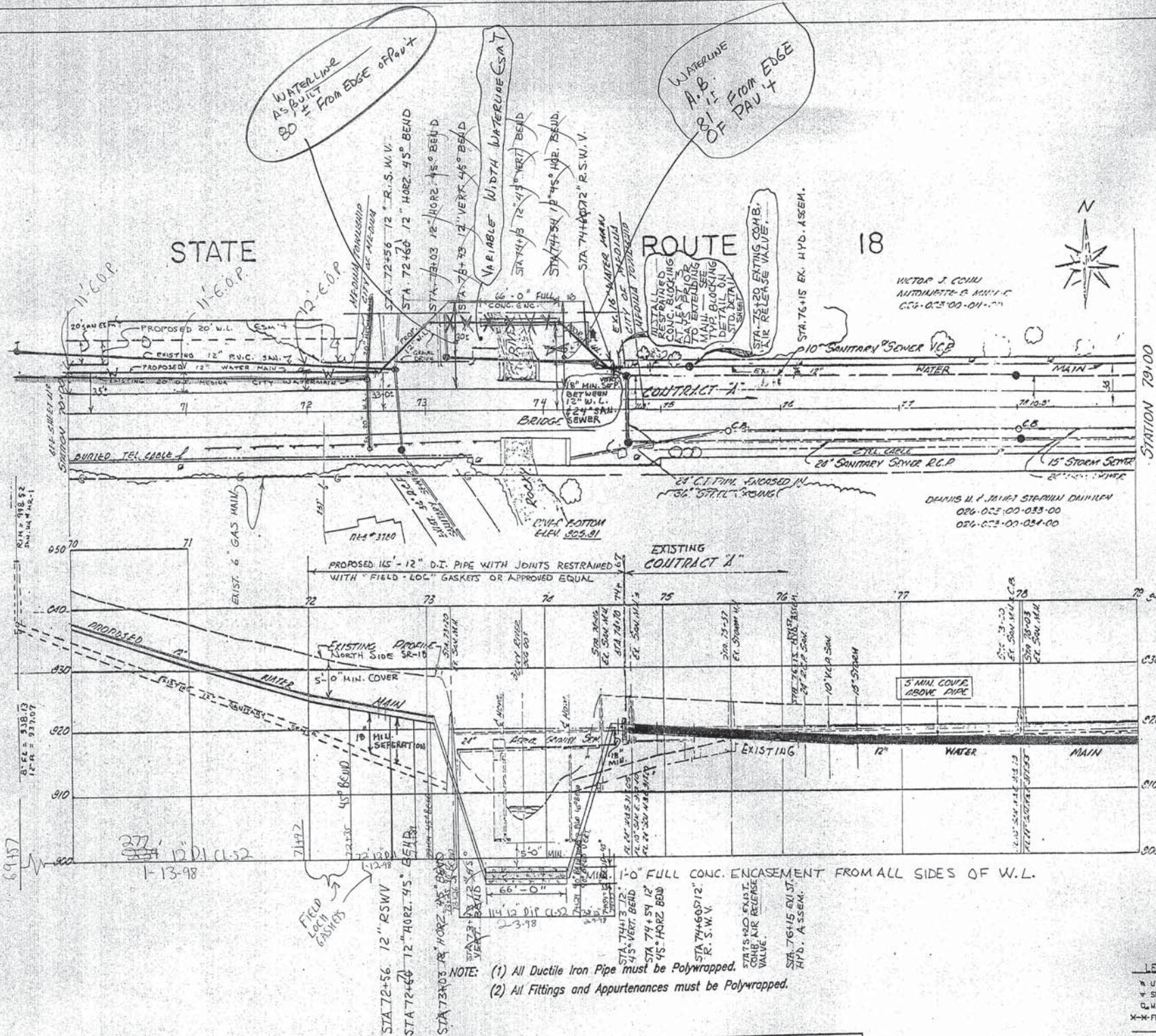
COUNTY OF MEDINA  
 WATER 1997

MEDINA ROAD S.R. 18

NO.	DATE	DESCRIPTION	BY

SCALES: PLAN: 1"=50', PROFILE: HORZ.: 1"=50', VERT.: 1"=10'  
 DATE: MAY 1997  
 PROJ. NO. W-500/00-7.1.17 SHEET 11 OF 16

M.C.S.E. CAD File Name: SR 18.DWG

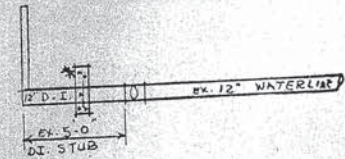


WATERLINE  
A.S. BUILT  
80' FROM EDGE OF PAV.

WATERLINE  
A.S. B. FROM EDGE  
OF PAV.

VARIABLE WIDTH WATERLINE CSAT  
STA 74+3 12\"/>

REMOVE  
PIPE  
RETURN TO P.C.S.E.  
INSTALL PER REMOVAL  
CONTRACT BLOCKING AT  
LEAST 3' FROM SIDE OF  
EXTENDING TO D.I. W.L.



NOTE: (1) All Ductile Iron Pipe must be Polywrapped.  
(2) All Fittings and Appurtenances must be Polywrapped.

- CAUTION -  
5'-0\"/>

MAINTAIN MINIMUM OF 5'-0\"/>

LEGEND

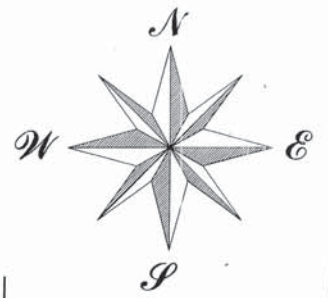
UTILITY POLE	WATER VALVE	CATCH BASIN
SIGN	HYDRANT	UTILITY/SIGNAL BOX
MAIL/PAPER BOX	GAS LINE MARKER	PHONE BOX
X-FENCE	GAS VALVE/METER	SURVEY MONUMENT
GAS LINE	BODY OF WATER	WOODED AREA
UNDERGROUND PHONE LINE		

- PLAN PREPARED BY - <b>MEDINA COUNTY SANITARY ENGINEER</b> 701 WEST SMITH ROAD MEDINA, OHIO (216)723-2570	COUNTY OF MEDINA WATER 1997
	MEDINA ROAD S.R. 18
NO. DATE DESCRIPTION BY	SCALES: PLAN: 1" = 40'; PROFILE: HORIZ: 1" = 40'; VERT: 1" = 4'
M.C.S.E. CAD File Name: SR 18.DWG	DATE: MAY 1997 PROJ. NO. W-500/00-7.1.17 SHEET 12 OF 16



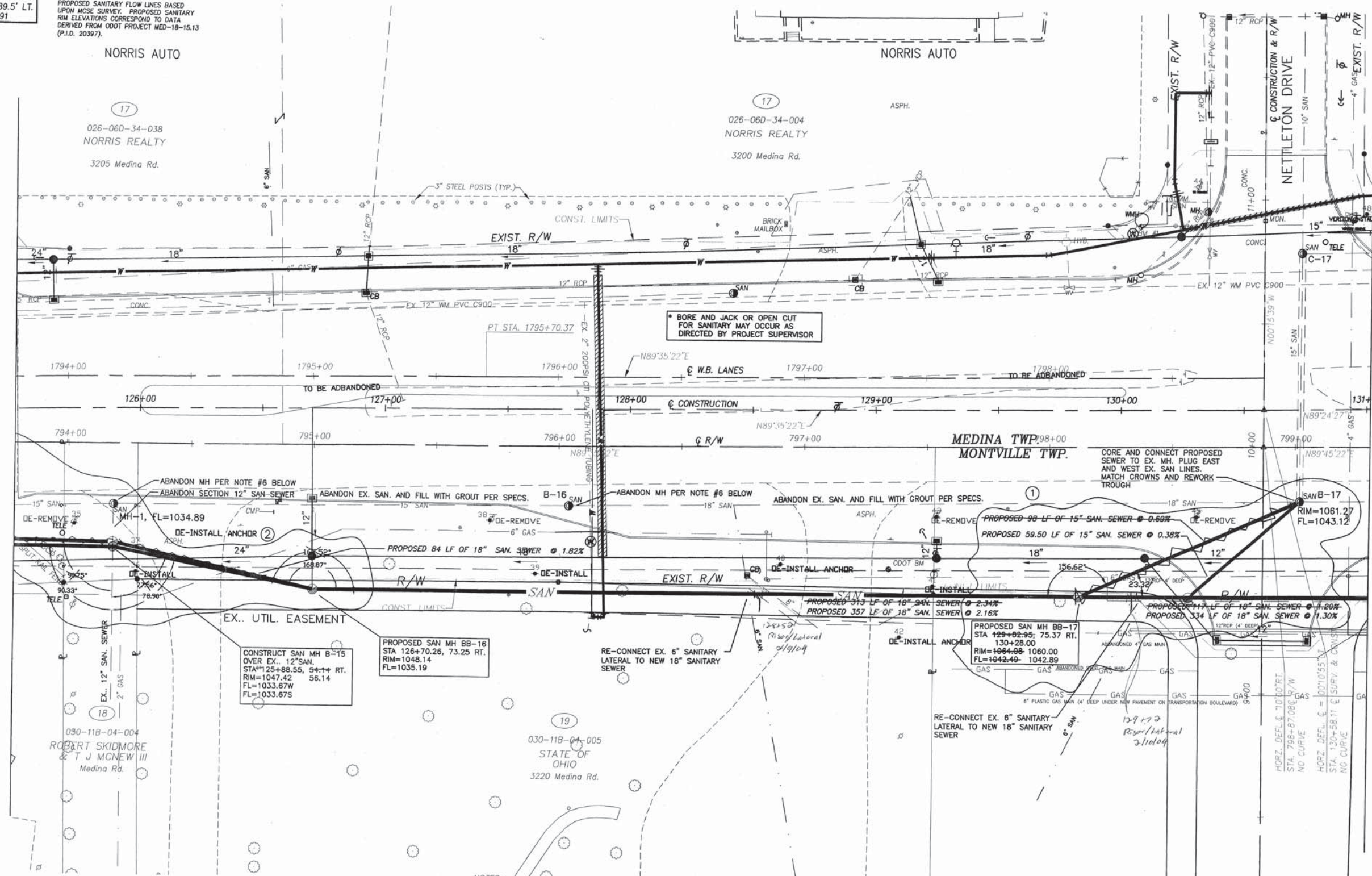
BENCHMARK NO. 1  
CHISELED "X" SOUTH SIDE OF  
ROUND CONC. WATER MANHOLE  
STA. 798+37 CL R/W, 89.5' LT.  
MSE ELEVATION 1058.91

BENCHMARK ELEVATIONS RESENT MOSE  
GPS SURVEY INFORMATION USING THE  
FOLLOWING DATUM:  
HORIZONTAL: NAD 83 (1995) OHIO NORTH  
VERTICAL: NAVD 88  
PROPOSED SANITARY FLOW LINES BASED  
UPON MOSE SURVEY. PROPOSED SANITARY  
RIM ELEVATIONS CORRESPOND TO DATA  
DERIVED FROM ODOT PROJECT MED-18-15.13  
(P.I.D. 20397).



MATCH LINE STA. 125+50 SEE SHEET 4

MATCH LINE STA. 131+00 SEE SHEET 8



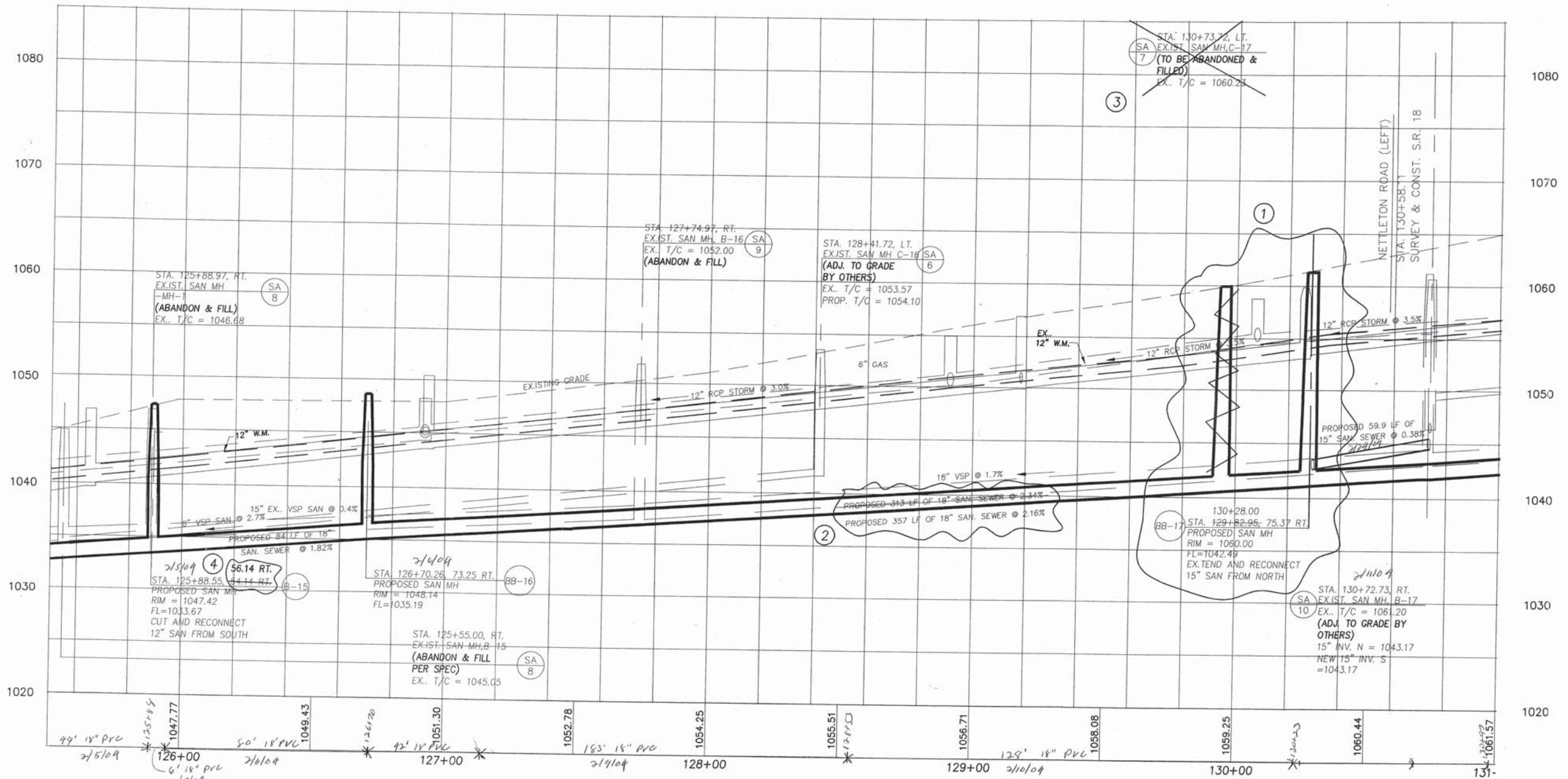
- NOTES:
1. PROPOSED WATERLINE SHOWN ON THESE PLANS IS TO BE PERFORMED BY OTHERS UNDER CONTRACT WR500/00-7.1.2 AND IS SHOWN FOR INFORMATIONAL PURPOSES ONLY.
  2. REFER TO PROFILE SHEETS FOR ADDITIONAL SANITARY INFORMATION.
  3. ALL PROPOSED SANITARY SEWER LOCATED WITH LESS THAN TEN(10) FEET HORIZONTAL SEPARATION FROM EX. OR PROPOSED WATERLINE SHALL BE INSTALLED FROM MANHOLE TO MANHOLE USING C-900 PVC WATER PIPE OR EQUIVALENT.
  4. CONTRACTOR TO INSTALL SANITARY MANHOLES IN PAVEMENT AREAS TO EX. PAVEMENT ELEVATION. PLAN ELEVATIONS OF PROPOSED MANHOLES REPRESENT FINISHED GROUND ELEVATIONS FOR ODOT PROJECT MED-18.15.13. THIS ELEVATION INFORMATION IS PROVIDED FOR INFORMATIONAL PURPOSES WITH ADJUSTMENT TO GRADE TO BE PERFORMED BY OTHERS AT A LATER DATE. SANITARY SEWERS IN TURF AREAS SHOULD BE INSTALLED TO PROPOSED GRADE AS INDICATED IN THE PLANS.
  5. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING EX. SANITARY SEWER LATERALS AND RE-CONNECTING EACH TO THE NEW 18" SANITARY SEWER.
  6. ABANDON EX. MANHOLE IN PLACE, FILL WITH 2'-0" OF CONCRETE, REMOVE CONE SECTION AND FILL WITH #57 CRUSHED LIMESTONE TO GRADE.
  7. ABANDON EXISTING SANITARY SEWER AND FILL WITH GROUT FROM STA. 121+77 TO 156+50 ON THE SOUTH SIDE OF STATE ROUTE 18 AS SHOWN ON THE PLANS.

- CAUTION -  
5'-0" minimum of undisturbed earth from the face of the pole to the trench wall MUST be maintained or the pole must be held by the effected utility. (cost of holding to be paid for by contractor) - TYPICAL -

**REVISED**  
1/30/04

File: J:\drawings\design\ar18andrsr\ar18-swr\ar500-10-1-plan(REVISED).dwg

SCALE: 1"=20'		- PLAN PREPARED BY - <b>MEDINA COUNTY SANITARY ENGINEER</b> K.W. HOTZ, P.E. 791 WEST SMITH ROAD MEDINA, OHIO (330) 723-9585 (330) 225-3113	
COUNTY: MEDINA	TOWNSHIP: MEDINA		
DRAWN BY:	CHECKED BY:	DATE: SEPT 2003	
1/30/04	② ADDED MANHOLE, ADJUSTED SAN. SEWER, AND ANGLES	T.M.P.	
12/2/03	① RELOCATED MH B-17, ADJUSTED SLOPES, AND RELOCATED 15" SEWER	T.M.P.	
DATE	DESCRIPTION	BY	
			<b>SANITARY RELOCATION FOR SR18 (MEDINA ROAD) PLAN VIEW</b>
			PROJECT NUMBER: SR500/10-1(WR500/00-7.1.2)
			STA. 125+50 TO STA. 131+00 SHEET 6 OF 19



**REVISED**

**1/30/04**

- CAUTION -  
 5'-0" minimum of undisturbed earth from the face of the pole to the trench wall MUST be maintained or the pole must be held by the effected utility. (cost of holding to be paid for by contractor) - TYPICAL -

File: J:\drawings\design\sr18andavr\sr18-swr\ar500-10-1(REVISED).dwg

SCALES: HORIZ.: 1"=20' VERT.: 1"=5'		- PLAN PREPARED BY -	
COUNTY: MEDINA		TOWNSHIP: MEDINA, MONTVILLE	
DRAWN BY:		CHECKED BY:	
DATE: SEPT 2003		DATE: SEPT 2003	
1/30/04	④ CHANGED TO 56.14 RT.	T.M.P	
12/2/03	③ REMOVED NOTE	T.M.P	
12/2/03	② CHANGED LENGTH AND SLOPE	T.M.P	
12/2/03	① MOVED MH BB-17 TO STA. 130+28	T.M.P	
DATE	DESCRIPTION	BY	
	STA. 147+50 TO STA. 153+00		SHEET 7 OF 19

MEDINA COUNTY SANITARY ENGINEER  
 K.W. HOZ, P.E.  
 791 WEST SMITH ROAD  
 MEDINA, OHIO  
 (330) 723-9585 (330) 225-3113

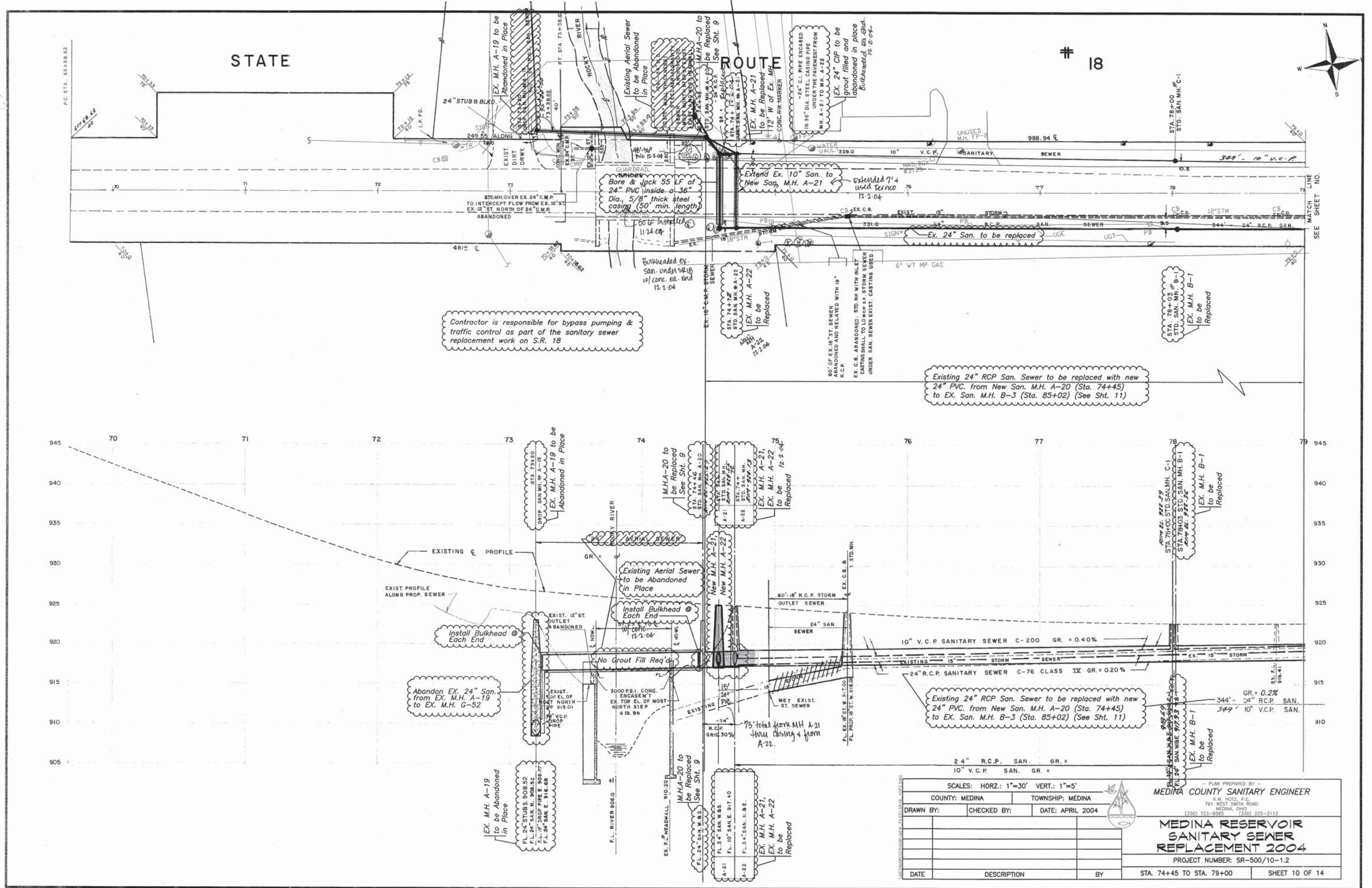
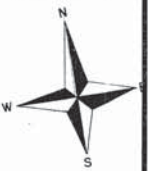
**SANITARY RELOCATION  
 FOR SR18 (MEDINA ROAD)  
 PROFILE VIEW**

PROJECT NUMBER: SR500/10-1 (WR500/00-7.1.2)

STATE

ROUTE

# 18



Contractor is responsible for bypass pumping & traffic control as part of the sanitary sewer replacement work on S.R. 18

Existing 24" RCP San. Sewer to be replaced with new 24" PVC from New San. M.H. A-20 (Sta. 74+45) to EX. San. M.H. B-3 (Sta. 85+02) (See Sht. 11)

Existing 24" RCP San. Sewer to be replaced with new 24" PVC from New San. M.H. A-20 (Sta. 74+45) to EX. San. M.H. B-3 (Sta. 85+02) (See Sht. 11)

PLAN PREPARED BY -  
**MEDINA COUNTY SANITARY ENGINEER**  
 R.W. HOTEL, P.E.  
 791 WEST SMITH ROAD  
 MEDINA, OHIO  
 (330) 721-5585 (330) 225-3113

**MEDINA RESERVOIR  
 SANITARY SEWER  
 REPLACEMENT 2004**

PROJECT NUMBER: SR-500/10-1.2

DATE	DESCRIPTION	BY	STA. 74+45 TO STA. 79+00	SHEET 10 OF 14
------	-------------	----	--------------------------	----------------

REVISED

STATE

ROUTE

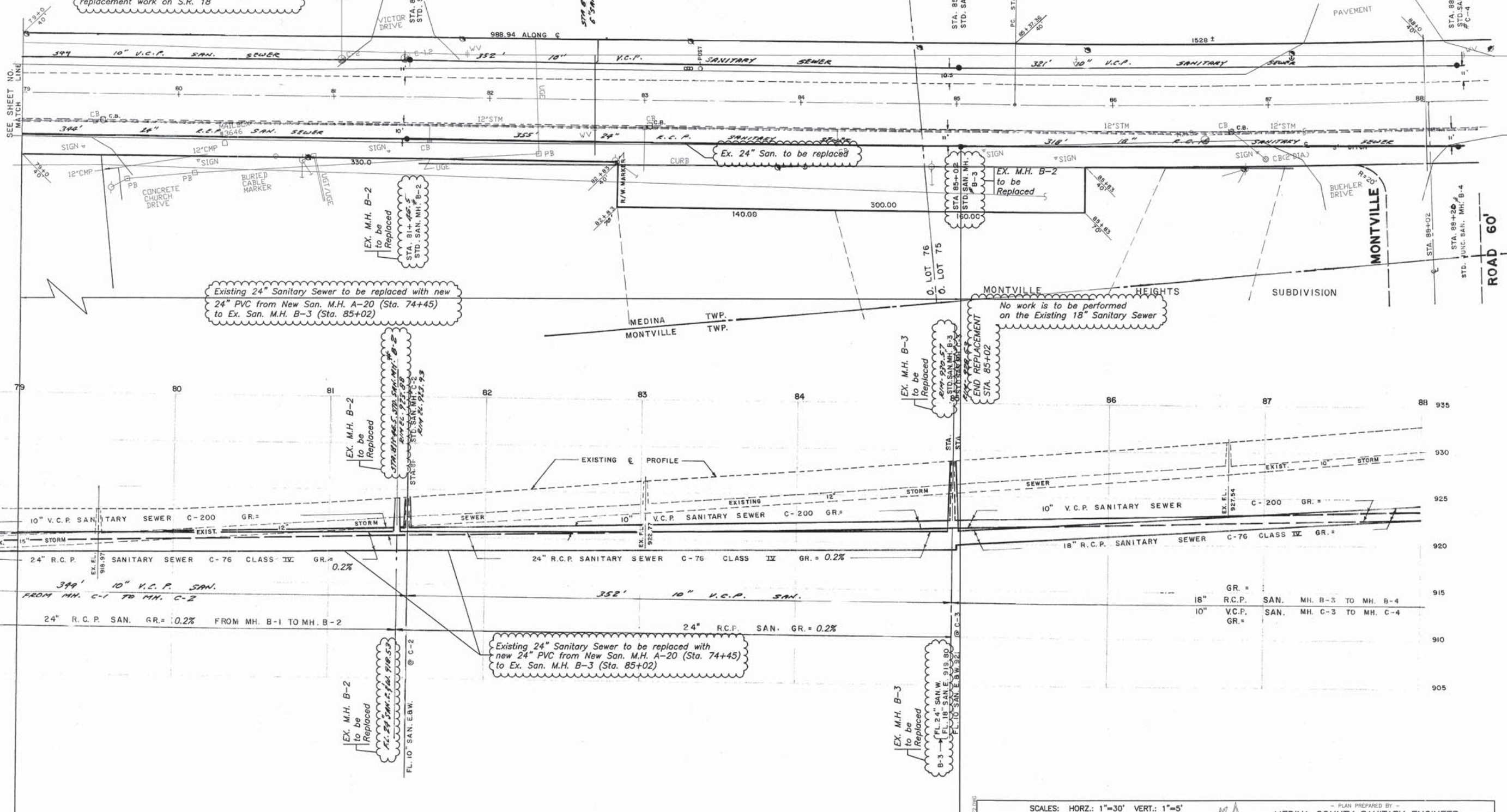
# 18

DATA:  
Δ = 5'-14" LT.  
D = 1'-00"  
E = 523.33  
R = 59.3  
T = 5729.6  
T = 261.86



Contractor is responsible for bypass pumping & traffic control as part of the sanitary sewer replacement work on S.R. 18

SEE SHEET NO. 18 MATCH LINE



Existing 24" Sanitary Sewer to be replaced with new 24" PVC from New San. M.H. A-20 (Sta. 74+45) to Ex. San. M.H. B-3 (Sta. 85+02)

Existing 24" Sanitary Sewer to be replaced with new 24" PVC from New San. M.H. A-20 (Sta. 74+45) to Ex. San. M.H. B-3 (Sta. 85+02)

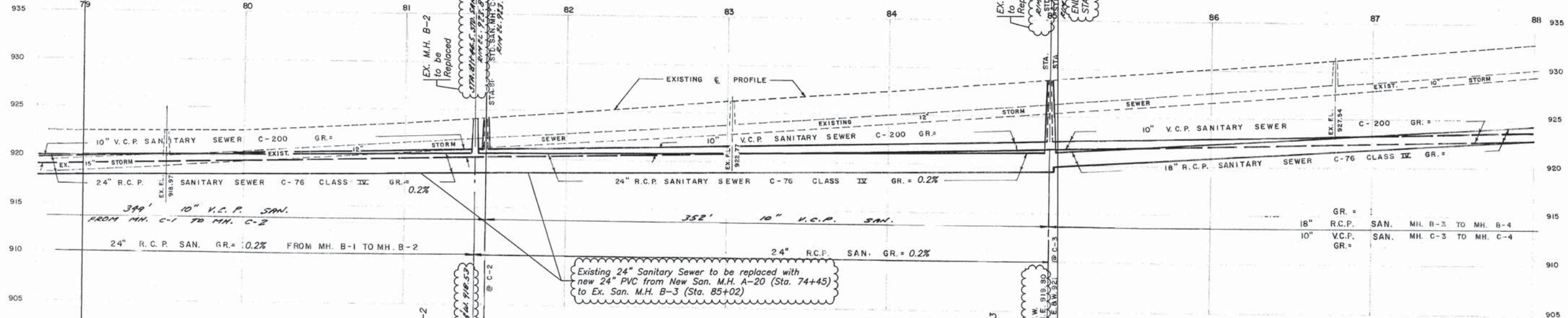
No work is to be performed on the Existing 18" Sanitary Sewer

END REPLACEMENT STA. 85+02

EX. M.H. B-2 to be Replaced STA. 81+45.5 STD. SAN. MH. # C-2

EX. M.H. B-3 to be Replaced STA. 85+02.5 STD. SAN. MH. # C-3

EX. M.H. B-2 to be Replaced STA. 81+45.5 STD. SAN. MH. # C-2



SCALES: HORZ.: 1"=30' VERT.: 1"=5'

COUNTY: MEDINA      TOWNSHIP: MEDINA

DRAWN BY:      CHECKED BY:      DATE: APRIL 2004

PROJECT NUMBER: SR-500/10-1.2

SHEET 11 OF 14

DATE      DESCRIPTION      BY

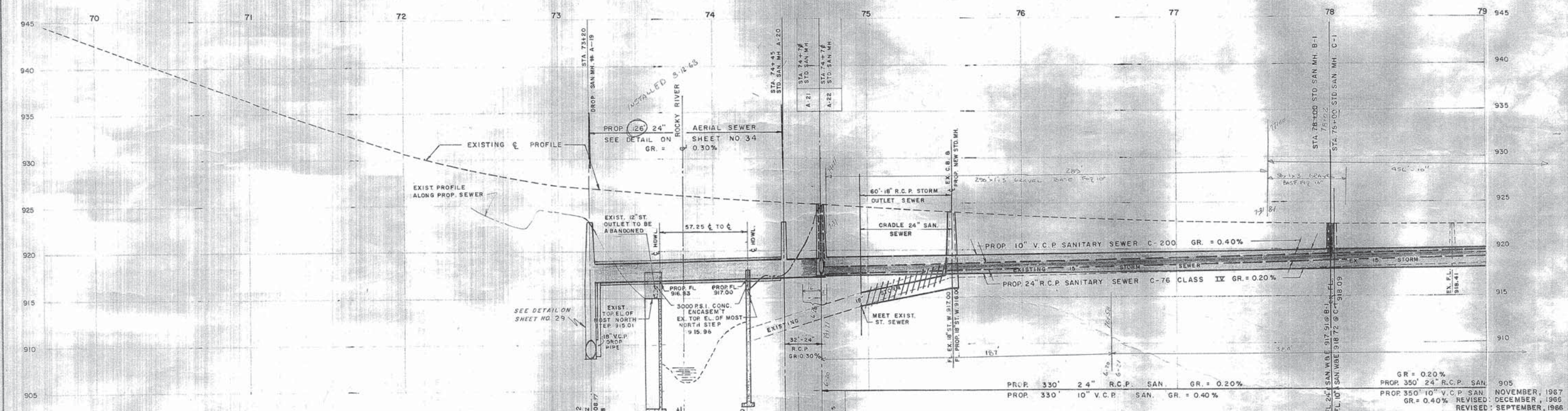
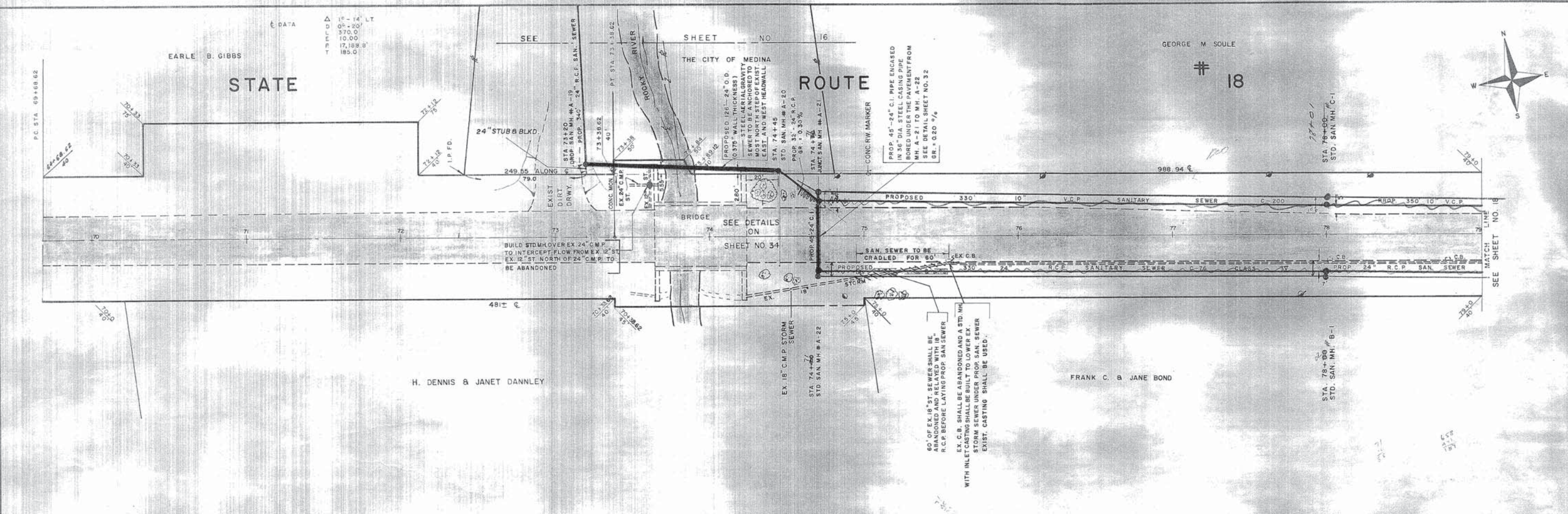
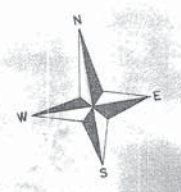
STA. 79+00 TO STA. 85+02

REVISED

EARLE B. GIBBS  
STATE

THE CITY OF MEDINA  
ROUTE

GEORGE M. SOULE  
# 18



- GENERAL NOTES:**
1. ALL R.C.P. SANITARY SEWER TO BE C-76 CLASS IV WITH A.S.T.M. C-443-63 T JOINTS APPROVED BY ENGINEER.
  2. ALL V.C.P. SANITARY SEWER TO BE C-200 WITH A.S.T.M. C-425 JOINTS APPROVED BY ENGINEER.
  3. ALL SANITARY LOT CONN. SHALL BE C-200 WITH A.S.T.M. C-425 JOINTS APPROVED BY ENGINEER.
  4. ALL MANHOLE OFFSETS ARE TO BACK OF CURB OR PAVEMENT UNLESS OTHERWISE SHOWN.
  5. ADEQUATE SIGNS SHALL BE POSTED DURING CONSTRUCTION TO CONFORM WITH THE MANUAL ON UNIFORM TRAFFIC DEVICES FOR STREETS AND HIGHWAYS AS PREPARED BY OHIO DEPARTMENT OF HIGHWAYS DIVISION OF OPERATIONS BUREAU OF TRAFFIC.

- GENERAL NOTES:**
1. ALL MANHOLE CASTINGS SHALL BE SET TO GRADE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE PLANS
  2. ANY UNDERGROUND DRAINAGE STRUCTURE DISTURBED DURING CONSTRUCTION SHALL BE REPLACED.
  3. ANY PAVEMENT DISTURBED DURING CONSTRUCTION OF SAN. SEWER SHALL BE REPLACED BY THE CONTRACTOR UNDER DIRECTION OF THE ENGINEER.
  4. NO EXCAVATION ON S.R. 3 & S.R. 18 SHALL BE LEFT OPEN OVER-NIGHT.
  5. NO WORK SHALL BE PERFORMED ON S.R. 18 ON SATURDAYS, SUNDAYS OR HOLIDAYS WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
  6. THE ENGINEER AND THE HIGHWAY DEPARTMENT SHALL BE NOTIFIED THREE (3) DAYS BEFORE ACTUAL CONSTRUCTION BEGINS ON S.R. 3 AND S.R. 18.

**MEDINA COUNTY**  
**SANITARY SEWER DISTRICT NO. 10**  
**SEWER IMPROVEMENT NO. 1**  
 STATE ROUTE NO. 18  
 STA. 70+0 TO STA. 79+0

SCALE: HOR. 1" = 30' VERT. 1" = 5'  
 JANUARY, 1966  
 WILLIAM V. HALISHAK ENGINEERS & ASSOCIATES  
 4150 DUNHAM ROAD  
 MAPLE HEIGHTS 37, OHIO 475-1515

NOVEMBER, 1967  
 DECEMBER, 1966  
 SEPTEMBER, 1966

STATE

ROUTE

ALFRED J. GERICKE JR.



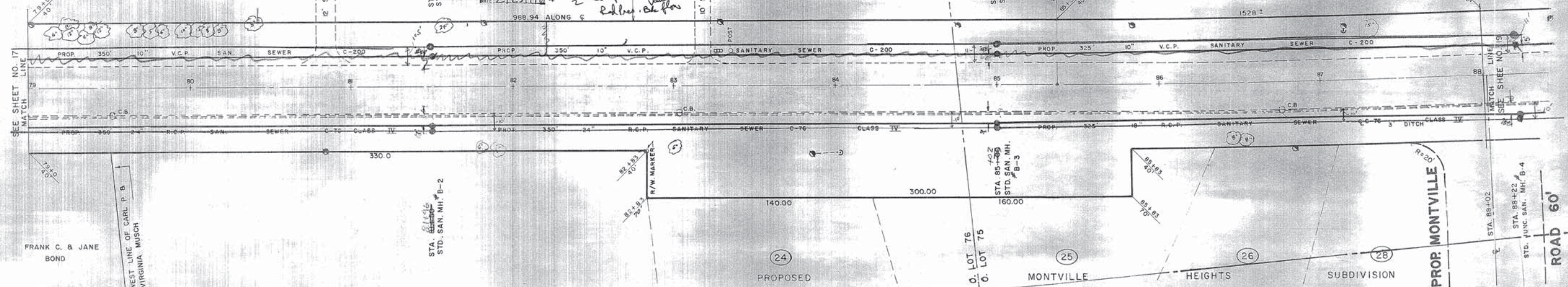
DATA  
1" = 5'-14" LT.  
D = 1" = 00"  
E = 533  
R = 5729.6  
T = 261.86

Office # 18  
HSE # 20501  
PP # 02-03-10-07-00  
SUB LOT # 11500  
SAN PER # 1372  
DATE 5-6-91

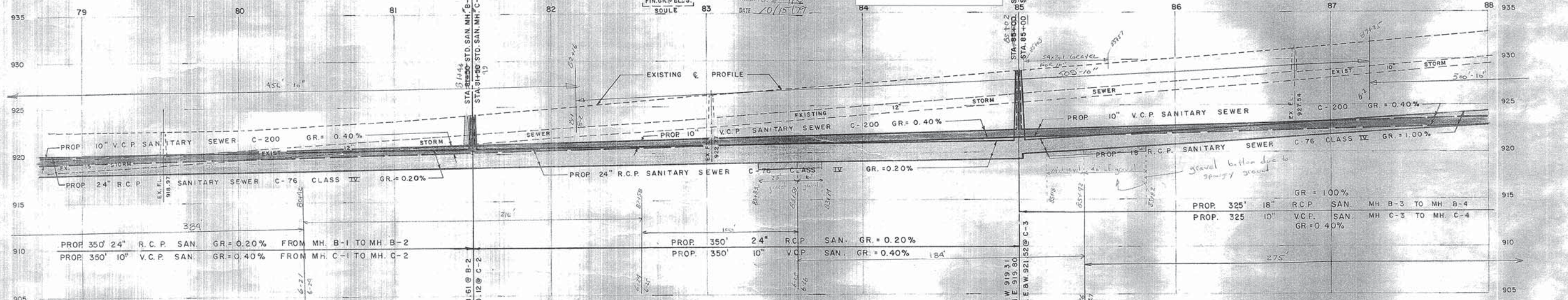
GEORGE M. SOULE  
Medina Rd  
HSE # 3705  
PP # 026-06-132-13X  
SUB LOT # 1.037  
SAN PER # 22507  
WATER PER # 6538  
DATE 2.23.99

SOULE  
130'  
10' SLAG DRWY.  
10' SLAG DRWY.

STA. 85+00  
STD. SAN. MH. # C-3  
PC STA. 85+137.56  
85+137.56



FIRST BAPTIST CHURCH  
NEW YOUTH CENTER  
3646 MEDINA RD  
30 11B 02 006  
S31326  
W13320  
9/14/07



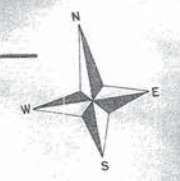
LEGEND:  
BSMT. ELEV. NAME: EXISTING SOUTH BSM'T ELEV. WITH OWNERS NAME UNLESS OTHERWISE NOTED.  
BSMT. ELEV. NAME: EXISTING NORTH BSM'T ELEV. WITH OWNERS NAME UNLESS OTHERWISE NOTED.  
0000: ADDRESS  
NOTE: SEE GENERAL NOTES ON SHEET NO. 17

MEDINA COUNTY  
SANITARY SEWER DISTRICT NO. 10  
SEWER IMPROVEMENT NO. 1  
STATE ROUTE NO. 18  
STA. 79+0 TO STA. 88+0  
SCALE: HOR. 1" = 30' VERT. 1" = 5'  
JANUARY, 1966  
WILLIAM V. HALISHAK ENGINEERS & ASSOCIATES  
6150 DUNHAM ROAD  
MAPLE HEIGHTS 37, OHIO 475-1555  
18/34

REVISED: SEPTEMBER, 1966  
REVISED: DECEMBER, 1966  
REVISED: NOVEMBER, 1967

DATA  
 50' 14' T  
 523.33  
 523.6  
 261.66

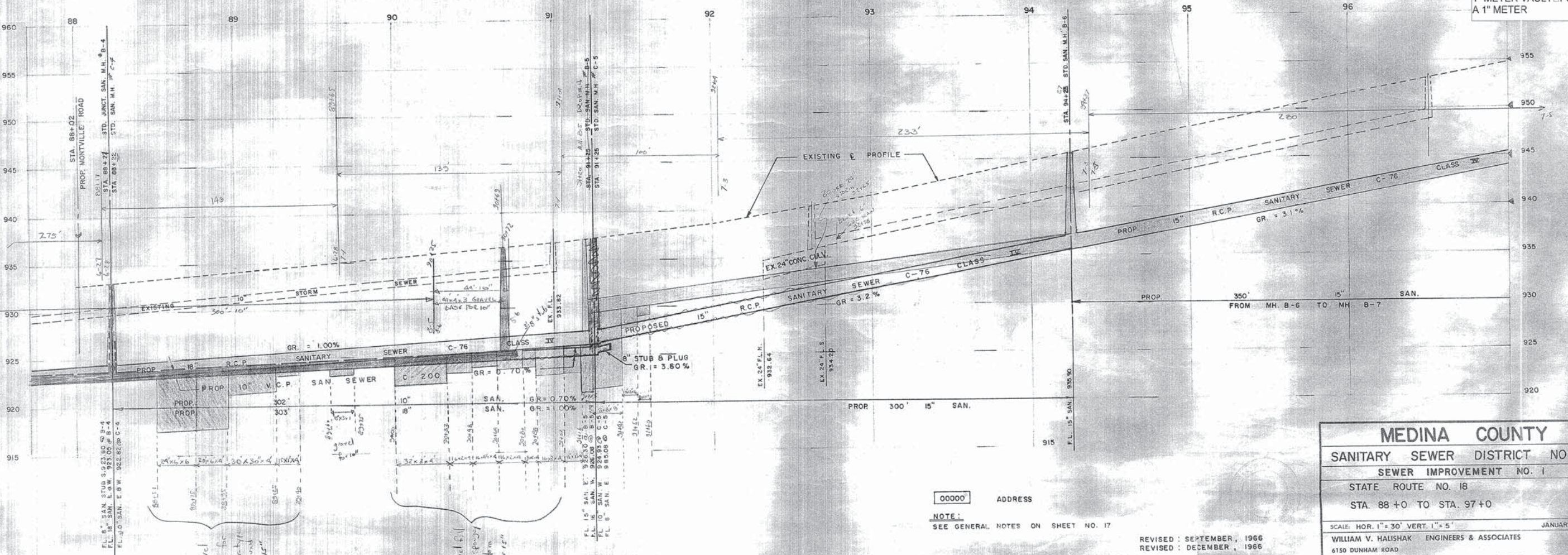
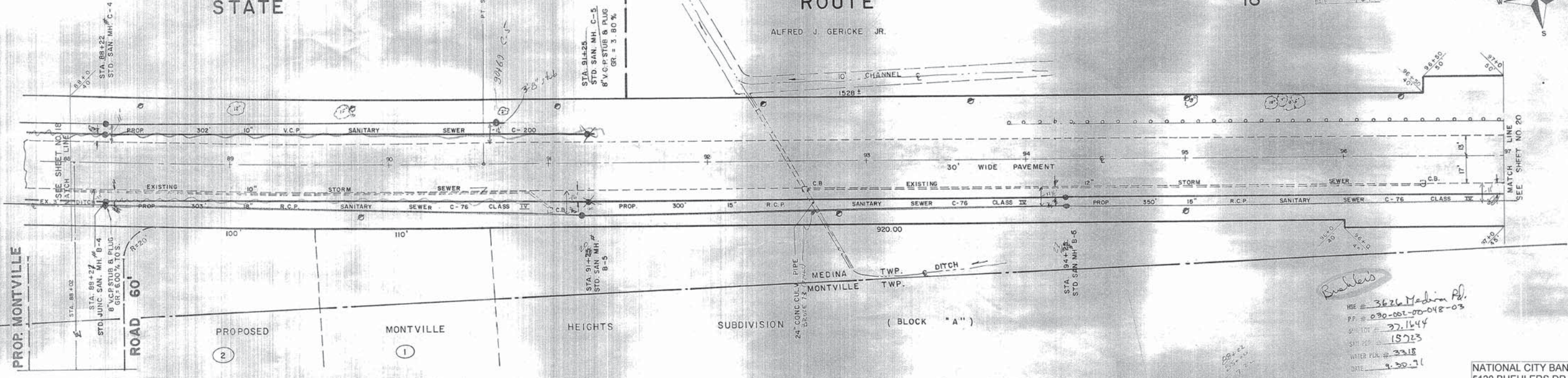
Revised office file  
 HSE # 3637 Madin Rd.  
 (Was 5000 Valley Gate)  
 SHEET # 11387  
 WATER PERM. 1325  
 DATE 5/6/81



STATE

ROUTE # 18

ALFRED J. GERICKE JR.



Buehlers  
 HSE # 3626 Madin Rd.  
 P.F. # 030-001-00-042-03  
 SHEET # 371644  
 SHEET # 15223  
 WATER PERM. 2318  
 DATE 9-20-71

NATIONAL CITY BANK  
 5120 BUEHLERS DR  
 23.5AC  
 26 06D 33 070  
 S31333  
 W13327  
 9/12/07  
 1" METER VAULT FOR  
 A 1" METER

<b>MEDINA COUNTY</b>	
SANITARY SEWER DISTRICT NO. 10	
SEWER IMPROVEMENT NO. 1	
STATE ROUTE NO. 18	
STA. 88+0 TO STA. 97+0	
SCALE: HOR. 1" = 30' VERT. 1" = 5'	JANUARY, 1966
WILLIAM V. HALISHAK ENGINEERS & ASSOCIATES	
6150 DUNHAM ROAD	
MAPLE HEIGHTS 37, OHIO 475-1555	

00000 ADDRESS  
 NOTE:  
 SEE GENERAL NOTES ON SHEET NO. 17

REVISED: SEPTEMBER, 1966  
 REVISED: DECEMBER, 1966

JOB NO. 1987

MC 65-3 500/0-1

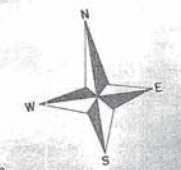
ALFRED J. GERICKE JR.

R. E. & GEORGANN WELTY

STATE

ROUTE

# 18



DATE 6-23-88  
WATER PER # 2566  
SAL. PER # 1414  
S' LOT # Block A  
RIP # 021-023-017  
Hickory Woods

SEE SHEET NO. 19  
MATCH LINE

SEE SHEET NO. 21  
MATCH LINE

MEDINA TOWNSHIP  
MONTVILLE TOWNSHIP

Block "A"  
STA. 97+75  
STD. SAN. MH. B-7

PROPOSED MONTVILLE HEIGHTS SUBDIVISION

CARL P. & VIRGINIA M. MUSCH

MUSCH

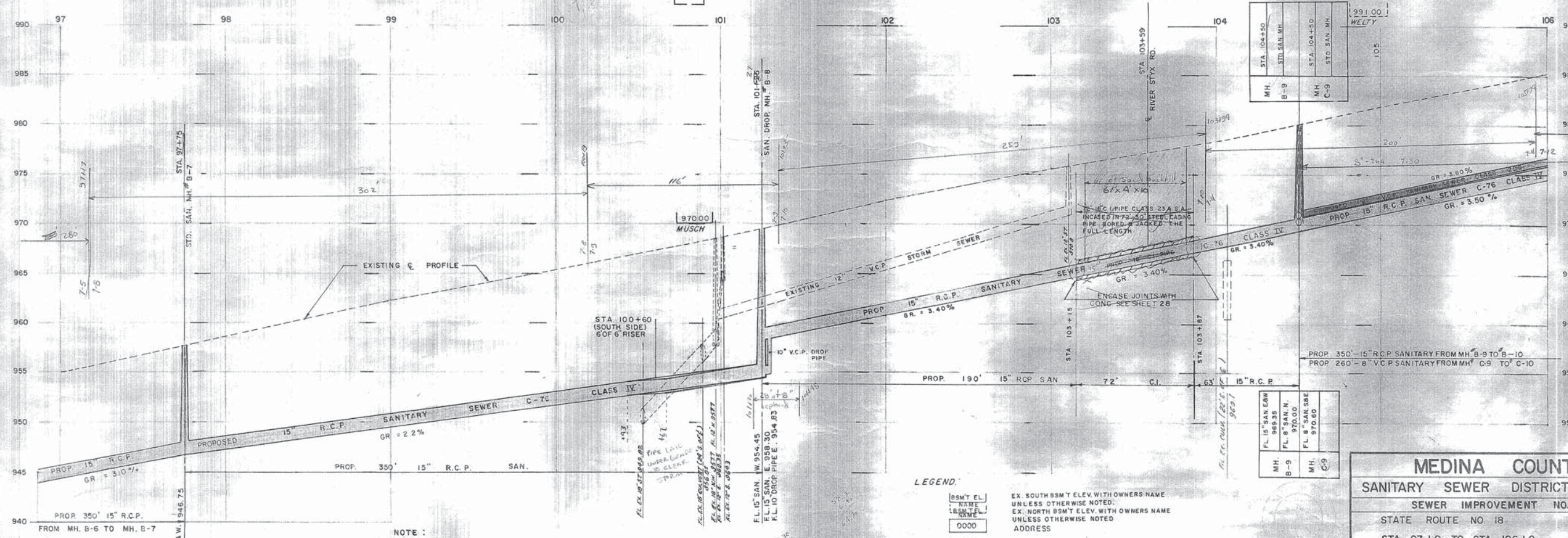
Danny Boy Market  
HSE # 3500  
P.P. #  
SUB LOT # 2.8266 AC  
SAN PER # 14007  
WATER PER # 2493  
DATE 3-28-88

RIVER STYX

ROAD 60'

EDWARD C. MEARS

GUARD RAIL SHALL BE REPLACED IN ACCORDANCE WITH STATE OF OHIO SPECIFICATIONS



NOTE: ANY GUARD RAIL DISTURBED DURING THE ACTUAL CONSTRUCTION PERIOD SHALL BE REPLACED BY THE CONTRACTOR.

LEGEND:

- BSMT EL. NAME
- EX. SOUTH BSMT ELEV. WITH OWNERS NAME UNLESS OTHERWISE NOTED.
- EX. NORTH BSMT ELEV. WITH OWNERS NAME UNLESS OTHERWISE NOTED.
- ADDRESS

NOTES:

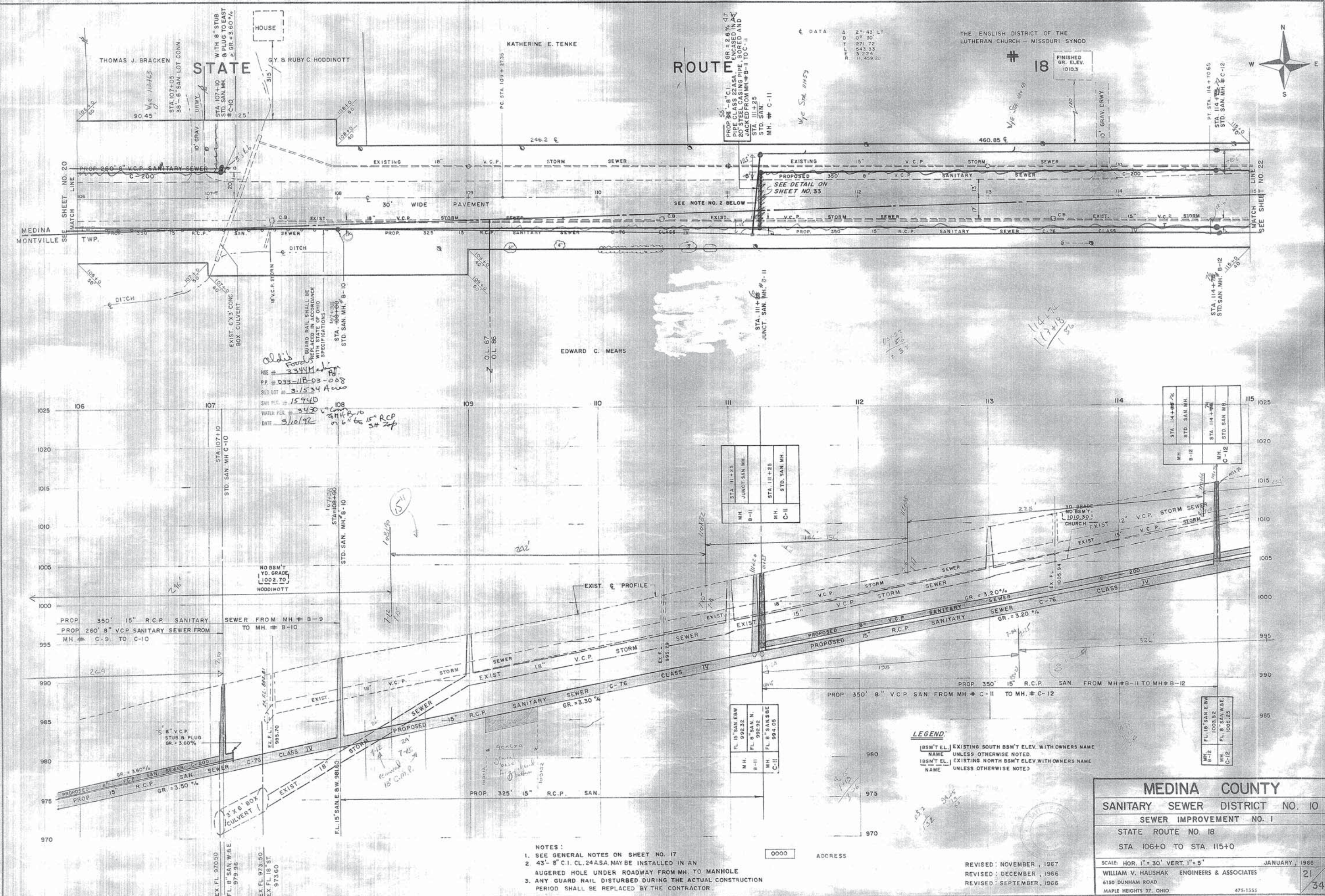
- 1) SEE GENERAL NOTES ON SHEET NO. 17
- 2) 40" C.I.P. CL. 24 A.S.A. MAYBE INSTALLED IN AUGERED HOLE UNDER ROADWAY FROM MH. TO MH.

STA. 104+50	MH. STD. SAN. MH. B-9
STA. 104+50	MH. STD. SAN. MH. C-9

FL. 15" SAN. E.W.	868.35
FL. 8" SAN. N.	970.00
FL. 8" SAN. S.E.	970.00

**MEDINA COUNTY**  
**SANITARY SEWER DISTRICT NO. 10**  
**SEWER IMPROVEMENT NO. 1**  
 STATE ROUTE NO 18  
 STA. 97+0 TO STA. 106+0  
 SCALE: HOR. 1" = 30' VERT. 1" = 5'  
 JANUARY, 1966  
 WILLIAM V. HALISHAK ENGINEERS & ASSOCIATES  
 6150 DUNHAM ROAD  
 MAPLE HEIGHTS 27, OHIO 475-1555





DATA

2-43	LT
0° 30'	
271.72	
543.33	
3.224	
11,459.20	

THE ENGLISH DISTRICT OF THE  
LUTHERAN CHURCH - MISSOURI SYNOD  
# 18  
FINISHED GR. ELEV. 1010.3



*Oldis Food*  
HSE # 3344  
P.P. # D33-11B-03-008  
SUB LOT # 3.1534 A  
SAV. PER. # 15940  
WATER PER. # 3430  
DATE 3/10/72

STA. 111+25	JUNCT. SAN. MH.
MH. B-11	
STA. 111+25	STD. SAN. MH.
MH. C-11	

STA. 114+76	STD. SAN. MH.
MH. B-12	
STA. 114+76	STD. SAN. MH.
MH. C-12	

FL. 15" SAN. EW	992.32
FL. 8" SAN. N.	992.92
FL. 8" SAN. SE	984.05
MH. B-11	
MH. C-11	

FL. 15" SAN. EW	1005.52
FL. 8" SAN. W.E.	1005.25
MH. B-12	
MH. C-12	

**LEGEND:**  
[BSM'T] EL. EXISTING SOUTH BSM'T. ELEV. WITH OWNERS NAME  
NAME UNLESS OTHERWISE NOTED.  
[NSM'T] EL. EXISTING NORTH BSM'T. ELEV. WITH OWNERS NAME  
NAME UNLESS OTHERWISE NOTED.

- NOTES:**
- SEE GENERAL NOTES ON SHEET NO. 17
  - 43'-8" C.I. CL. 24 A.S.A. MAY BE INSTALLED IN AN AUGERED HOLE UNDER ROADWAY FROM MH. TO MANHOLE
  - ANY GUARD RAIL DISTURBED DURING THE ACTUAL CONSTRUCTION PERIOD SHALL BE REPLACED BY THE CONTRACTOR.

REVISED: NOVEMBER, 1967  
REVISED: DECEMBER, 1966  
REVISED: SEPTEMBER, 1966

**MEDINA COUNTY**  
SANITARY SEWER DISTRICT NO. 10  
SEWER IMPROVEMENT NO. 1  
STATE ROUTE NO. 18  
STA. 106+0 TO STA. 115+0

SCALE: HOR. 1" = 30' VERT. 1" = 5'  
JANUARY, 1966  
WILLIAM V. HALISHAK ENGINEERS & ASSOCIATES  
6150 DUNHAM ROAD  
MAPLE HEIGHTS 37, OHIO 475-1555

21  
34

337 MEDINA RD  
 JAC FOODS  
 FRONT BLDG  
 # 30321  
 # 12087  
 PRIVATE PROPERTY  
 CHECK BKFLOW  
 IN NEW BLDG  
 2" TAP & 2"  
 METER IN PIT

3337  
 P.P. # 022-04-00  
 SUP. LOT # 12414  
 WATER PER. # 1692  
 DATE 11-18-83  
 County Assessor  
 # 3337 means  
 P.P. 022-04-00  
 SUB LOT # 5 AC  
 SAN. PER. # 23085  
 DATE 1-10-80

3305 MARGARET ANN LANSBURY  
 P.P. # 022-06-34-00  
 SUB LOT # 8.0 AC  
 SAN. PER. # 15132  
 WATER PER. # 2031  
 DATE 11-20-80

3271  
 P.P. # 022-06-34-00  
 SUB LOT # 5 AC  
 SAN. PER. # 27878  
 WATER PER. # 3291  
 DATE 10-23-80  
 LILLIAN H. BAGLEY

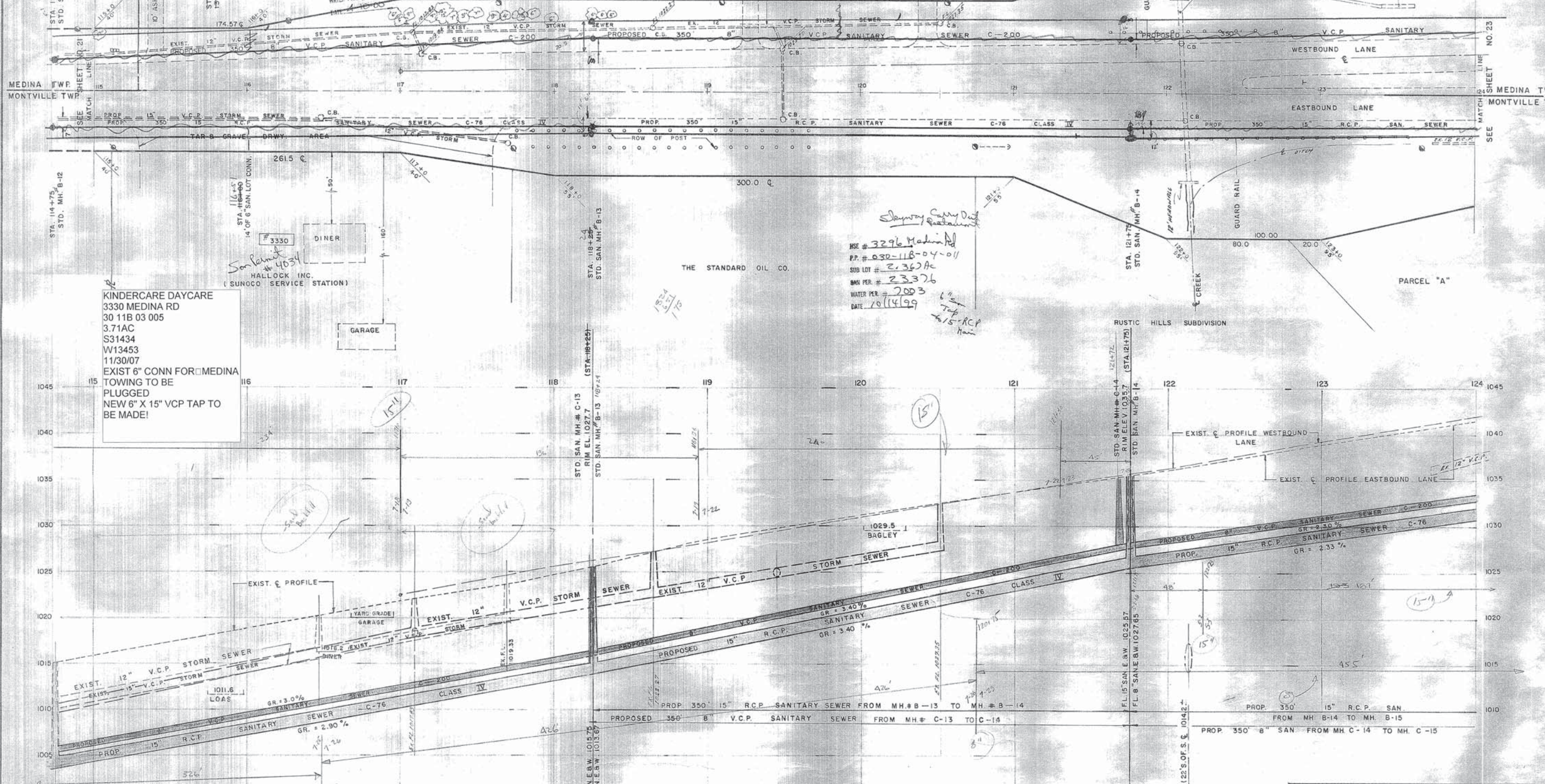
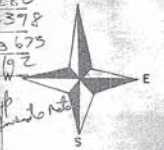
3277  
 P.P. # 022-06-34-00  
 SUB LOT # 2.01 AC  
 SAN. PER. # 21200  
 WATER PER. # 5997  
 DATE 2-19-84

3239 Madin Rd  
 P.P. # 022-06-34-00  
 SUB LOT # 1.72 AC  
 SAN. PER. # 16378  
 WATER PER. # 3675  
 DATE 11-30-82

STATE

ROUTE

# 18



KINDERCARE DAYCARE  
 3330 MEDINA RD  
 30 11B 03 005  
 3.71AC  
 S31434  
 W13453  
 11/30/07  
 EXIST 6" CONN FOR MEDINA  
 TOWING TO BE  
 PLUGGED  
 NEW 6" X 15" VCP TAP TO  
 BE MADE!

3330  
 DINNER  
 HALLOCK INC.  
 (SUNOCO SERVICE STATION)

Slawny Curry Del  
 Restaurant  
 HSE # 3296 Madin Rd  
 P.P. # 022-11B-04-01  
 SUB LOT # 2.367 AC  
 SAN. PER. # 23376  
 WATER PER. # 7003  
 DATE 10/14/99

NOTE:  
 ANY GUARD RAIL DISTURBED DURING THE ACTUAL CONSTRUCTION  
 PERIOD SHALL BE REPLACED BY THE CONTRACTOR.

LEGEND  
 SOUTH  
 BSM'T ELEV. WITH OWNERS NAME  
 UNLESS OTHERWISE NOTED  
 NAME  
 BSM'T ELEV. WITH OWNERS NAME  
 UNLESS OTHERWISE NOTED  
 NAME  
 ADDRESS  
 NOTE:  
 SEE GENERAL NOTES ON SHEET NO. 17

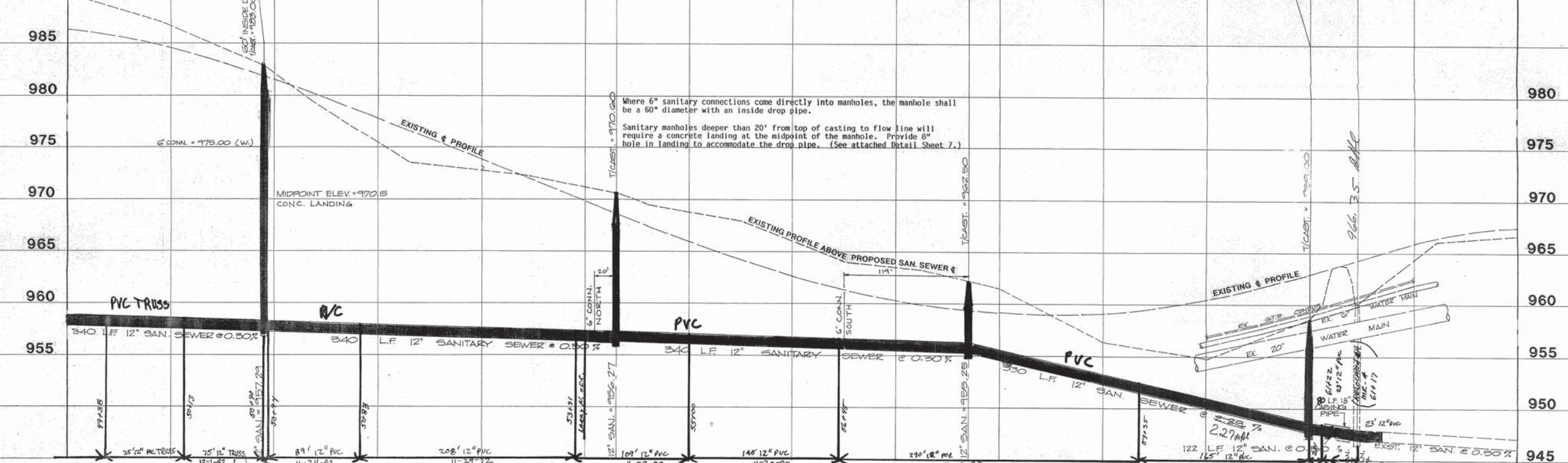
REVISED: NOVEMBER, 1967  
 REVISED: SEPTEMBER, 1966  
 REVISED: DECEMBER, 1966

<b>MEDINA COUNTY</b>	
SANITARY SEWER DISTRICT NO. 10	
SEWER IMPROVEMENT NO. 1	
STATE ROUTE NO. 18	
STA. 115+0 TO STA. 124+0	
SCALE: HOR. 1" = 30' VERT. 1" = 5'	JANUARY, 1966
WILLIAM V. HALISHAK ENGINEERS & ASSOCIATES 6150 DUNHAM ROAD MAPLE HEIGHTS 37, OHIO 475-1555	22 34

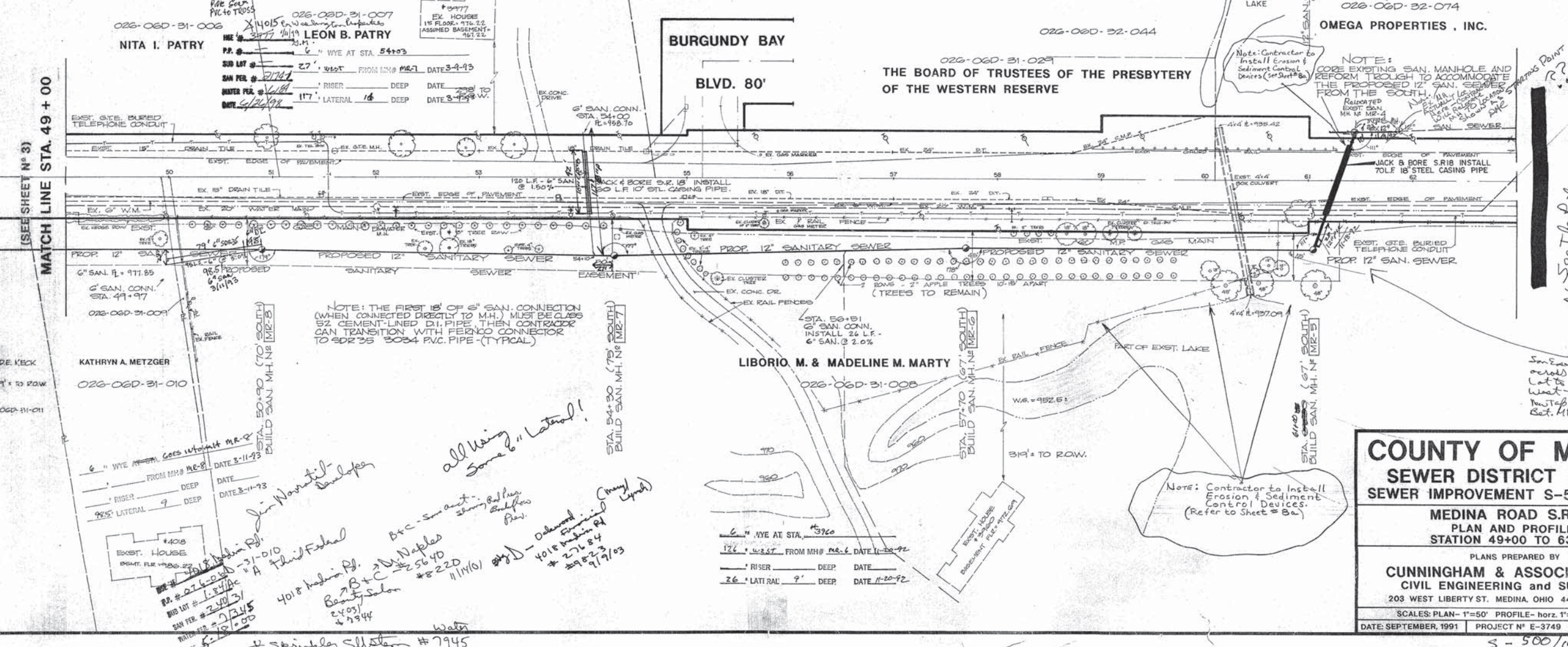
JOB NO. 1987

MC 65-3 500/10-1

990 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63



**MEDINA ROAD (S.R. 18)**



MATCH LINE STA. 49 + 00

(SEE SHEET N° 3)

**NITA I. PATRY**  
 026-060-31-006  
 P.P. # 6" WYE AT STA. 54+03  
 SUB LOT # 27  
 SAN PER. # 2174  
 WATER PER. # 117  
 DATE 4/2/98

**LEON B. PATRY**  
 026-020-31-007  
 EX. HOUSE 1st FLOOR - 976.22  
 ASSUMED BASEMENT - 961.22

**KATHRYN A. METZGER**  
 026-060-31-010  
 6" WYE AT STA. 54+03  
 FROM MH# MR-8  
 DATE 3-11-93

**LIBORIO M. & MADELINE M. MARTY**  
 026-060-31-008  
 STA. 54+30 (75' SOUTH)  
 BUILD SAN. M.H. N° MR-3

**BURGUNDY BAY**  
 BLVD. 80'

**THE BOARD OF TRUSTEES OF THE PRESBYTERY OF THE WESTERN RESERVE**  
 026-060-32-044

**LIBORIO M. & MADELINE M. MARTY**  
 026-060-31-008  
 STA. 57+70 (67' SOUTH)  
 BUILD SAN. M.H. N° MR-5

**OMEGA PROPERTIES, INC.**  
 026-060-32-074

**NOTE:** CONTRACTOR TO INSTALL EROSION & SEDIMENT CONTROL DEVICES (SEE SHEET # 8a)

**NOTE:** CORE EXISTING SAN. MANHOLE AND REFORM TROUGH TO ACCOMMODATE THE PROPOSED 12" SAN. SEWER FROM THE SOUTH.

**NOTE:** CONTRACTOR TO INSTALL JACK & BORE S.R.I.B. INSTALL 70' 18" STEEL CASING PIPE

**NOTE:** CONTRACTOR TO INSTALL EROSION & SEDIMENT CONTROL DEVICES. (REFER TO SHEET # 8a)

**SCALE:** 1" = 50'

**AKA Liborio & Madeline Marty**  
 5/20/10-40  
 19268

**Sanitary Sewer**  
 Lot to West  
 Date 4/25/96  
 West to East  
 Sect. 44 = MR-4 + MR-5

**COUNTY OF MEDINA**  
**SEWER DISTRICT N° 500**  
**SEWER IMPROVEMENT S-500/10-42.1**

**MEDINA ROAD S.R. 18**  
**PLAN AND PROFILE**  
**STATION 49+00 TO 63+00**

PLANS PREPARED BY  
**CUNNINGHAM & ASSOCIATES, INC.**  
 CIVIL ENGINEERING AND SURVEYING  
 203 WEST LIBERTY ST. MEDINA, OHIO 44256 725-5980

SCALES: PLAN-1"=50' PROFILE-horz.1"=50' vert.1"=5'  
 DATE: SEPTEMBER, 1991 PROJECT N° E-3749 SHEET N° 2 OF 8

*all using some 6" lateral!*

*Jim Warrick Developer*

*4018 Medina Pl. A Third Floor*

*B+C 5640*

*Beauty Salon*

*4018 Medina Pl. (Amey) (Lynch)*

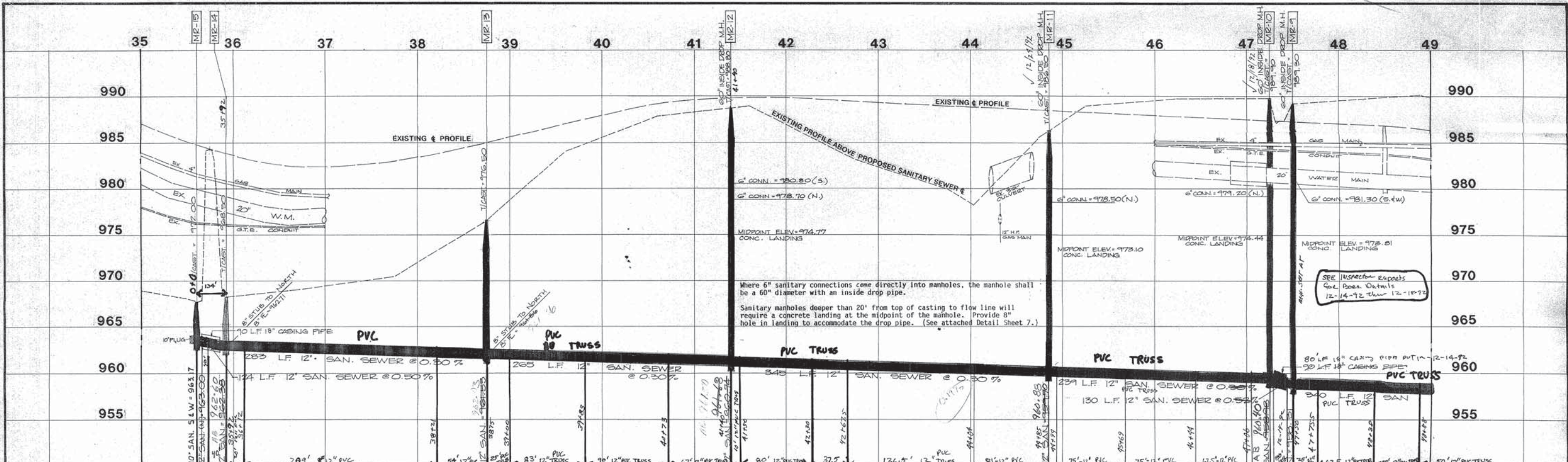
*276-010*

*24031*

*2345*

*5-12-00*

*\* Sprinkler System # 7945*



# MEDINA ROAD S.R. 18

NOTE: THE FIRST 18'-0" OF 6" SANITARY CONNECTION (WHEN CONNECTED DIRECTLY TO M.H.) MUST BE CLASS 52 CEMENT-LINED D.I. PIPE. THEN CONTR. CAN TRANSITION WITH FIBERGLASS CONNECTOR TO SD 35 SOCA PVC PIPE - TYPICAL.

6" WVE AT STA. goes into MH-MR-12  
 18" LATERAL 9 DEEP DATE 2-12-93  
 FROM MH# MR-12 DATE 1-5-93

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

4092  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 11/94

HOFFMAN BLDG  
 5000 FOOTE RD  
 S29925  
 W11604  
 8/29/05

026-06D-31-019  
 MAGDOLNA M. LOVASH  
 FROM MH# MR-11 DATE 3-11-93

026-06D-31-018  
 SUE A. KORTE  
 P.P. # 026-06D-31-018  
 SUB LOT # 4420  
 SAN PER # 12674  
 WATER PER # 4420  
 DATE 8/29/98

026-06D-31-017  
 KENNETH A. & KIM LEE DOBIES  
 EXIST. HOUSE  
 18" L.F. 6" SAN. CONN. @ 150%  
 DATE 3-11-93

026-06D-31-016  
 JACK & BORE S.R. 18 INSTALL  
 90' L.F. 10" STEEL CASING PIPE (0.375" WALL)

026-06D-31-015  
 JACK & BORE S.R. 18 INSTALL  
 90' L.F. 10" STEEL CASING PIPE (0.375" WALL)

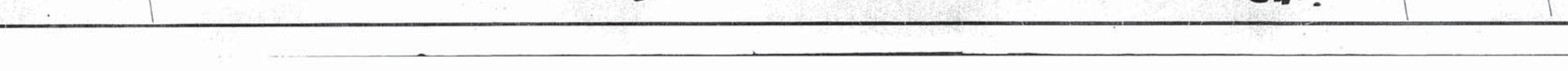
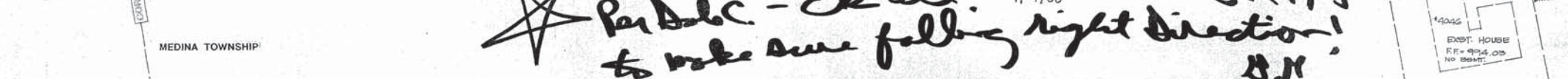
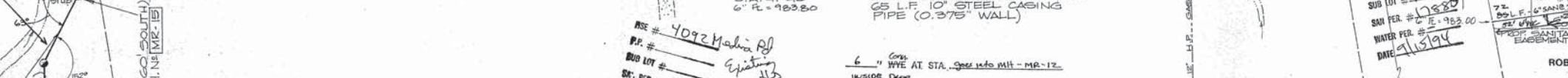
026-06D-31-014  
 JACK & BORE S.R. 18 INSTALL  
 90' L.F. 10" STEEL CASING PIPE (0.375" WALL)

026-06D-31-013  
 JACK & BORE S.R. 18 INSTALL  
 90' L.F. 10" STEEL CASING PIPE (0.375" WALL)

026-06D-31-012  
 JACK & BORE S.R. 18 INSTALL  
 90' L.F. 10" STEEL CASING PIPE (0.375" WALL)

026-06D-31-011  
 JACK & BORE S.R. 18 INSTALL  
 90' L.F. 10" STEEL CASING PIPE (0.375" WALL)

Notes: Contractor to Install Erosion & Sediment Control Devices.  
 Refer to Sheet # 8a



★ 8/18/94  
 Per ABC - check all 6" Conn into MH's  
 to make sure falling right direction!  
 B.M.

**COUNTY OF MEDINA**  
**SEWER DISTRICT N° 500**  
**SEWER IMPROVEMENT S-500/10-42.1**  
**MEDINA ROAD S.R. 18**  
**PLAN AND PROFILE**  
**STATION 35+00 TO 49+00**

PLANS PREPARED BY  
**CUNNINGHAM & ASSOCIATES, INC.**  
 CIVIL ENGINEERING and SURVEYING  
 203 WEST LIBERTY ST. MEDINA, OHIO 44256 725-5980

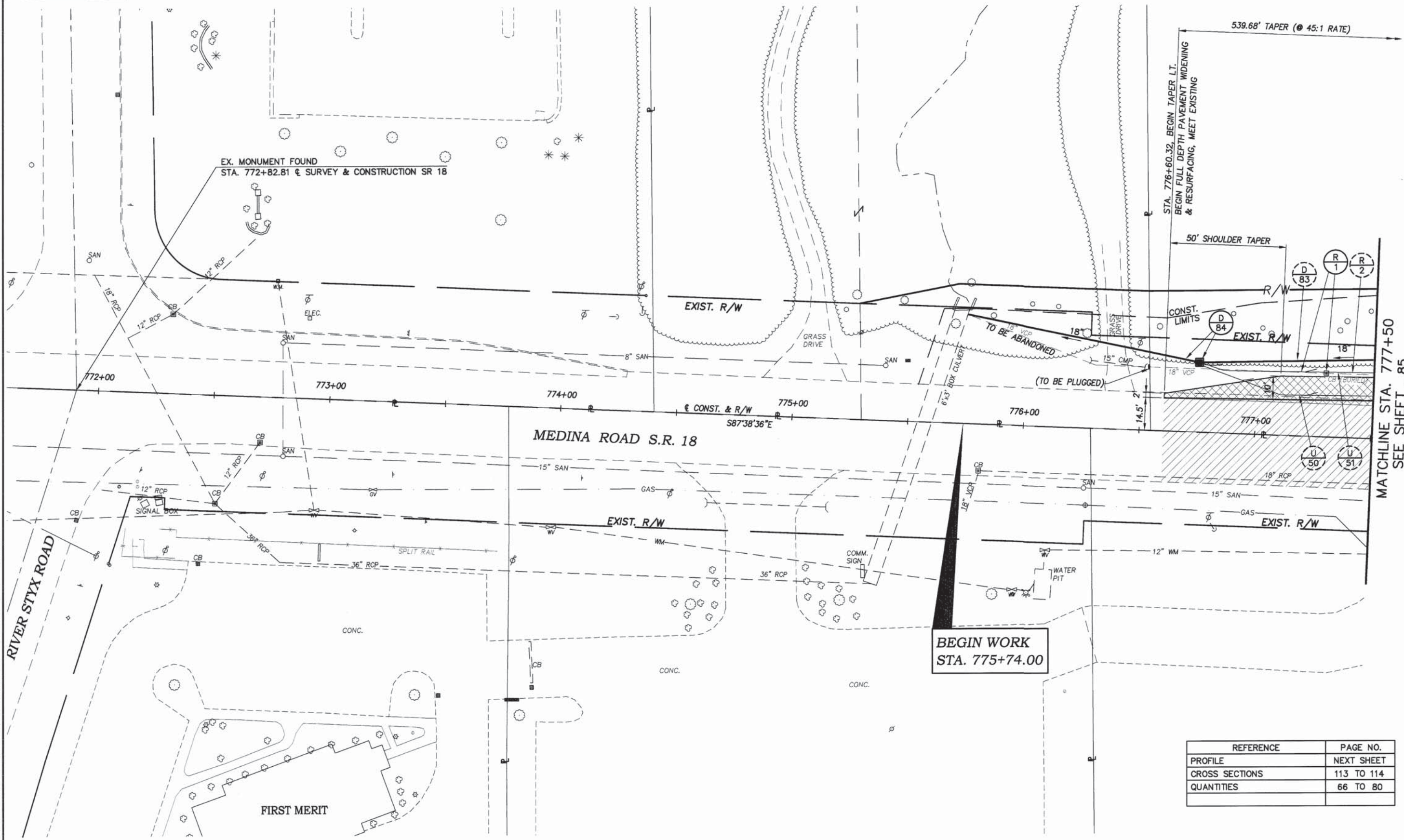
SCALE: PLAN-1"=50' PROFILE-horz 1"=50' vert 1"=5'  
 DATE: SEPTEMBER, 1991 PROJECT N° E-3749 SHEET N° 3 OF 8

S-500/10-42.1

**BENCHMARK NO. 1**  
 CHISELED "3" SOUTH EDGE OF  
 CONC. BASE OF LIGHT POLE  
 STA. 788+64 @ R/W, 72' LT.  
 ELEVATION 1033.64



CALCULATED  
 CHECKED



MATCHLINE STA. 777+50  
SEE SHEET 85

**PLAN - S.R. 18**  
**STA 771+00 TO STA. 777+50**

**BEGIN WORK**  
**STA. 775+74.00**

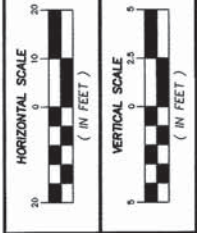
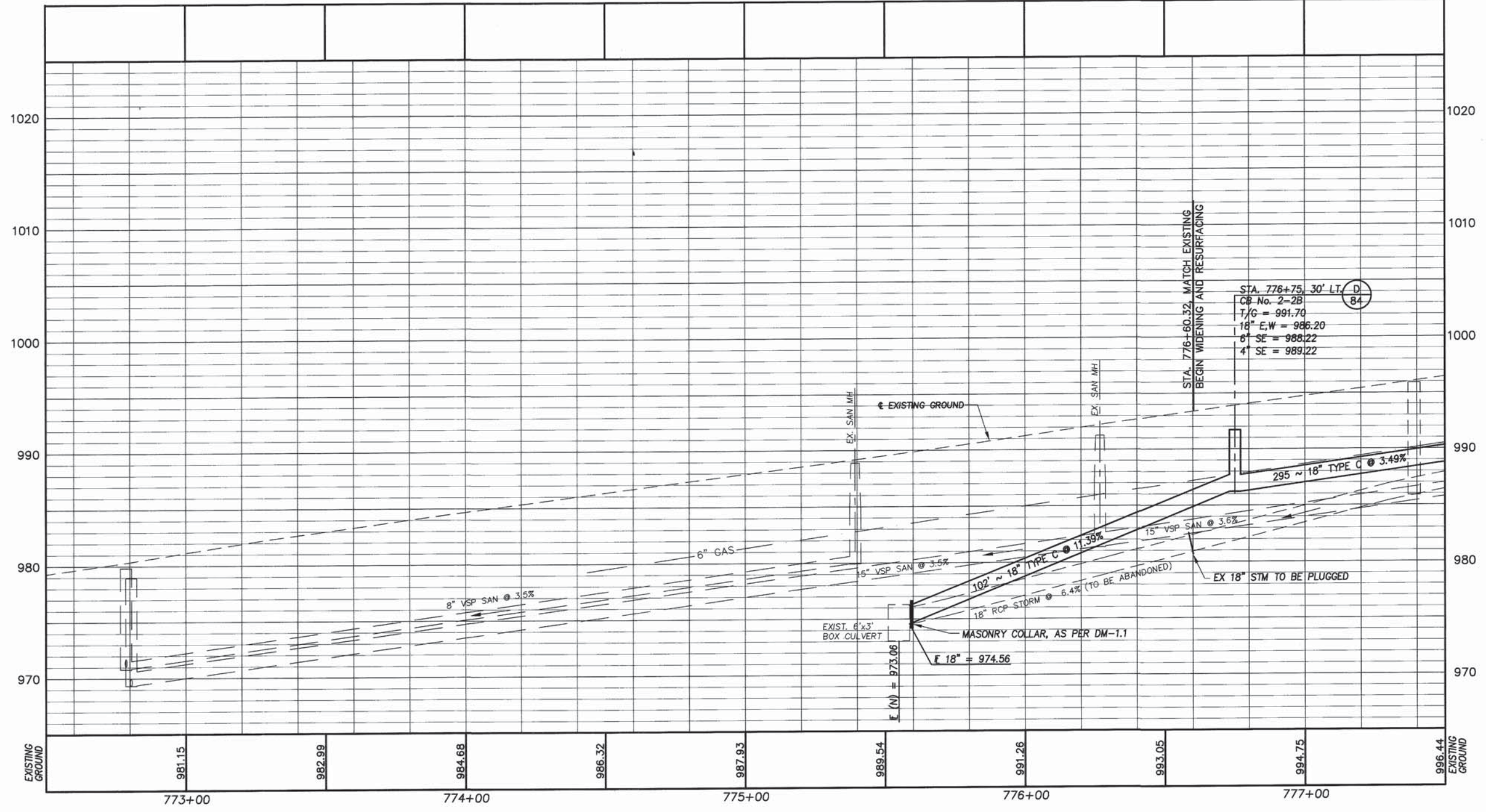
REFERENCE	PAGE NO.
PROFILE	NEXT SHEET
CROSS SECTIONS	113 TO 114
QUANTITIES	66 TO 80

- MILLING AND RESURFACING
- FULL DEPTH PAVEMENT WIDENING

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**MED - 18 - 15.13**

83  
362

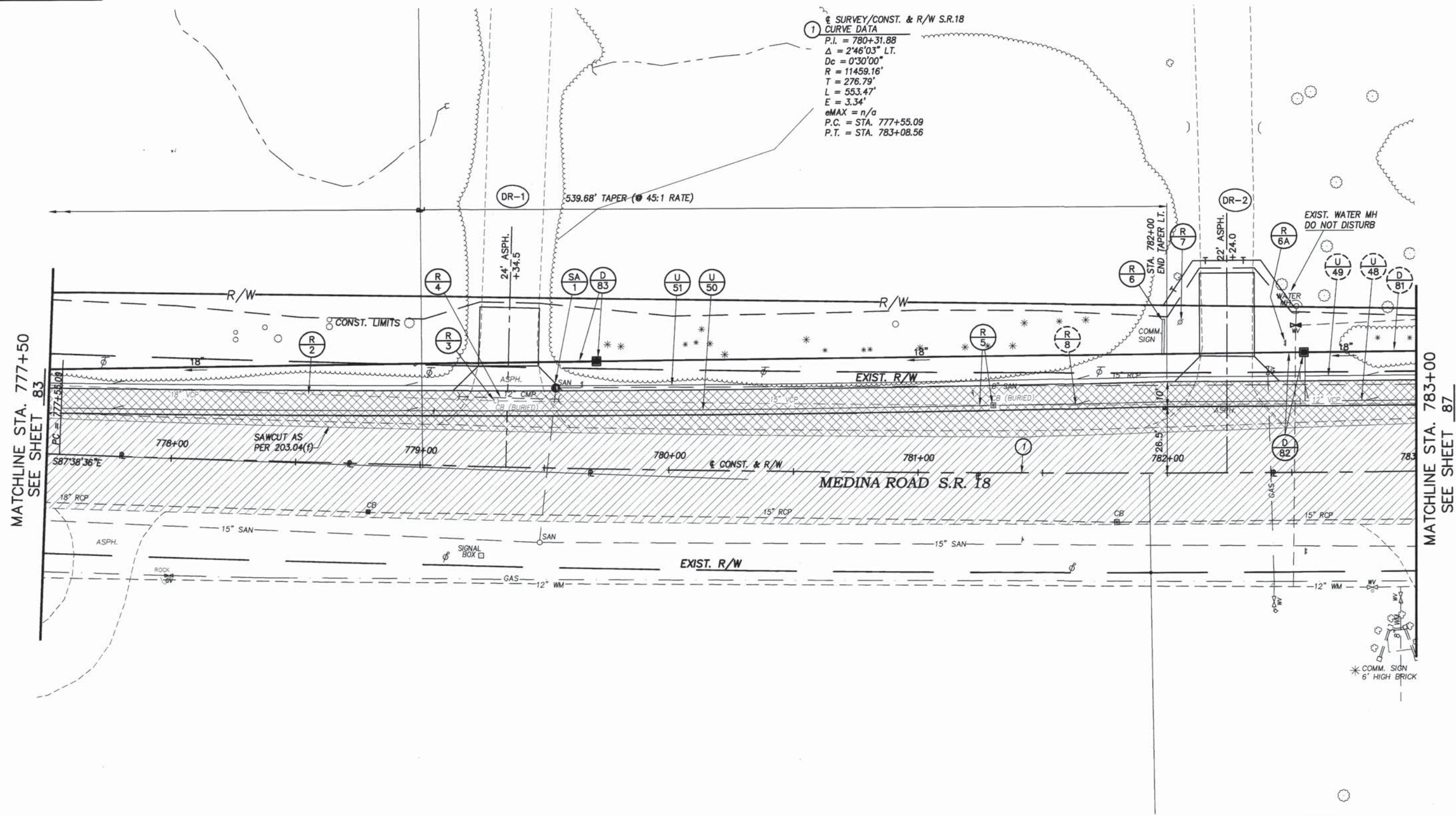


CALCULATED  
CHECKED

**PROFILE - S.R. 18**  
**STA. 772+50 TO STA. 777+50**

**BENCHMARK NO. 1**  
 CHISELED "d" SOUTH EDGE OF  
 CONC. BASE OF LIGHT POLE  
 STA. 788+64 @ R/W, 72' LT.  
 ELEVATION 1033.64

① SURVEY/CONST. & R/W S.R.18  
 CURVE DATA  
 P.I. = 780+31.88  
 $\Delta = 2^{\circ}46'03''$  LT.  
 $D_c = 0^{\circ}30'00''$   
 $R = 11459.16'$   
 $T = 276.79'$   
 $L = 553.47'$   
 $E = 3.34'$   
 $eMAX = n/a$   
 P.C. = STA. 777+55.09  
 P.T. = STA. 783+08.56



MATCHLINE STA. 777+50  
 SEE SHEET 83

MATCHLINE STA. 783+00  
 SEE SHEET 87

REFERENCE	PAGE NO.
PROFILE	NEXT SHEET
CROSS SECTIONS	114 TO 117
QUANTITIES	66 TO 80

- MILLING & RESURFACING
- FULL DEPTH PAVEMENT WIDENING

N

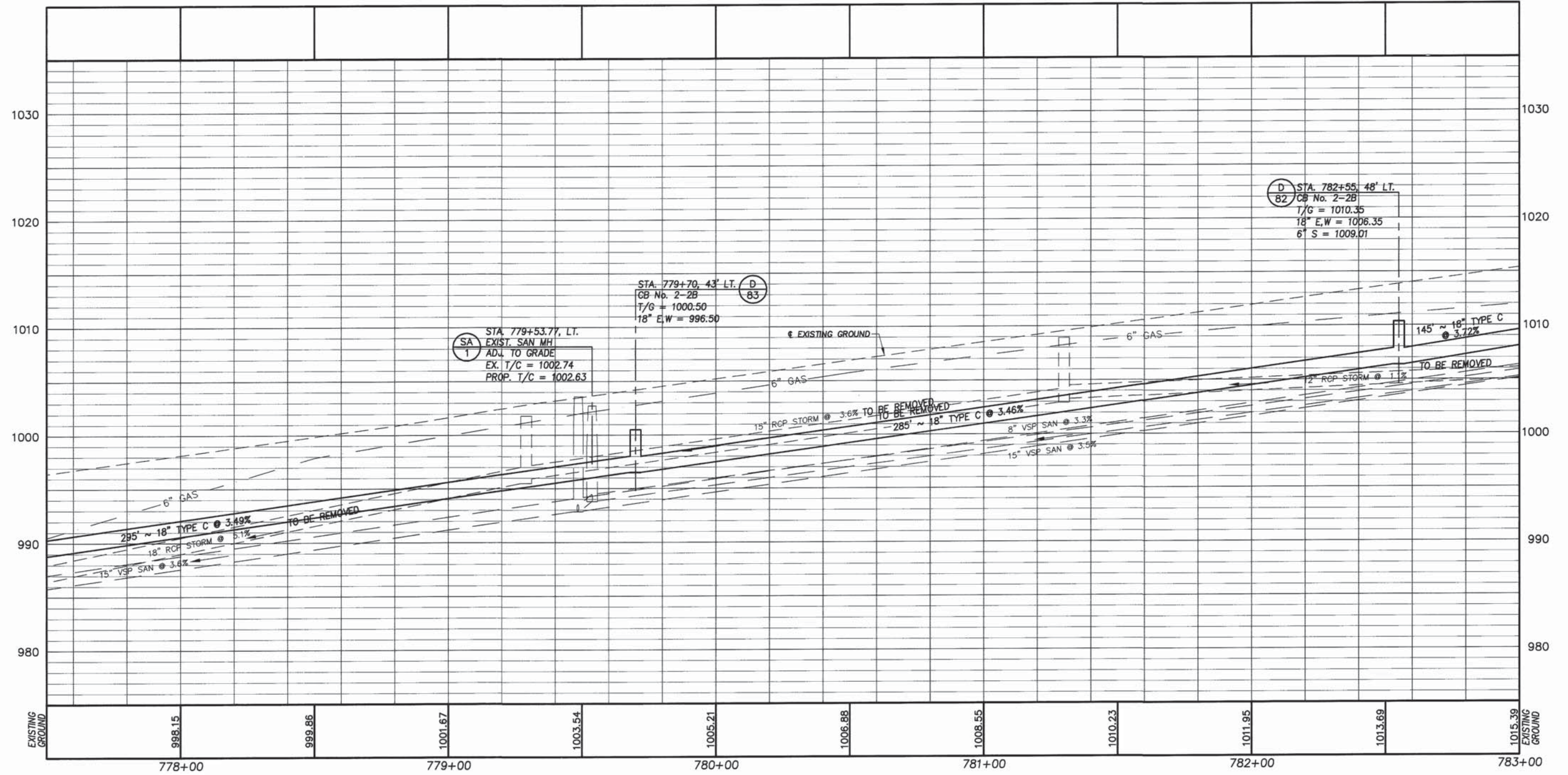
( IN FEET )

CALCULATED  
 CHECKED

**PLAN - S.R. 18**  
**STA. 777+50+00 TO STA. 783+00**

**MED - 18 - 15.13**

85  
 362



CALCULATED  
CHECKED

PROFILE - S.R. 18  
STA. 777+50 TO 783+00

MED - 18 - 15.13



1 SURVEY/CONST. & R/W S.R.18  
 CURVE DATA  
 P.I. = 780+31.88  
 $\Delta = 2'46'03''$  LT.  
 $D_c = 0'30'00''$   
 $R = 11459.16'$   
 $T = 276.79'$   
 $L = 553.47'$   
 $E = 3.34'$   
 $eMAX = n/a$   
 P.C. = STA. 777+55.09  
 P.T. = STA. 783+08.56

B1 W.B. LANES S.R. 18  
 CURVE DATA  
 P.I. = 785+77.25  
 $\Delta = 2'12'25''$  LT.  
 $D_c = 0'30'00''$   
 $R = 11459.16'$   
 $T = 220.72'$   
 $L = 441.39'$   
 $E = 2.13'$   
 $eMAX = n/c$   
 P.C. = STA. 1783+56.53  
 P.T. = STA. 1787+97.92

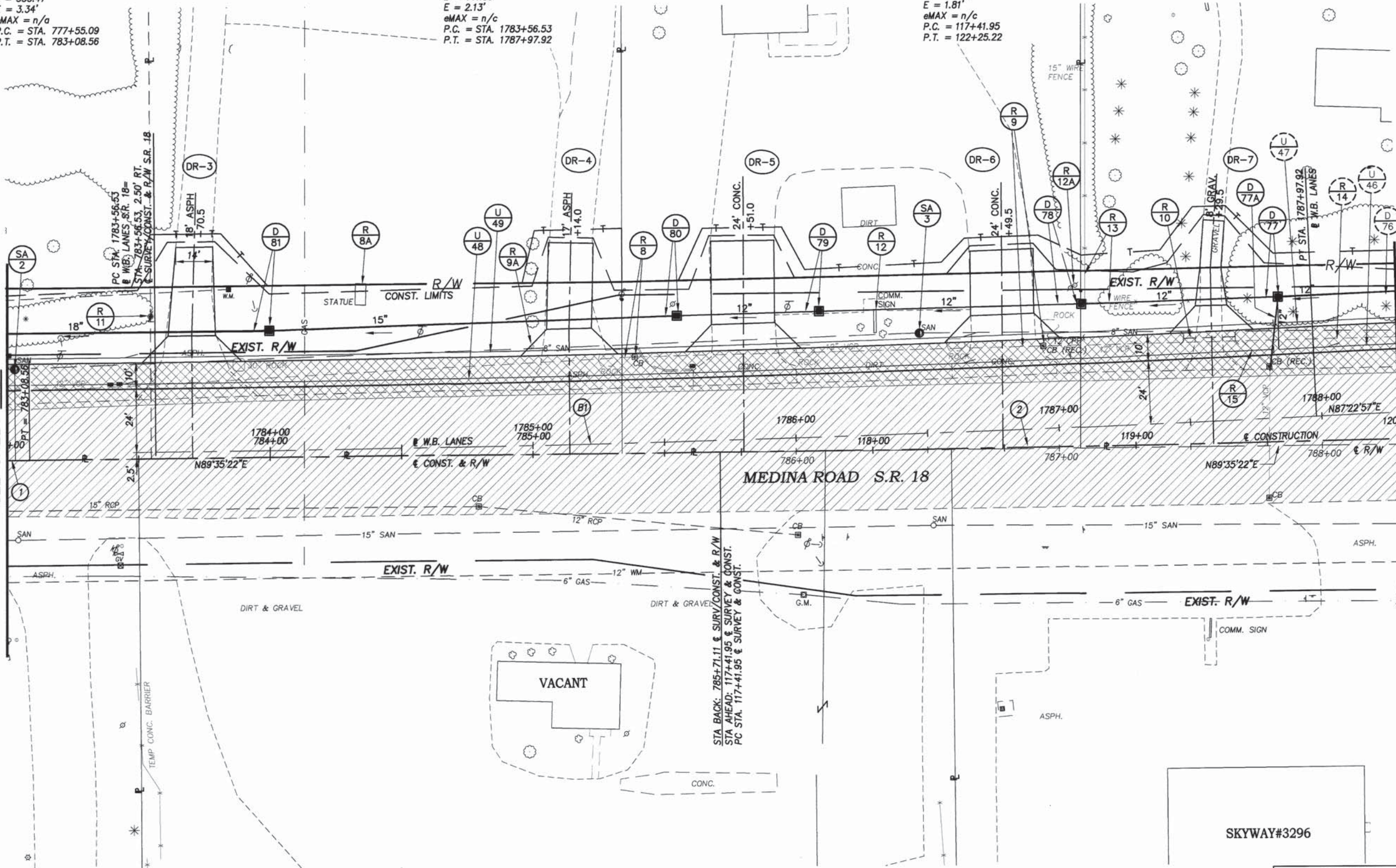
2 SURVEY & CONST. S.R. 18  
 CURVE DATA  
 P.I. = 119+83.60  
 $\Delta = 1'43'14''$  LT.  
 $D_c = 0'21'22''$   
 $R = 16092.78'$   
 $T = 241.65'$   
 $L = 483.27'$   
 $E = 1.81'$   
 $eMAX = n/c$   
 P.C. = 117+41.95  
 P.T. = 122+25.22

MATCHLINE STA. 783+00  
 SEE SHEET 85

MATCHLINE STA. 120+00  
 SEE SHEET 89

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BENCHMARK NO. 1  
 CHISELED "6" SOUTH EDGE OF  
 CONC. BASE OF LIGHT POLE  
 STA. 788+64 @ R/W, 72' LT.  
 ELEVATION 1033.64



REFERENCE	PAGE NO.
PROFILE	NEXT SHEET
CROSS SECTIONS	117 TO 120
QUANTITIES	66 TO 80

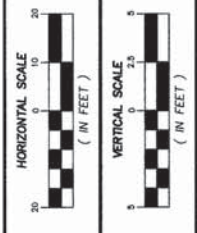
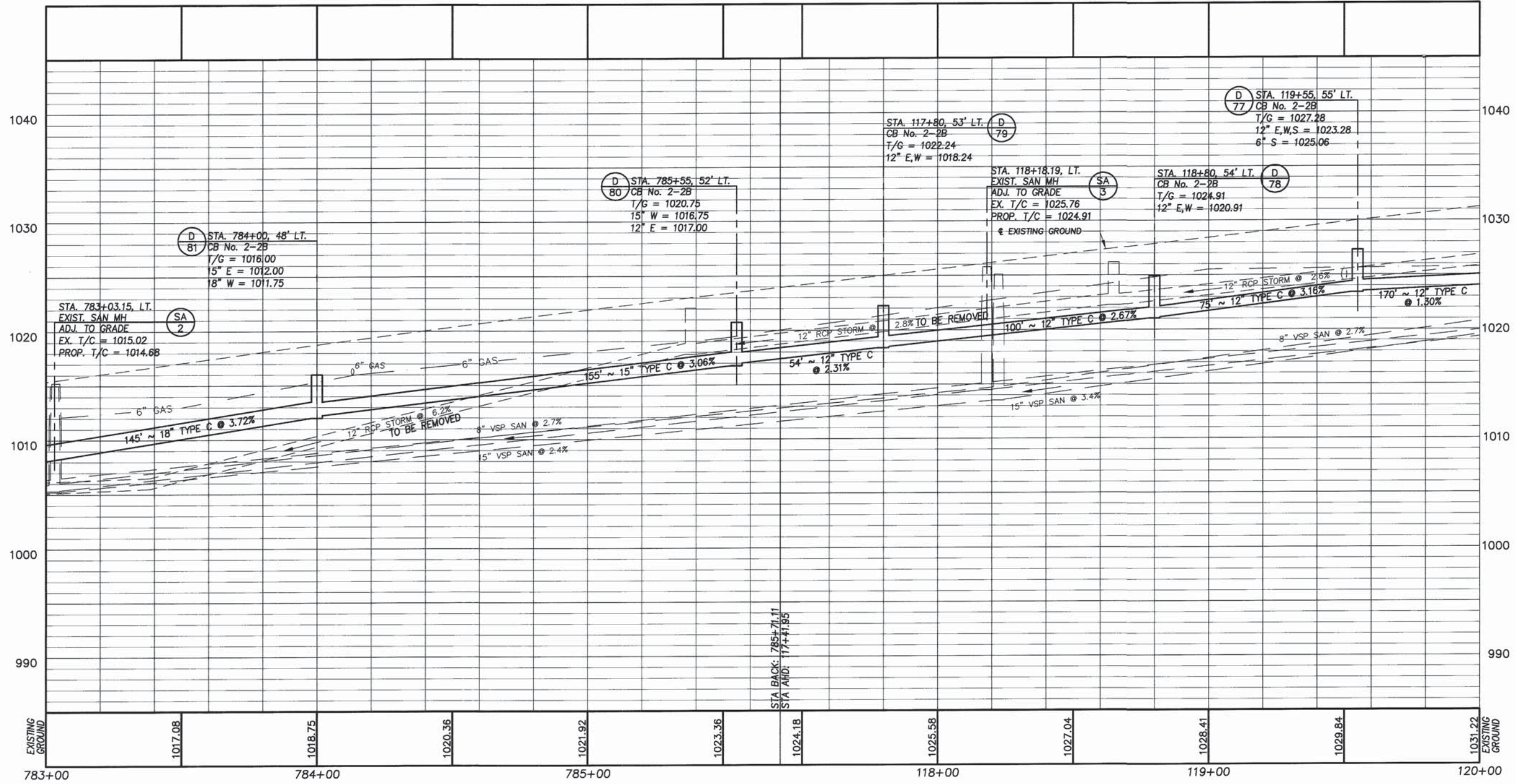
- MILLING & RESURFACING
- FULL DEPTH PAVEMENT WIDENING



PLAN - S.R. 18  
 STA. 783+00 TO STA. 120+00

MED - 18 - 15.13

87  
 362

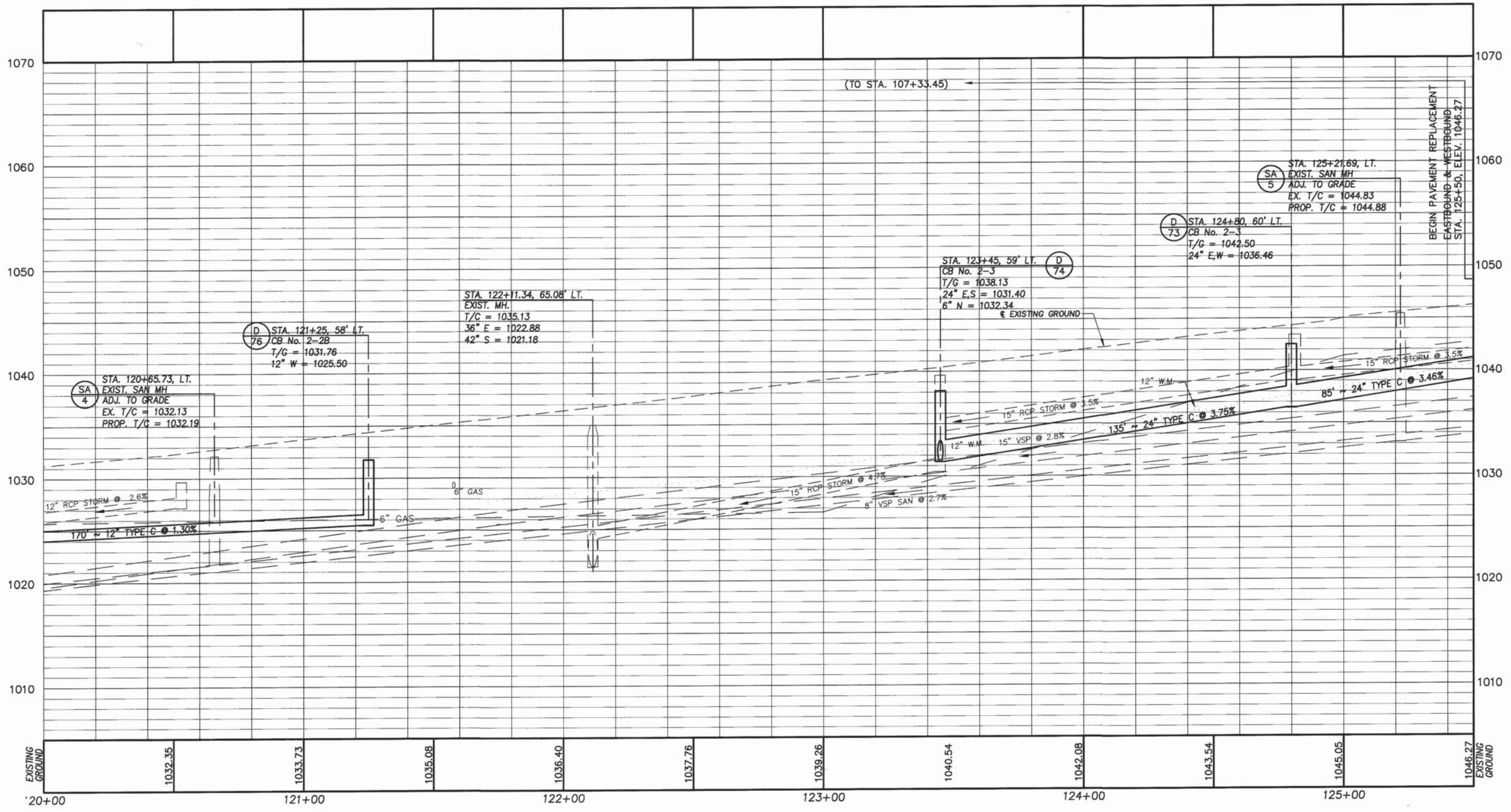
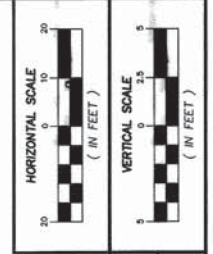


CALCULATED  
CHECKED

**PROFILE - S.R. 18**  
**STA. 783+00 TO 120+00**

**MED - 18 - 15.13**





CALCULATED  
CHECKED

**PROFILE - S.R. 18**  
**STA. 120+00 TO 125+50**

**MED - 18 - 15.13**

**BENCHMARK NO. 2**  
 CHISELED "+" SOUTH SIDE OF  
 ROUND CONC. WATER MANHOLE  
 STA. 798+37 @ R/W, 89.5' LT.  
 ELEVATION 1059.29

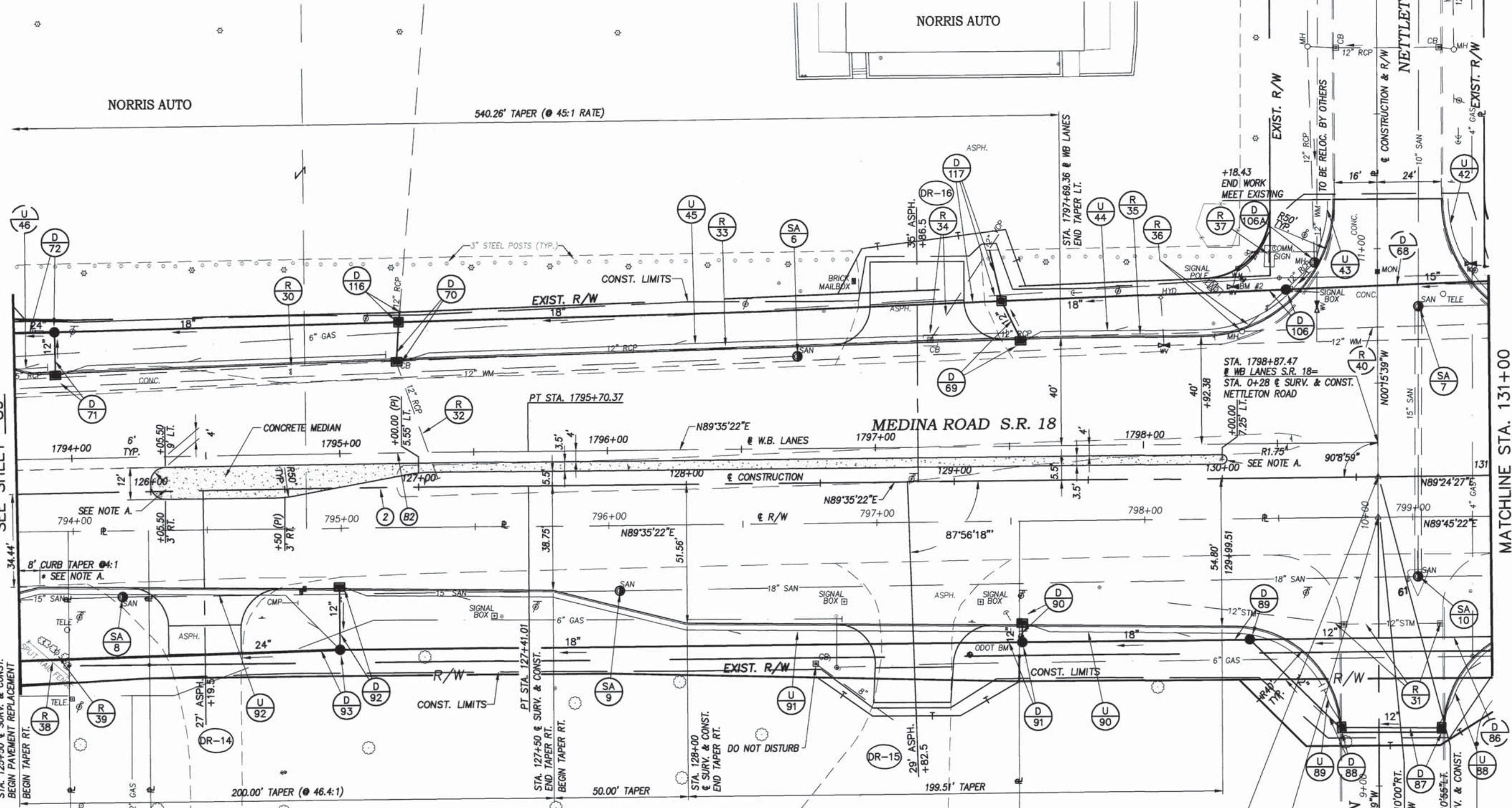
REFERENCE	PAGE NO.
PROFILE	NEXT SHEET
CROSS SECTIONS	125 TO 129
QUANTITIES	66 TO 80
NETTLETON INTERSECTION DETAIL	207
DRAINAGE PROFILES	215, 221

NOTE A: TRANSITION CURB/MEDIAN HEIGHT FROM 0" TO 6" IN 10'

MATCHLINE STA. 125+50  
 SEE SHEET 89

MATCHLINE STA. 131+00  
 SEE SHEET 93

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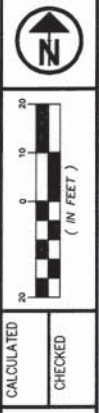
<p>② SURVEY &amp; CONST. S.R. 18          CURVE DATA          P.I. = 119+83.60  <math>\Delta = 1^{\circ}43'14''</math> LT.  <math>D_c = 0^{\circ}21'22''</math>  <math>R = 16092.78'</math>  <math>T = 241.65'</math>  <math>L = 483.27'</math>  <math>E = 1.81'</math>  <math>e_{MAX} = n/c</math>          P.C. = 117+41.95          P.T. = 122+25.22</p>	<p>③ W.B. LANES S.R. 18          CURVE DATA          P.I. = STA. 1792+39.37  <math>\Delta = 2^{\circ}12'25''</math> RT.  <math>D_c = 0^{\circ}20'00''</math>  <math>R = 17188.73'</math>  <math>T = 331.09'</math>  <math>L = 662.09'</math>  <math>E = 3.19'</math>  <math>e_{MAX} = n/c</math>          P.C. = STA. 1789+08.28          P.T. = STA. 1795+70.37</p>
---	--

STA. 130+58.11 @ SURV. & CONST. S.R. 18=  
 STA. 10+15 @ SURV. & CONST.  
 NETTLETON ROAD

STA. 798+87.08 @ R/W S.R. 18=  
 STA. 10+00 @ SURV. & CONST.  
 NETTLETON ROAD

TRANSPORTATION  
 COURT

HORZ. DEF.  $\Delta = 00^{\circ}10'00''$  RT.  
 STA. 798+87.08 @ R/W  
 NO CURVE  
 HORZ. DEF.  $\Delta = 00^{\circ}10'56''$  LT.  
 STA. 130+58.11 @ SURV. & CONST.  
 NO CURVE

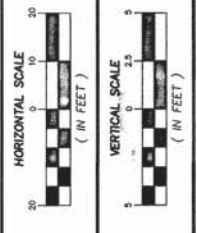
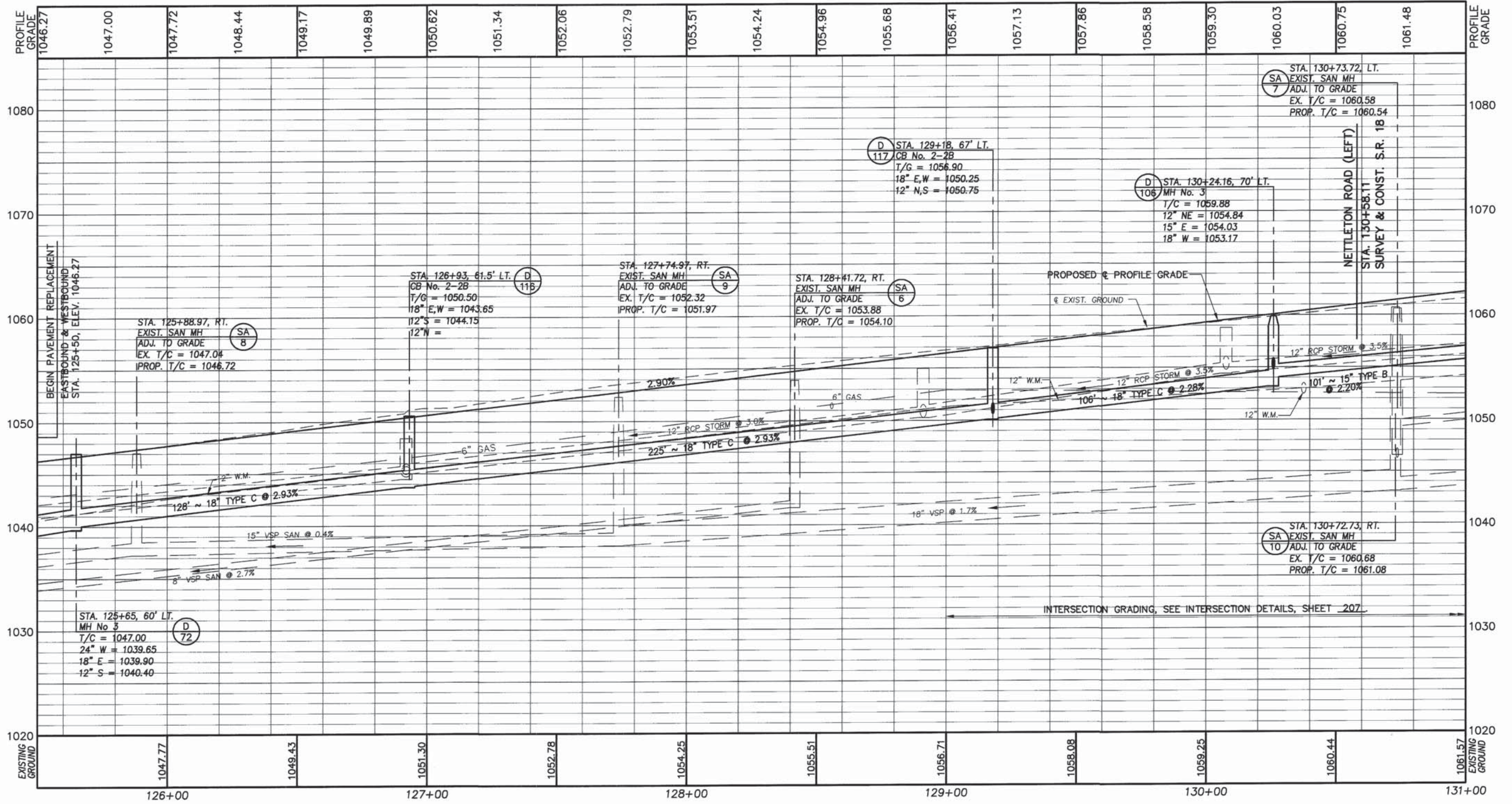


CALCULATED  
 CHECKED

PLAN - S.R. 18  
 STA. 125+50 TO STA. 131+00

MED - 18 - 15.13

91  
 362



CALCULATED  
CHECKED

**PROFILE - S.R. 18**  
**STA. 125+50 TO STA. 131+00**

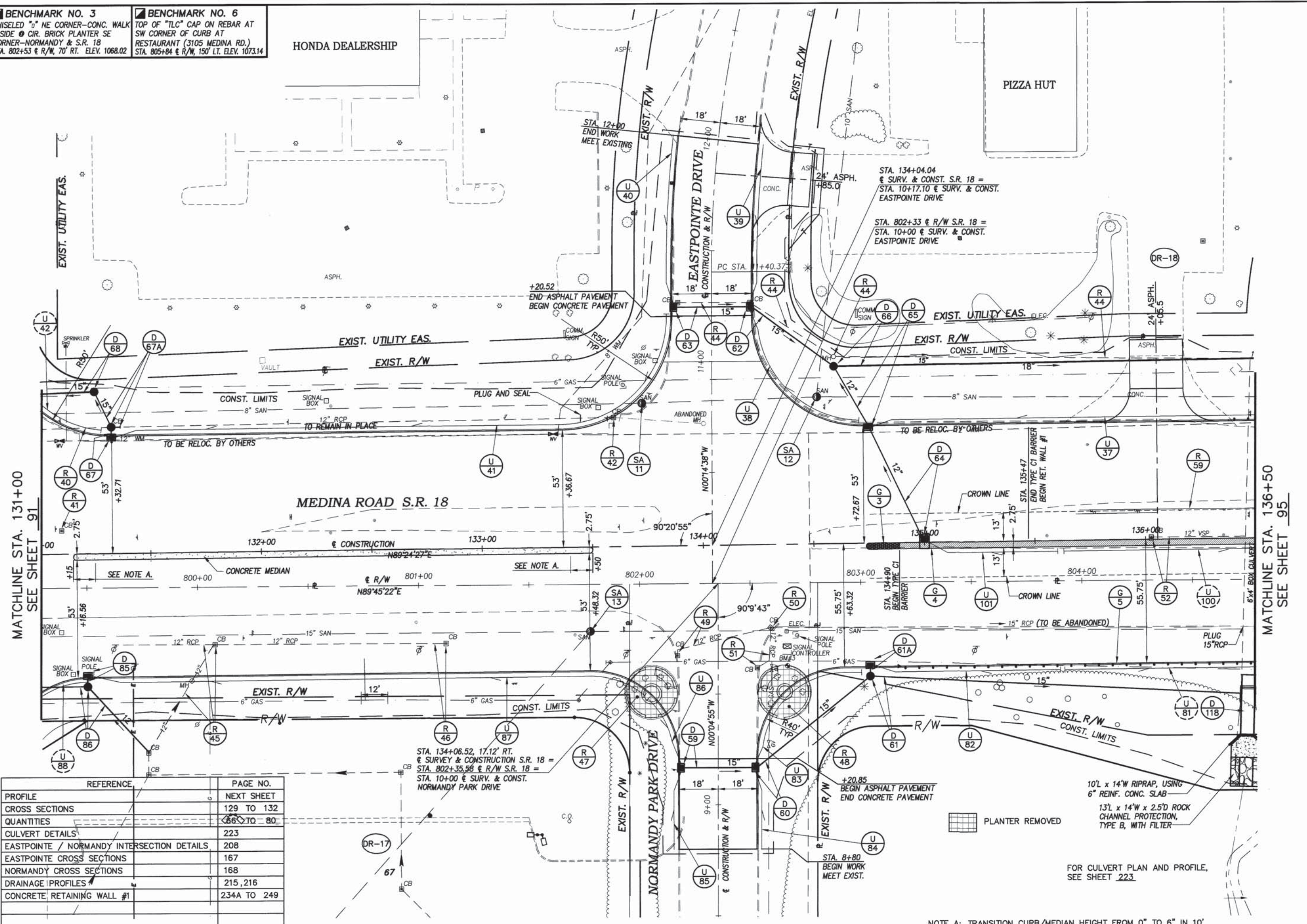
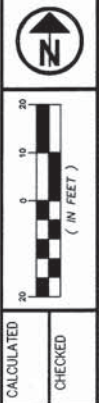
**MED - 18 - 15.13**

**BENCHMARK NO. 3**  
 CHISELED "6" NE CORNER-CONC. WALK  
 N. SIDE @ CIR. BRICK PLANTER SE  
 CORNER-NORMANDY & S.R. 18  
 STA. 802+53 @ R/W, 70' RT. ELEV. 1068.02

**BENCHMARK NO. 6**  
 TOP OF "TLC" CAP ON REBAR AT  
 SW CORNER OF CURB AT  
 RESTAURANT (3105 MEDINA RD.)  
 STA. 805+84 @ R/W, 150' LT. ELEV. 1073.14

HONDA DEALERSHIP

PIZZA HUT



MATCHLINE STA. 131+00  
 SEE SHEET 91

MATCHLINE STA. 136+50  
 SEE SHEET 95

REFERENCE	PAGE NO.
PROFILE	NEXT SHEET
CROSS SECTIONS	129 TO 132
QUANTITIES	166 TO 80
CULVERT DETAILS	223
EASTPOINTE / NORMANDY INTERSECTION DETAILS	208
EASTPOINTE CROSS SECTIONS	167
NORMANDY CROSS SECTIONS	168
DRAINAGE PROFILES	215, 216
CONCRETE RETAINING WALL #1	234A TO 249

STA. 134+06.52, 17.12' RT.  
 @ SURVEY & CONSTRUCTION S.R. 18 =  
 STA. 802+35.58 @ R/W S.R. 18 =  
 STA. 10+00 @ SURV. & CONST.  
 NORMANDY PARK DRIVE

10'L x 14"W RIPRAP, USING  
 6" REINF. CONC. SLAB  
 13'L x 14"W x 2.5'D ROCK  
 CHANNEL PROTECTION,  
 TYPE B, WITH FILTER

FOR CULVERT PLAN AND PROFILE,  
 SEE SHEET 223.

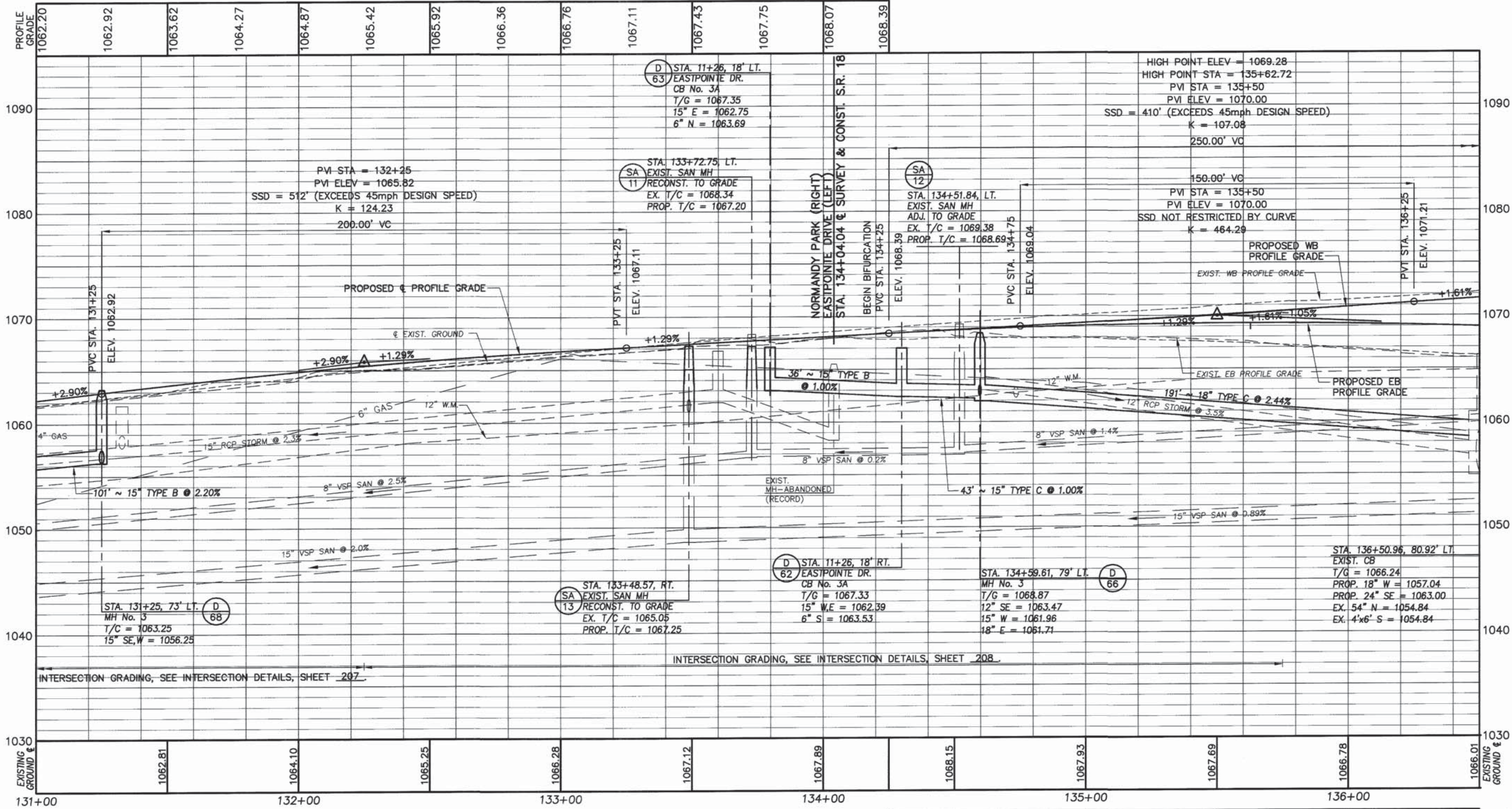
NOTE A: TRANSITION CURB/MEDIAN HEIGHT FROM 0" TO 6" IN 10'

PLAN - S.R. 18  
 STA. 131+00 TO STA. 136+50

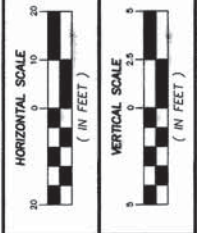
MED - 18 - 15.13

93  
 362

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PROFILE GRADE EB LANES	1068.39	1068.68	1068.92	1069.09	1069.21	1069.27	1069.27	1070.06	1070.43	1070.81	1071.21
PROFILE GRADE WB LANES	1068.39	1068.71	1069.04	1069.36	1069.71	1070.06	1070.43	1070.81	1071.21		



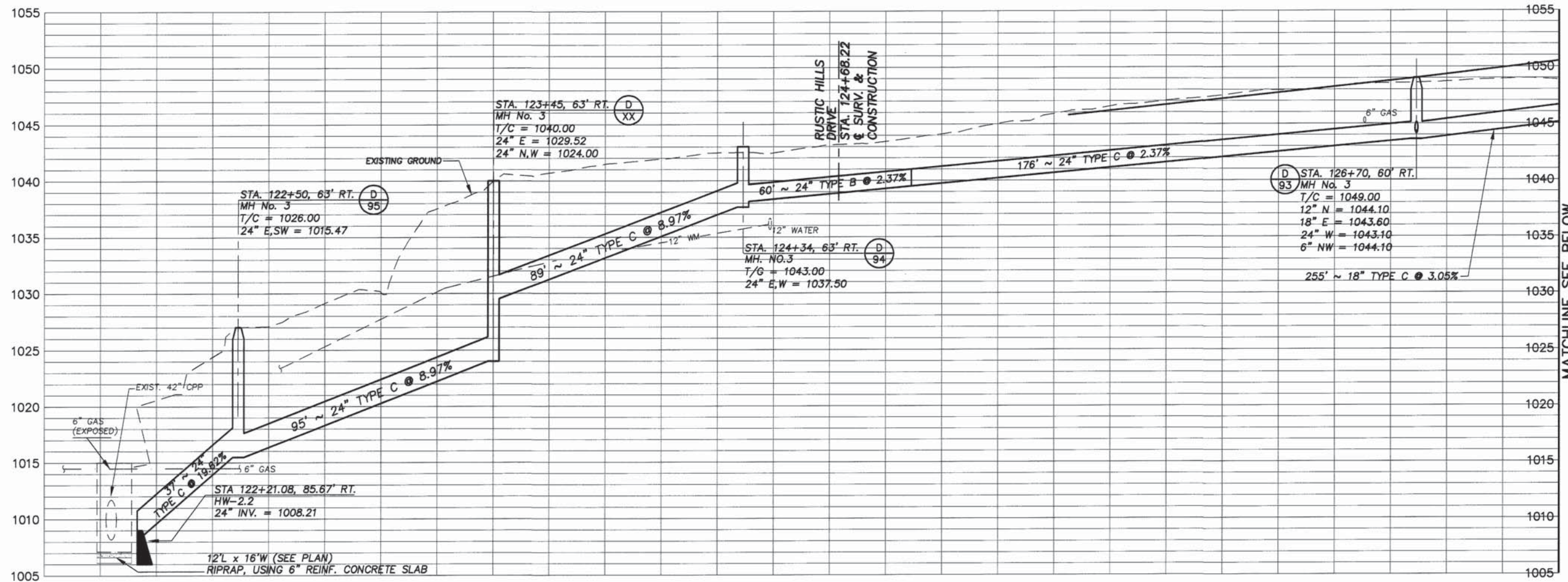
CALCULATED  
CHECKED

**PROFILE - S.R. 18  
STA. 131+00 TO STA. 136+50**

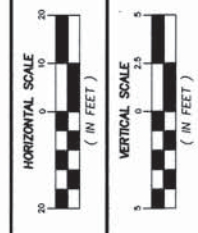
**MED - 18 - 15.13**



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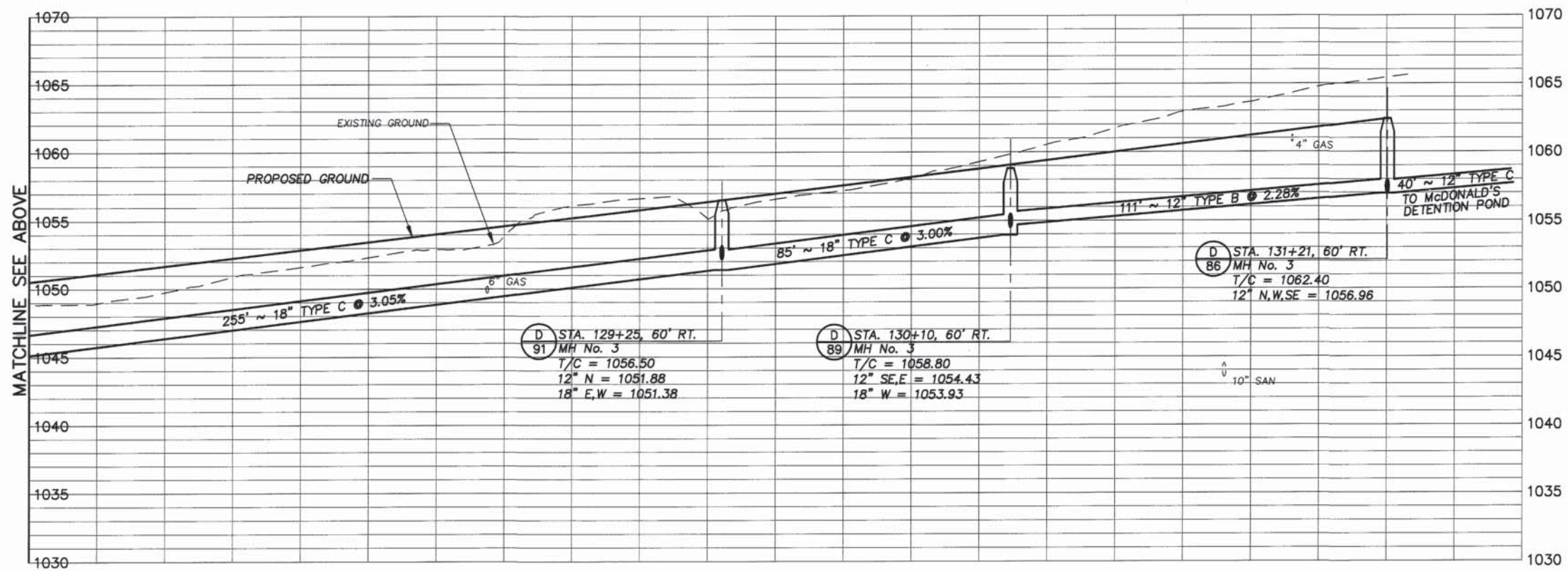


MATCHLINE SEE BELOW

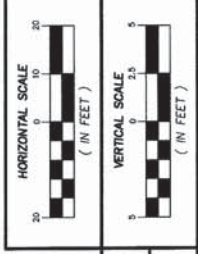
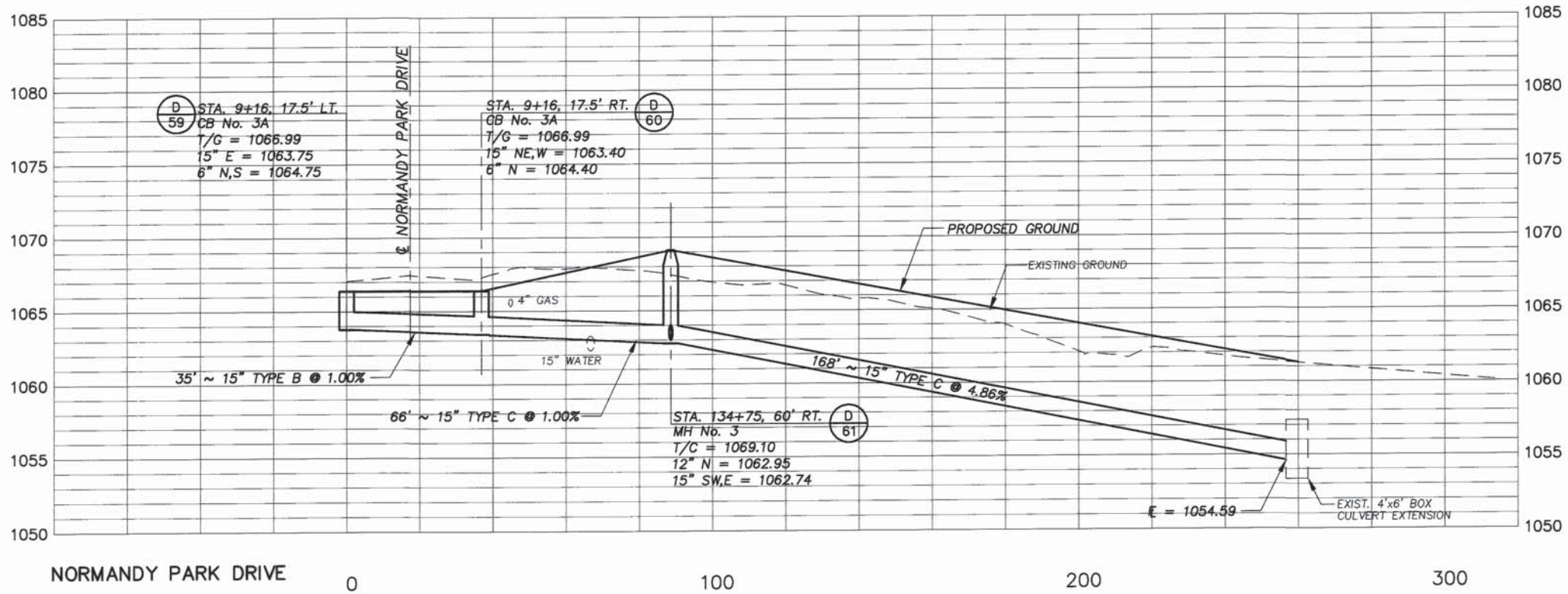


CALCULATED  
IMT  
CHECKED  
IM

**DRAINAGE PROFILE**  
**STA. 122+00 TO STA. 131+21**



MATCHLINE SEE ABOVE



CALCULATED	MJT
CHECKED	IM

**DRAINAGE PROFILE**  
**STA. 133+86 TO STA. 136+50**

**MED - 18 - 15.13**

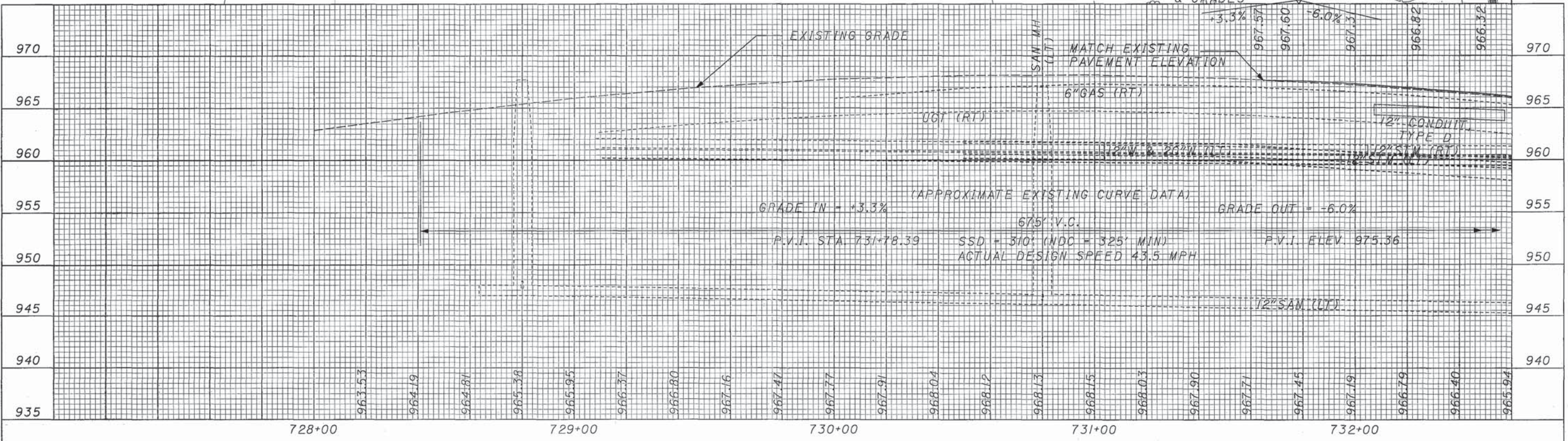
FOR ROADWAY QUANTITIES, SEE SHEET 22  
 FOR UNDERDRAIN QUANTITIES, SEE SHEET 26  
 FOR DRAINAGE, EROSION CONTROL, AND  
 WATER LINE QUANTITIES, SEE SHEET 23  
 FOR POST STORM WATER BMP  
 QUANTITIES, SEE SHEET 24

**LEGEND**

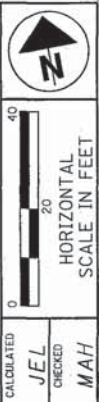
- - - DITCH CHECK
- FF- FILTER FABRIC FENCE
- ▨ SEDIMENT BASIN

**BM#1**  
 STA. 731+69.32, 36.55' LT.  
 TOP SOUTH FLANGE BOLT ON HYD. @ NE CORNER OF  
 SR 18 AND RETREAT DRIVE (STATE EL. 968.64)

**BM#5**  
 STA. 731+77.08, 48.85' LT.  
 " " CUT ON SW CORNER OF CONC. PAD FOR SEWER N/S  
 SR 18 15'± N. OF BM#1 EL. 967.12



MATCHLINE STA. 732+60 STATE ROUTE 18  
 SEE SHEET 30



**PLAN AND PROFILE**  
**STA. 728+00 TO STA. 732+60**

**MED-18-14.00**

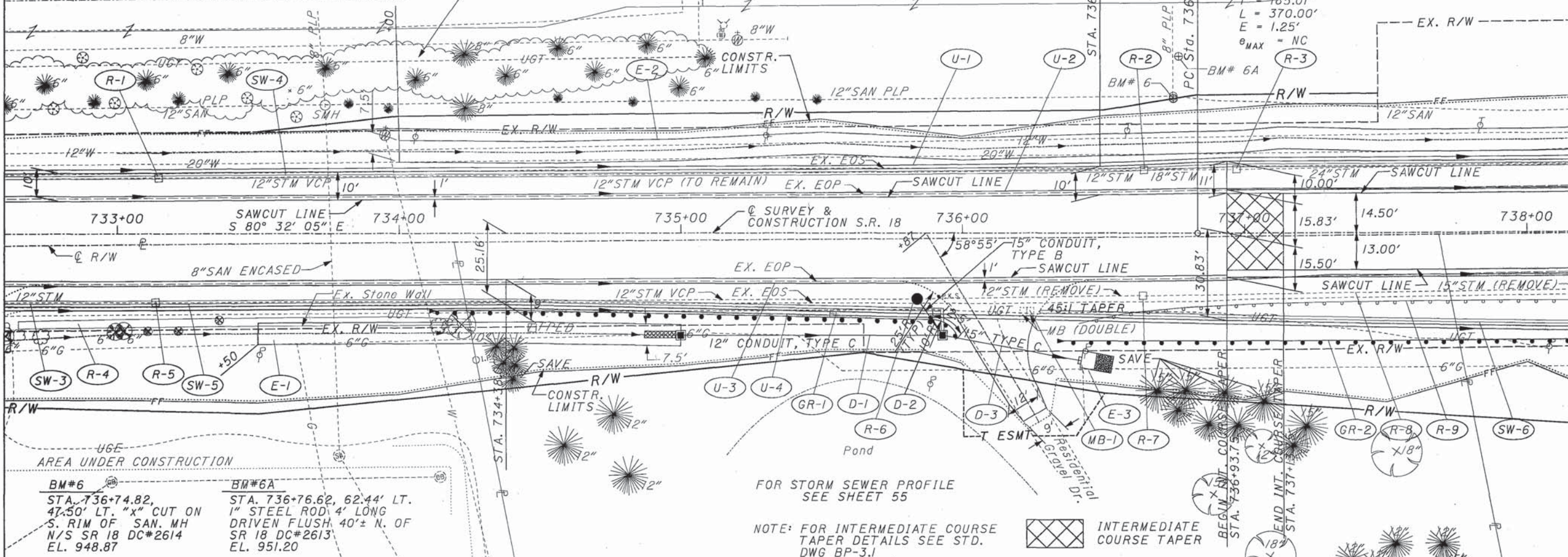
P:\p\24512\cadd\pssht1.dgn 04-13-01

MATCHLINE STA. 732+60 STATE ROUTE 18  
SEE SHEET 29

MATCHLINE STA. 738+20 STATE ROUTE 18  
SEE SHEET 31

FOR ROADWAY QUANTITIES, SEE SHEET 22  
FOR DRAINAGE QUANTITIES, SEE SHEET 23  
FOR UNDERDRAIN QUANTITIES, SEE SHEET 26  
FOR POST STORM WATER BMP  
QUANTITIES, SEE SHEET 24

CURVE DATA  
P.I. STA. 738+68.38  
 $\Delta = 1^\circ 32' 55''$  (LT)  
 $D_c = 0^\circ 25' 07''$   
 $R = 13,689.23'$   
 $L = 370.00'$   
 $E = 1.25'$   
 $\theta_{MAX} = NC$

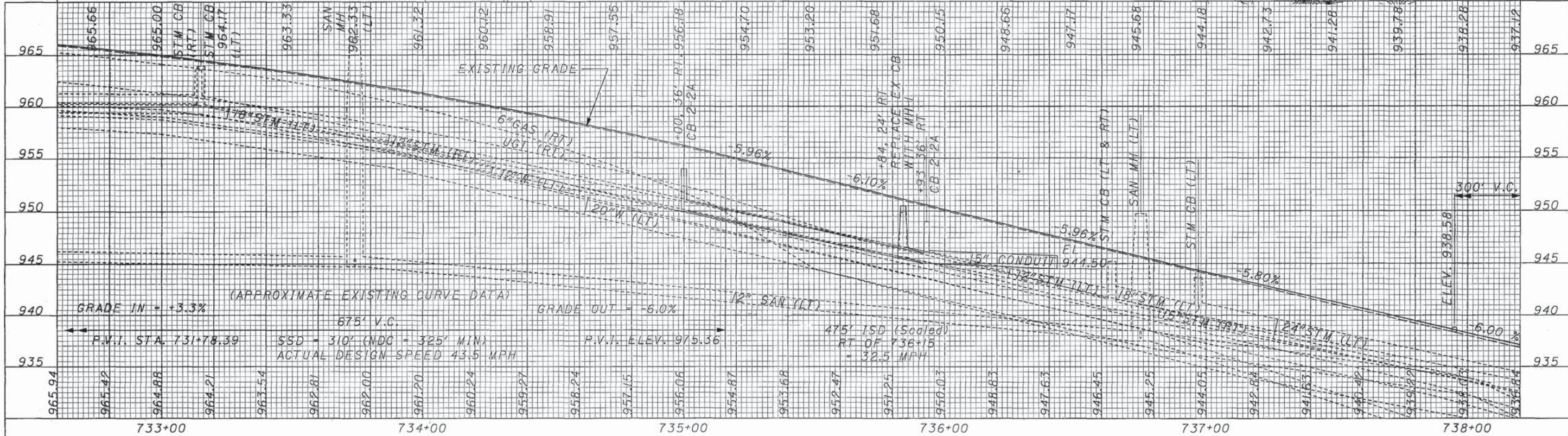


BM#6  
STA. 736+74.82,  
47.50' LT. "X" CUT ON  
S. RIM OF SAN. MH  
N/S SR 18 DC#2614  
EL. 948.87

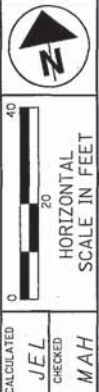
BM#6A  
STA. 736+76.62, 62.44' LT.  
1" STEEL ROD, 4' LONG  
DRIVEN FLUSH 40'± N. OF  
SR 18 DC#2613  
EL. 951.20

FOR STORM SEWER PROFILE  
SEE SHEET 55

NOTE: FOR INTERMEDIATE COURSE  
TAPER DETAILS SEE STD.  
DWG BP-3.1



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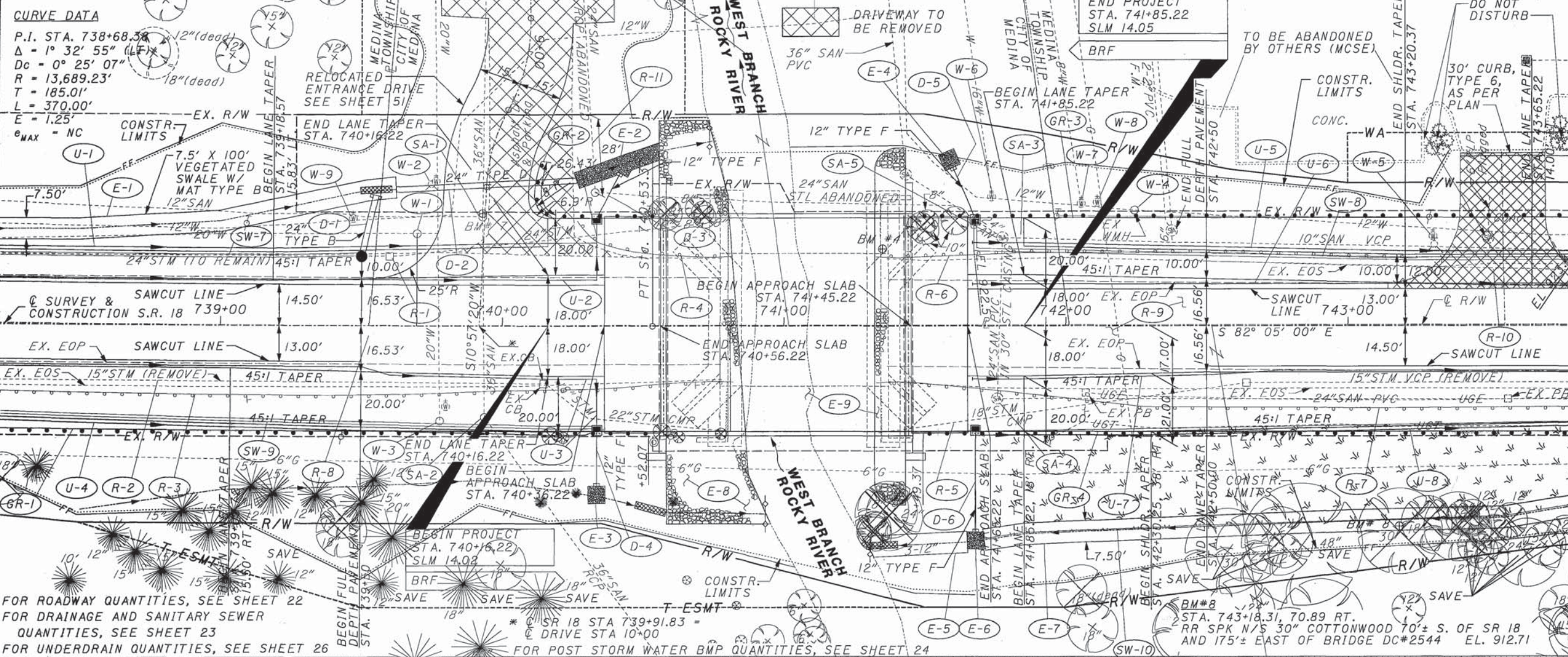
CALCULATED JEL  
CHECKED MAH

PLAN AND PROFILE  
STATION 732+60 TO STA. 738+20

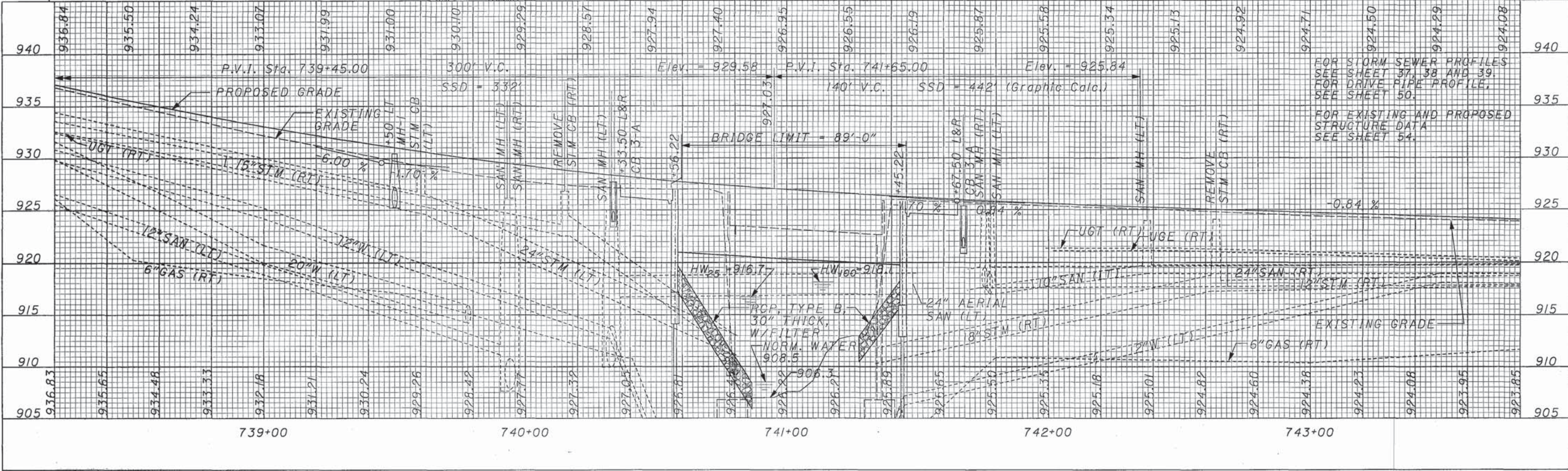
MED-18-14.00

MATCHLINE STA. 738+20 STATE ROUTE 18  
SEE SHEET 30

MATCHLINE STA. 743+80 STATE ROUTE 18  
SEE SHEET 32



FOR ROADWAY QUANTITIES, SEE SHEET 22  
 FOR DRAINAGE AND SANITARY SEWER QUANTITIES, SEE SHEET 23  
 FOR UNDERDRAIN QUANTITIES, SEE SHEET 26  
 FOR POST STORM WATER BMP QUANTITIES, SEE SHEET 24



SCALE IN FEET  
 HORIZONTAL  
 1\"/>

CALCULATED  
 JEL  
 CHECKED  
 MAH

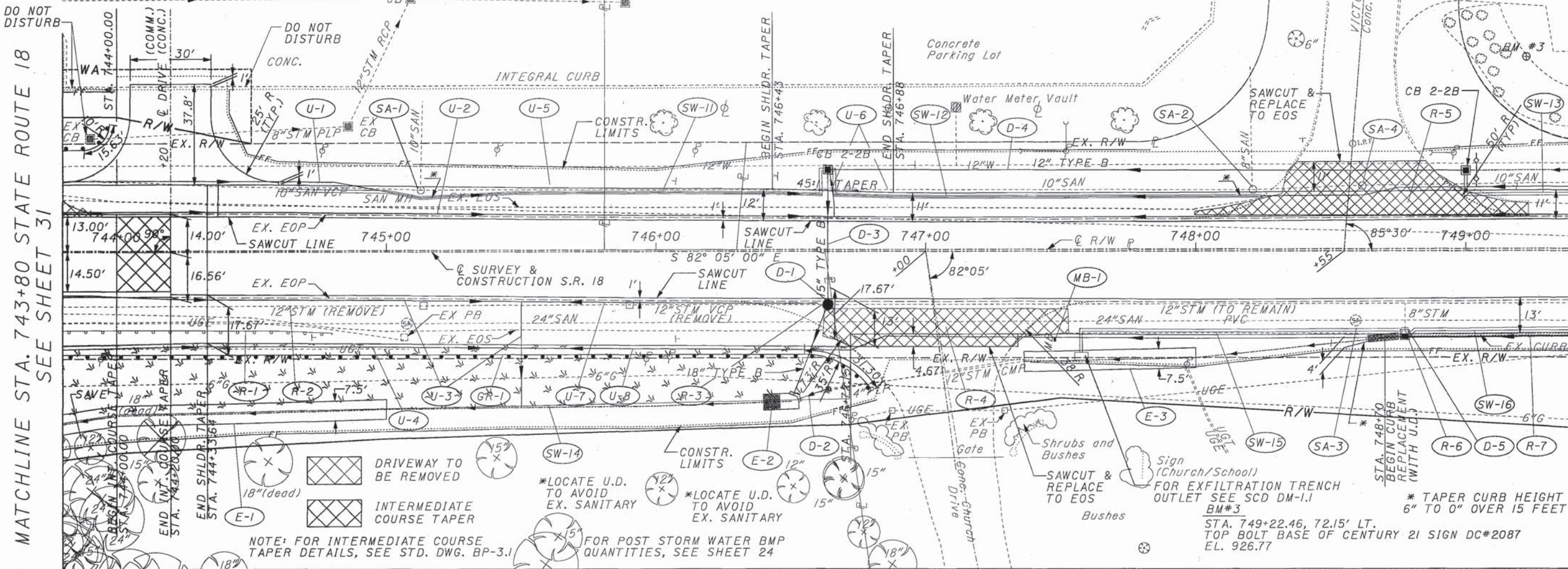
PLAN AND PROFILE  
 STA. 738+20 TO STA. 743+80

MED-18-14.00

31  
 81

D:\p\24512\cadd\pssht3.dgn 4-12-01

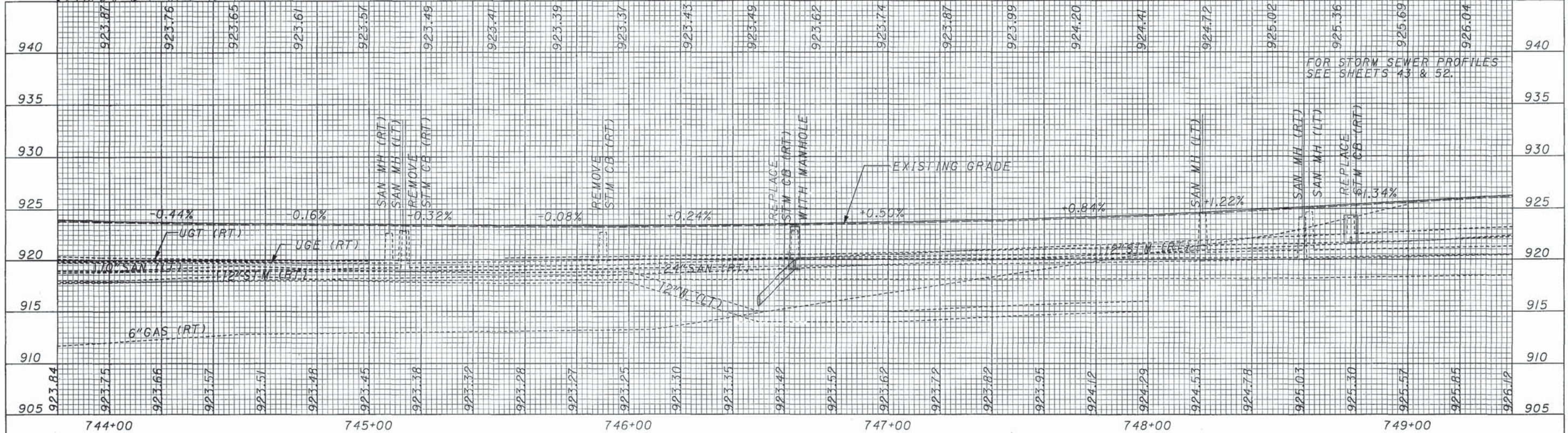
FOR ROADWAY QUANTITIES, SEE SHEET 22  
 FOR DRAINAGE AND SANITARY SEWER QUANTITIES, SEE SHEET 24  
 FOR UNDERDRAIN QUANTITIES, SEE SHEET 26



MATCHLINE STA. 743+80 STATE ROUTE 18  
SEE SHEET 31

MATCHLINE STA. 749+40 STATE ROUTE 18  
SEE SHEET 33

NOTE: FOR INTERMEDIATE COURSE TAPER DETAILS, SEE STD. DWG. BP-3.1  
 \*LOCATE U.D. TO AVOID EX. SANITARY  
 \*LOCATE U.D. TO AVOID EX. SANITARY  
 \*TAPER CURB HEIGHT 6" TO 0" OVER 15 FEET



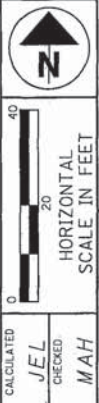
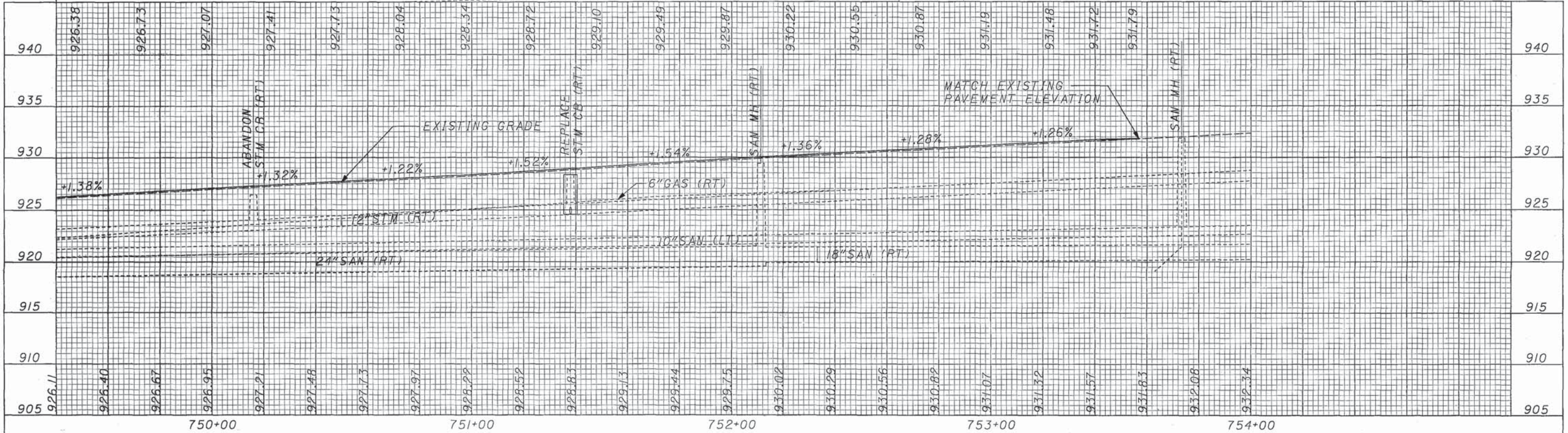
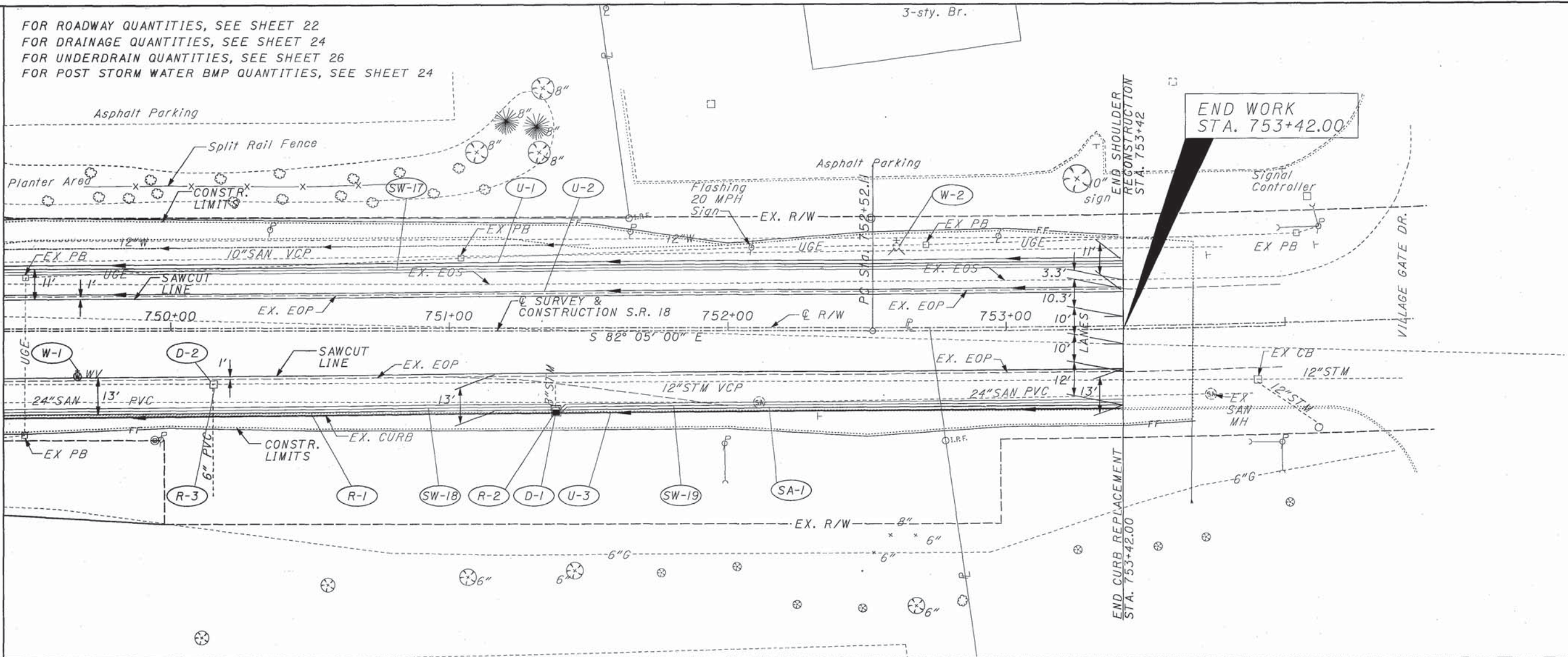
CALCULATED  
 JEL  
 CHECKED  
 MAH

**PLAN AND PROFILE**  
**STA. 743+80 TO STA. 749+40**

**MED-18-14.00**

MATCHLINE STA. 749+40 STATE ROUTE 18  
SEE SHEET 32

FOR ROADWAY QUANTITIES, SEE SHEET 22  
FOR DRAINAGE QUANTITIES, SEE SHEET 24  
FOR UNDERDRAIN QUANTITIES, SEE SHEET 26  
FOR POST STORM WATER BMP QUANTITIES, SEE SHEET 24

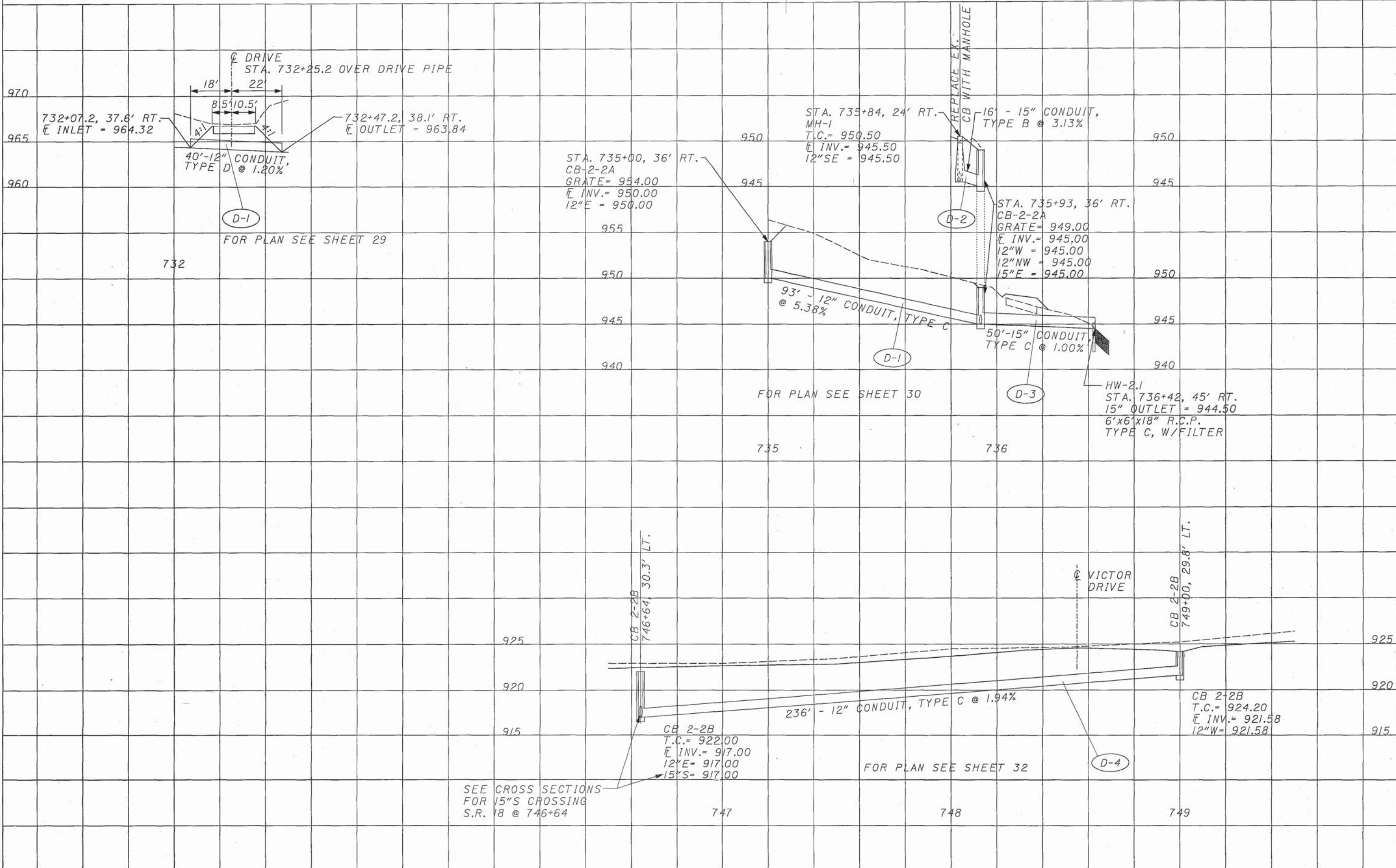


CALCULATED JEL  
CHECKED MAH

PLAN AND PROFILE  
STA. 749+40 TO STA. 754+00

MED-18-14.00

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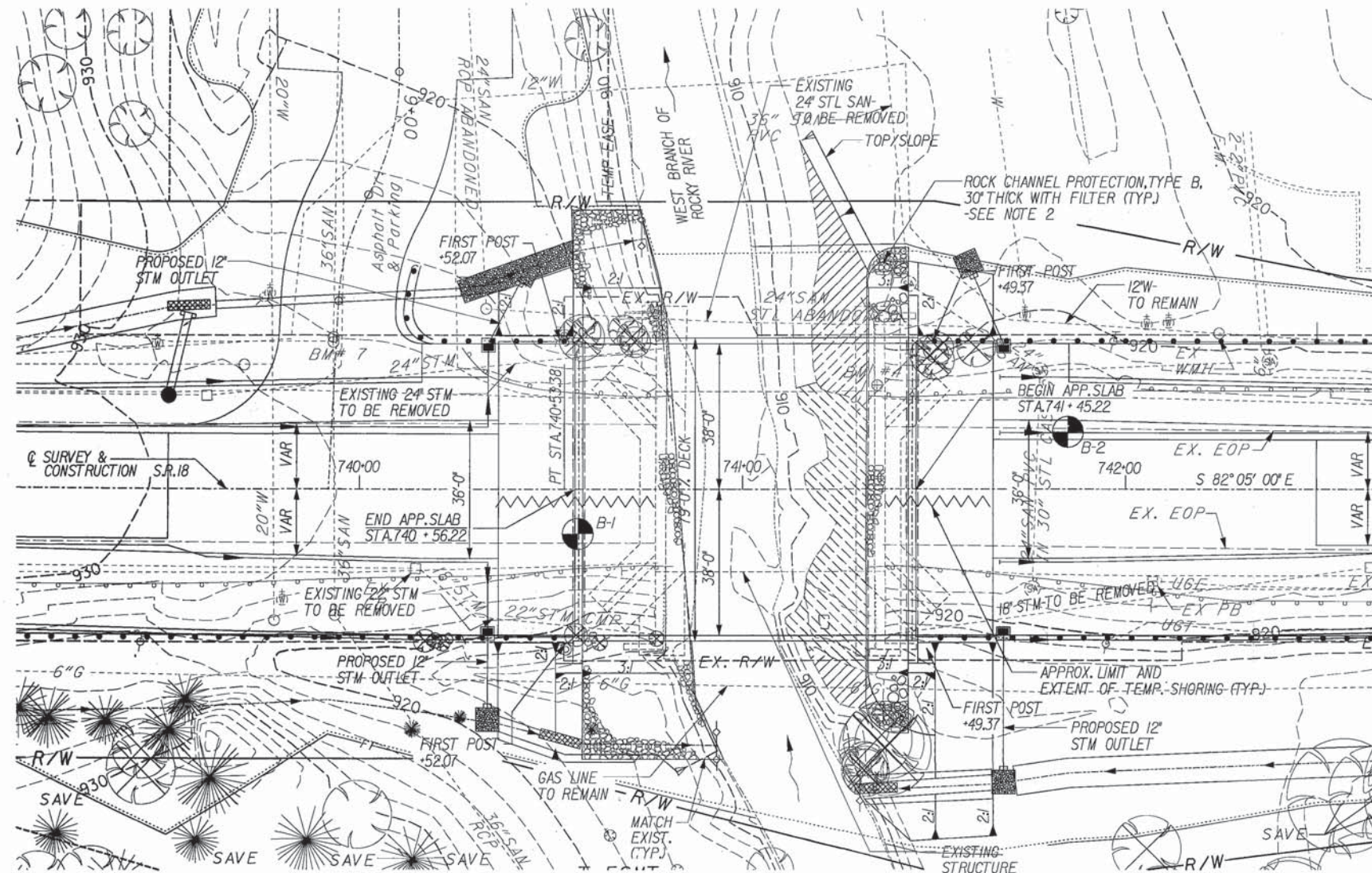


STORM SEWER & DRIVE PIPE PROFILES

MED -18 -14.00

D:\pr\24512\cadd\GX01.DGN 04-12-01





PLAN

NOTES:

1. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
2. INCLUDED WITH ROADWAY QUANTITIES FOR PAYMENT.

BENCHMARK DATA

B.M.\*4  
 USGS BENCHMARK \*60 CWL 1952  
 ELEV. 925.704  
 TOP OF TOP STEP OF NORTHEAST WINGWALL OF S.R.18 BRIDGE OVER WEST BRANCH ROCKY RIVER

B.M.\*6  
 STA. 736+74.82, 47.50' LT.  
 \*X CUT ON S. RIM OF SAN.  
 MH N/S SR 18 DC\*2614  
 EL. 948.87

LEGEND:

- INT = INTEGRAL
- VAR = VARIES
- BM = BENCHMARK
- FL = FLOWLINE ELEVATION
- EOP = EDGE OF PAVEMENT
- FOUNDATION INVESTIGATION BORING LOCATION
- EXCAVATE TO EL. 914.0
- GRADE TO DRAIN

HYDRAULIC DATA

DRAINAGE AREA: 21.11 SQ. MI. \*  
 Q25: 1720 CFS \*\*  
 V25: 3.1 FPS  
 HW25 EL.: 916.7  
 Q100: 2358 CFS \*  
 V100: 3.6 FPS  
 HW100 EL.: 918.2  
 \* DATA FROM FEMA FLOOD INSURANCE STUDY  
 \*\* DATA INTERPOLATED FROM FEMA FLOOD INSURANCE STUDY  
 SUPERSTRUCTURE CLEARS HW25 BY 2.9 FEET.

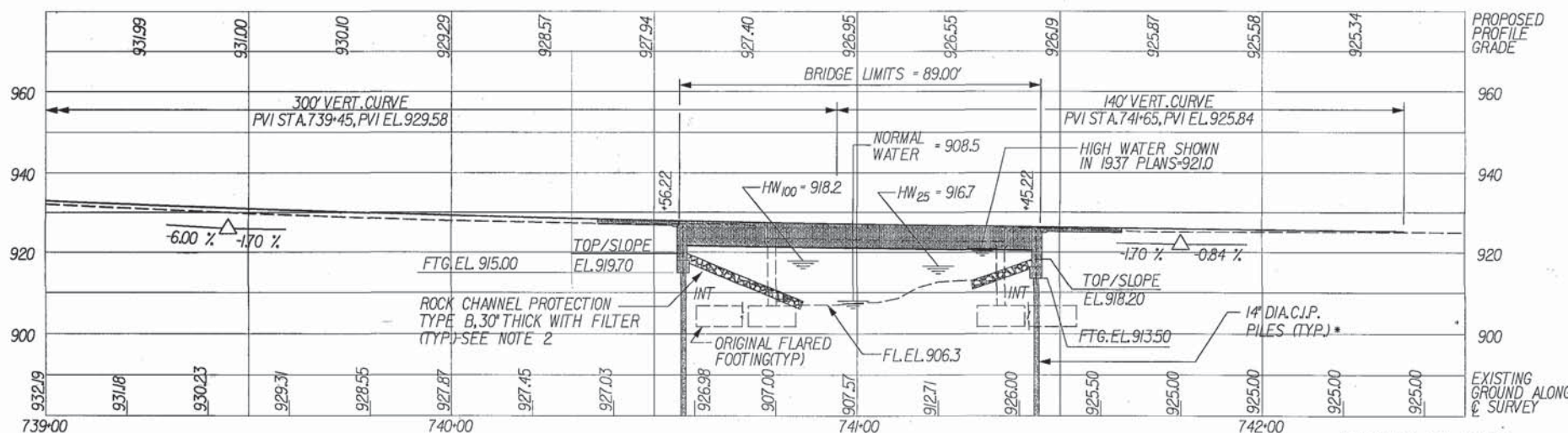
CURRENT ADT: 28100  
 DESIGN YEAR ADT (2021): 41400  
 DESIGN YEAR ADTT (2021): 3312

EXISTING STRUCTURE

TYPE: SINGLE SPAN REINFORCED CONCRETE BEAM WITH REINFORCED CONCRETE SLAB AND REINFORCED CONCRETE SUBSTRUCTURES  
 SPAN: 55'-0" (±) CLEAR  
 ROADWAY: 44'-0" (±) toe/toe PARAPET  
 ORIGINAL DESIGN LOADING: H-15-33  
 SKEW: NONE  
 WEARING SURFACE: ASPHALT CONCRETE  
 APPROACH SLABS: 25'-0" (±)  
 DATE BUILT: 1931, WIDENED IN 1937  
 S.F. NO.: 5200725

PROPOSED STRUCTURE

TYPE: SINGLE SPAN COMPOSITE PRESTRESSED I-GIRDERS WITH REINFORCED CONCRETE DECK AND INTEGRAL ABUTMENTS  
 SPAN: 87'-0" c/c BEARING  
 ROADWAY: 76'-0" toe/toe PARAPET  
 SKEW: NONE  
 WEARING SURFACE: MONOLITHIC CONCRETE  
 DESIGN LOADING: HS20-44 AND ALTERNATE MILITARY ALIGNMENT: TANGENT  
 APPROACH SLABS: 20'-0" (STD. DWG. AS-I-81)  
 CROWN: NORMAL (3/16" / FT)  
 LATITUDE: N 41° 08' 13" LONGITUDE: W 81° 49' 21"



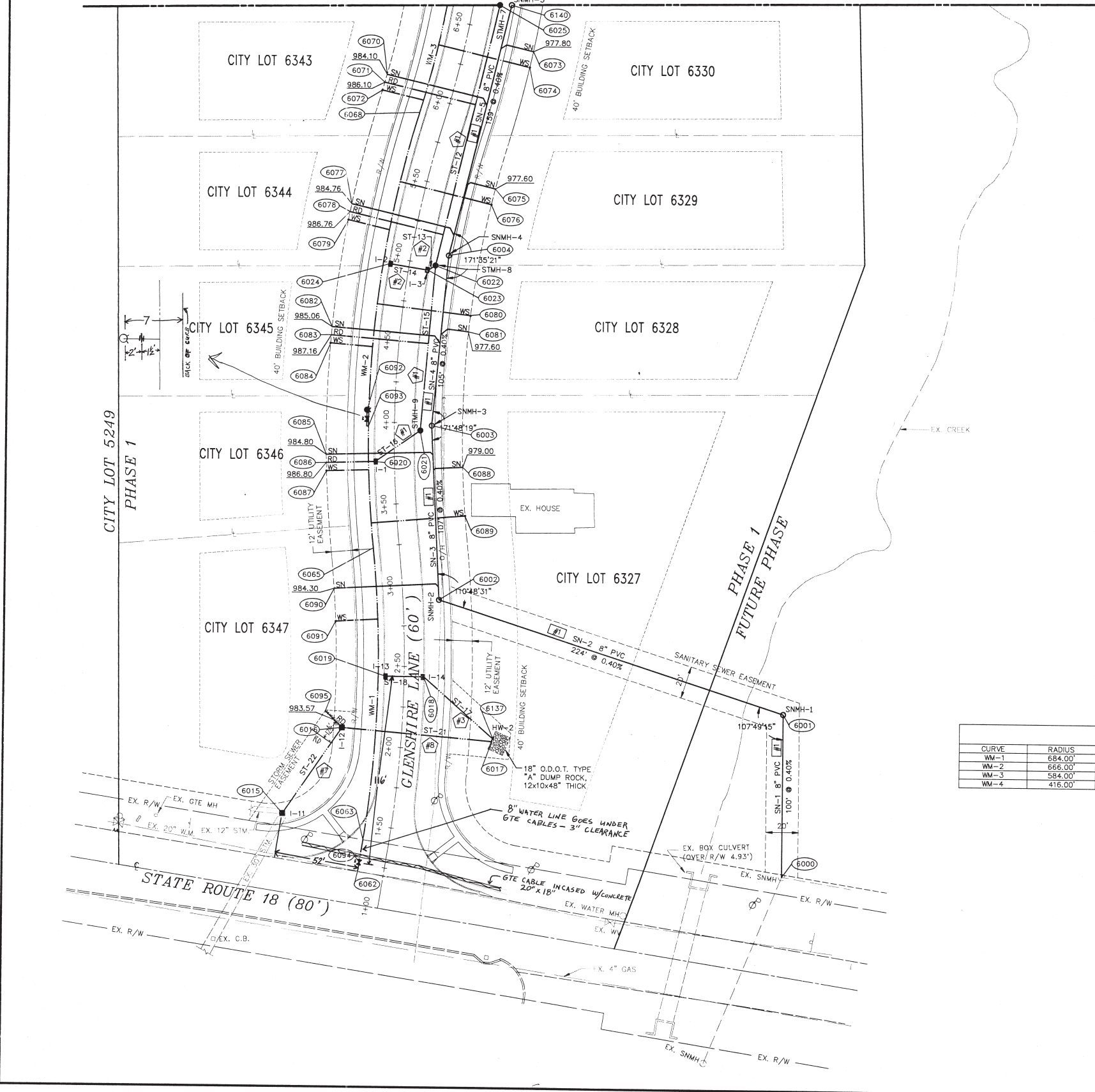
PROFILE ALONG C SURVEY & CONSTRUCTION

\* ESTIMATED PAY LENGTH  
 REAR ABUT. = 65 FEET  
 FORWARD ABUT. = 75 FEET

P:\PR24512\CADD\BRDGS\SHS\2005REV\MED18SP1.DGN

DESIGN AGENCY: BURGESS & NIPPLE  
 DATE: 7/2005  
 TAB: 5200733  
 DRAWN: AAA  
 CHECKED: DWR  
 MEDINA COUNTY  
 STA. 740+56.22  
 STA. 741+45.22  
 SITE PLAN  
 BRIDGE NO. MED-18-1403  
 OVER WEST BRANCH OF ROCKY RIVER  
 MED-18-14.00  
 1/15  
 57  
 81

MATCHLINE STA. 6+62.12 - SEE SHEET UP-2



- LEGEND:**
- PROPOSED GEOMETRIC POINT
  - SANITARY PROFILE NUMBER
  - STORM PROFILE NUMBER
  - ST-#** STORM NUMBER
  - SN-#** SANITARY NUMBER
  - EXISTING POWER POLE
  - EXISTING FIRE HYDRANT
  - EXISTING WATER VALVE
  - PROPOSED CURB STOP
  - PROPOSED CURB INLET (ROLLED CURB)
  - PROPOSED DOUBLE CURB INLET (ROLLED CURB)
  - PROPOSED INLET
  - PROPOSED STORM MANHOLE
  - PROPOSED SANITARY MANHOLE
  - PROPOSED WATER VALVE
  - PROPOSED HYDRANT
  - PROPOSED YARD DRAIN
  - PROPOSED HEADWALL
  - PROPOSED ROOF & FDN. DRAIN
  - PROPOSED STORM
  - PROPOSED SANITARY SERVICE
  - PROPOSED SANITARY
  - PROPOSED WATER SERVICE
  - PROPOSED 8" WATER MAIN
  - PROPOSED RIGHT OF WAY
  - PROPERTY LINE
  - PROPOSED LOT LINE
  - PROPOSED BUILDING SETBACK

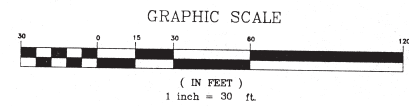
**NOTES:**

- CITY LOTS 6328 THROUGH 6330 WILL OUTLET ROOF/FOOTER DRAINS OUT THE BACK OF THE LOT.
- SEE SHEET ST-1 & ST-2 FOR STORM PROFILES.
- SEE SHEET SN-1 FOR SANITARY PROFILES.
- SEE SHEETS PF-1 - PF-3 FOR WATERMAIN PROFILES.
- SEE SHEET UP-3 FOR UTILITY POINT COORDINATES AND CURVE DATA.
- SEE SHEET GN-1 FOR GENERAL NOTES.

**WATERMAIN CURVE DATA**

CURVE	RADIUS	LENGTH	TANGENT	CHORD	BEARING	DELTA
WM-1	684.00'	180.49'	90.77'	179.96'	N 01°27'12" E	15°07'07"
WM-2	666.00'	256.03'	129.62'	254.46'	N 04°54'26" E	22°01'35"
WM-3	584.00'	67.97'	34.02'	67.93'	N 13°52'05" E	06°40'06"
WM-4	416.00'	165.21'	83.71'	164.13'	N 09°11'52" W	22°45'18"

SEWERAGE  
APPROVED  
AS INDICATED BY DATE OF  
LETTER OF APPROVAL  
HERE TO ATTACHED



**GPD ASSOCIATES**  
ENGINEERS ARCHITECTS PLANNER  
520 South Main Street, Suite 253  
Akron, Ohio 44311-1010  
216-434-4300 FAX 216-434-1333

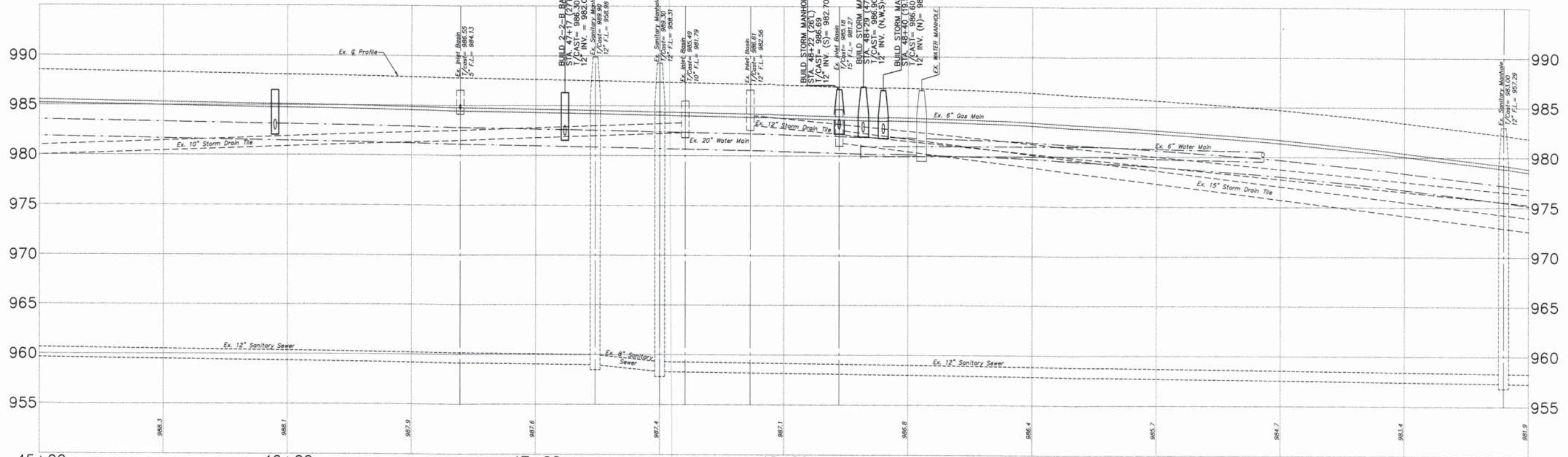
REV.	DATE	DESCRIPTION

**PHASE 1**  
**GLENSHIRE WOODS DEVELOPMENT**  
**MEDINA, OHIO**  
**PROPOSED UTILITY PLAN**

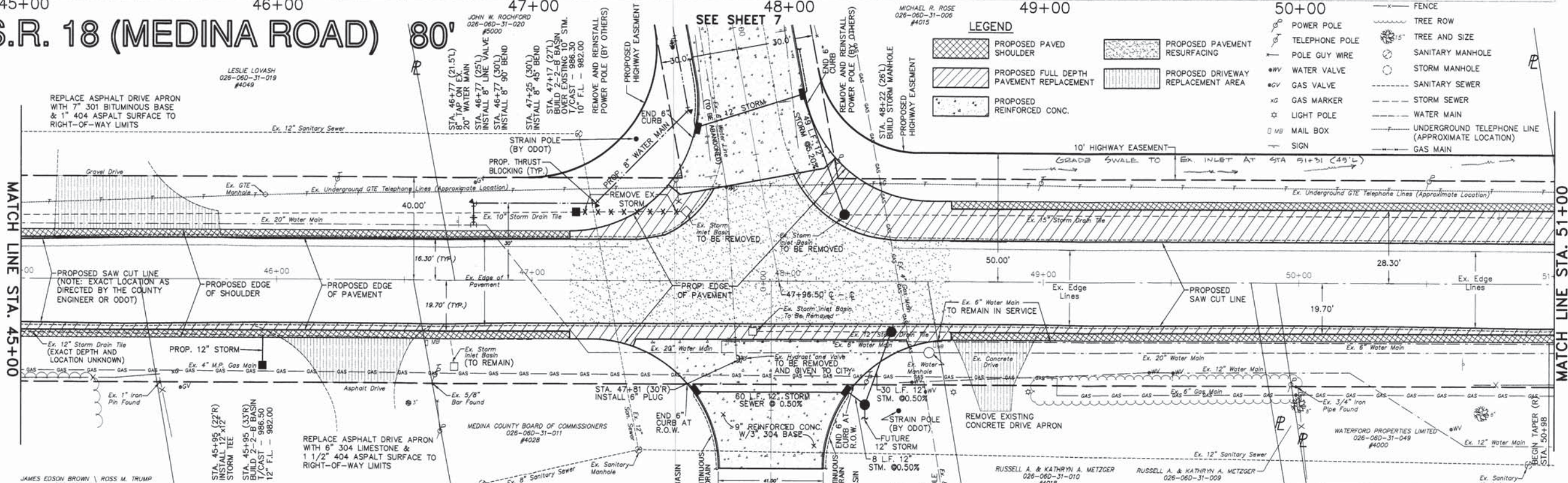
DESIGNED	DATE

JOB No.  
**9350**

**UP-1**



# S.R. 18 (MEDINA ROAD) 80'



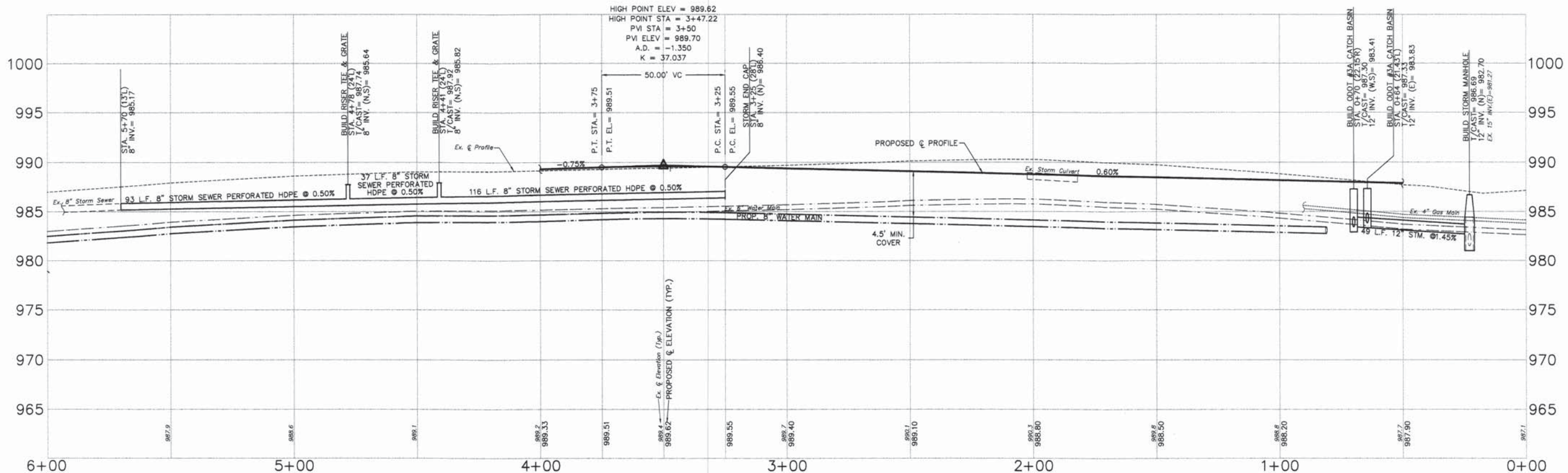
**LEGEND**

[Hatched Box]	PROPOSED PAVED SHOULDER	[Dotted Box]	PROPOSED PAVEMENT RESURFACING
[Diagonal Lines]	PROPOSED FULL DEPTH PAVEMENT REPLACEMENT	[Vertical Lines]	PROPOSED DRIVEWAY REPLACEMENT AREA
[Stippled Box]	PROPOSED REINFORCED CONC.	[Circle with X]	POWER POLE
[Circle with Dot]	TELEPHONE POLE	[Circle with Star]	WATER VALVE
[Circle with Triangle]	POLE GUY WIRE	[Circle with Square]	GAS VALVE
[Circle with Diamond]	WATER VALVE	[Circle with Triangle]	GAS MARKER
[Circle with Square]	GAS VALVE	[Circle with X]	LIGHT POLE
[Circle with Triangle]	GAS MARKER	[Circle with Diamond]	MAIL BOX
[Circle with X]	LIGHT POLE	[Circle with Star]	SIGN
[Circle with Diamond]	MAIL BOX	[Circle with Triangle]	SANITARY MANHOLE
[Circle with Star]	SIGN	[Circle with Square]	STORM MANHOLE
[Circle with Triangle]	SANITARY MANHOLE	[Circle with Diamond]	SANITARY SEWER
[Circle with Square]	STORM MANHOLE	[Circle with Star]	STORM SEWER
[Circle with Diamond]	SANITARY SEWER	[Circle with Triangle]	WATER MAIN
[Circle with Star]	STORM SEWER	[Circle with Square]	UNDERGROUND TELEPHONE LINE (APPROXIMATE LOCATION)
[Circle with Triangle]	WATER MAIN	[Circle with Diamond]	GAS MAIN

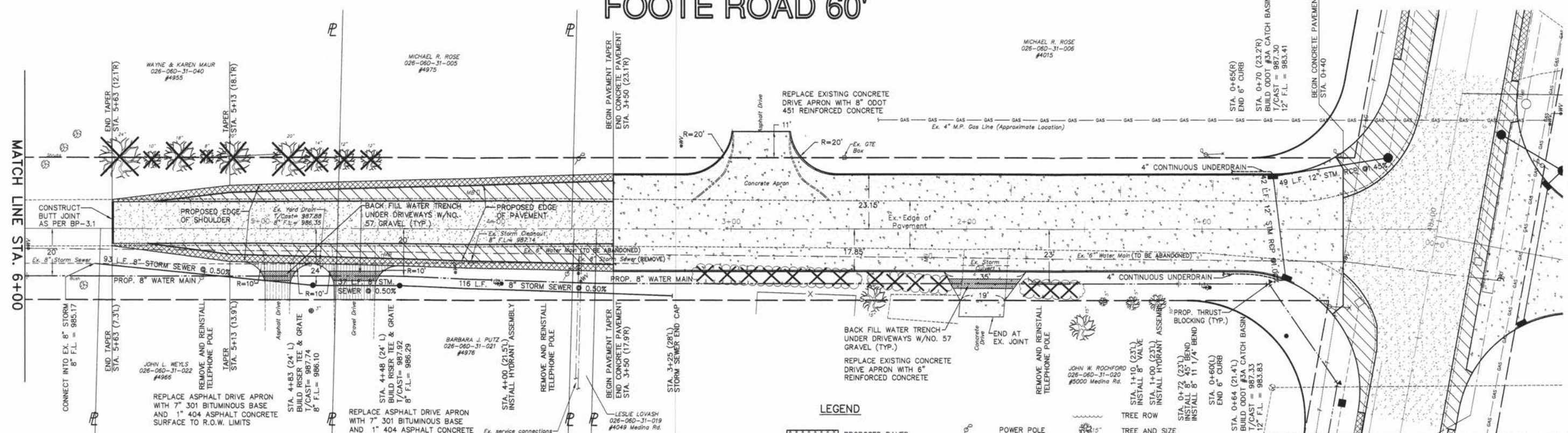
**NOTE:**  
 CONTRACTOR TO REMOVE AND REPLACE OR RELAY ALL CULVERTS, MAILBOXES, STREET SIGNS, ETC. TO THEIR EXISTING CONDITION OR BETTER. ALL MANHOLES, VALVE BOXES, ETC. WITHIN PROJECT AREA TO BE ADJUSTED TO PROPER GRADE.



<b>REVISION RECORD</b> NO. DATE BY 1 05/12/99 RSR 2 05/12/99 SDP 3 05/12/99 SDP 4 05/12/99 SDP 5 05/12/99 SDP			
<b>IMPROVEMENT PLANS FOR</b> <b>S.R. 18 / FOOTE ROAD</b> TOWNSHIP OF MEDINA COUNTY OF MEDINA <b>STATE ROUTE 18</b> PLAN AND PROFILE <b>CUNNINGHAM &amp; ASSOCIATES, INC.</b> CIVIL ENGINEERING AND SURVEYING 203 W. LIBERTY ST. MEDINA, OHIO 44226 725-5880			
DRAWN BY: <b>RSR &amp; SDP</b>	DATE: <b>05/12/99</b>	SCALE: PLAN-1"=20' PROFILE-Horz. 1"=20' Vert. 1"=5'	
ACAD FILE No. <b>M:\99-112\99112PP2</b>	PROJECT No. <b>99-112</b>	SHEET No. <b>5 OF 19</b>	



# FOOTE ROAD 60'



### NOTES:

- CONTRACTOR TO REMOVE AND REPLACE OR RELAY ALL CULVERTS, MAILBOXES, STREET SIGNS, ETC. TO THEIR EXISTING CONDITION OR BETTER. ALL MANHOLES, VALVE BOXES, ETC. WITHIN PROJECT AREA TO BE ADJUSTED TO PROPER GRADE.
- ALL EXISTING WATER SERVICE CONNECTIONS TO BE CONNECTED TO PROPOSED 8" WATER MAIN AS DIRECTED BY THE CITY OF MEDINA.
- CONTRACTOR WILL BE REQUIRED TO MAINTAIN WATER SERVICE TO ALL EXISTING WATER USERS AFFECTED BY THIS INSTALLATION AT ALL TIMES, EXCEPTING THAT SHORT PERIOD OF TIME WHEN THE CUSTOMERS INDIVIDUAL WATER LATERAL IS BEING TRANSFERRED TO THE NEW 8" WATER MAIN.
- LATERALS FOR #4955 AND #4956 FOOTE ROAD TO REMAIN ON 6" LINE.
- LATERALS TO BE TRANSFERRED FOR #4049 AND #4099 MEDINA ROAD, AND #4966, #4976, AND #5000 FOOTE ROAD. 5 TOTAL LATERALS TRANSFERRED.

### LEGEND

	PROPOSED PAVED SHOULDER		POWER POLE		TREE ROW
	PROPOSED FULL DEPTH PAVEMENT REPLACEMENT		TELEPHONE POLE		TREE TO BE REMOVED
	PROPOSED PAVEMENT RESURFACING		WATER VALVE		SANITARY MANHOLE
	PROPOSED DRIVEWAY REPLACEMENT AREA		GAS VALVE		STORM MANHOLE
	PROPOSED REINFORCED CONC.		GAS MARKER		CATCH BASIN
			LIGHT POLE		SANITARY SEWER
			MAIL BOX		STORM SEWER
			SIGN		WATER MAIN
			FENCE		UNDERGROUND TELEPHONE LINE (APPROXIMATE LOCATION)
					GAS MAIN

REVISION RECORD  
 INITIALS  
 DATE  
 DESCRIPTION

IMPROVEMENT PLANS FOR  
**S.R. 18 / FOOTE ROAD**  
 TOWNSHIP OF MEDINA  
 COUNTY OF MEDINA  
**FOOTE ROAD**  
 PLAN AND PROFILE  
**CUNNINGHAM & ASSOCIATES, INC.**  
 CIVIL ENGINEERING and SURVEYING  
 203 W. LIBERTY ST., MEDINA, OHIO 44259 725-5690

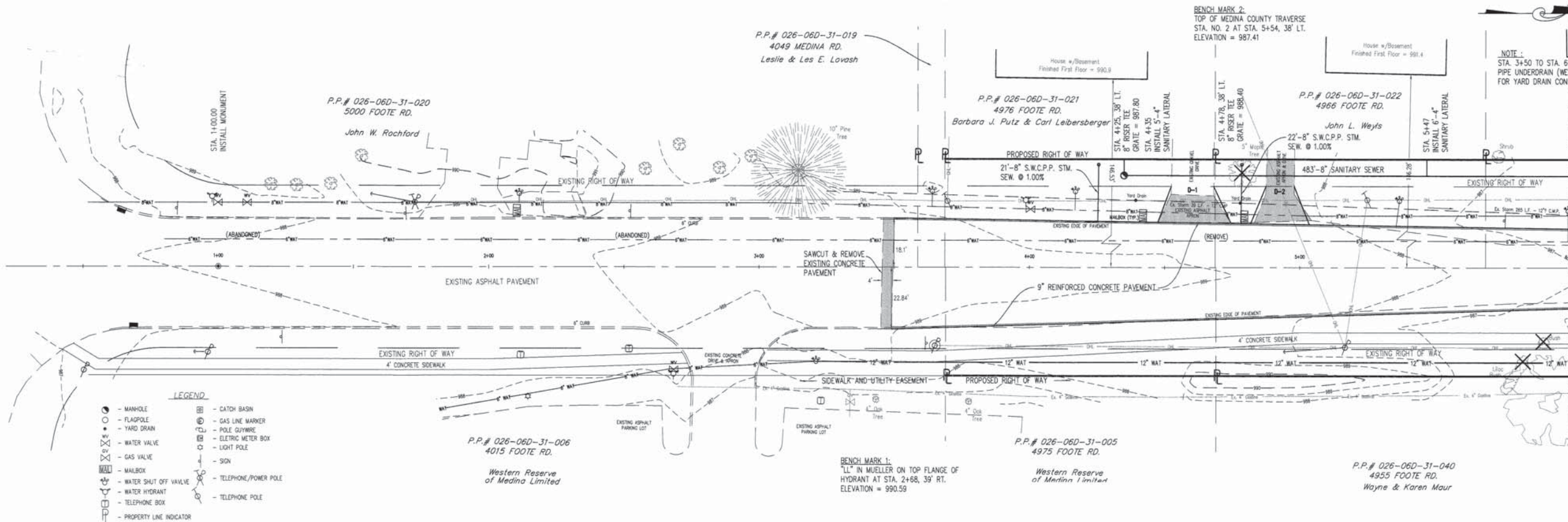
DRAWN BY: S.J.H. DATE: 05/12/99 SCALE: PLAN-1"=20' PROFILE-Horz. 1"=20' Vert. 1"=5'  
 ACAD FILE No. M:\99-112\99112PP4 PROJECT No. 99-112 SHEET No. 7 OF 19

BEGINNING STATION 0+00

MEDINA ROAD

S.R. 18

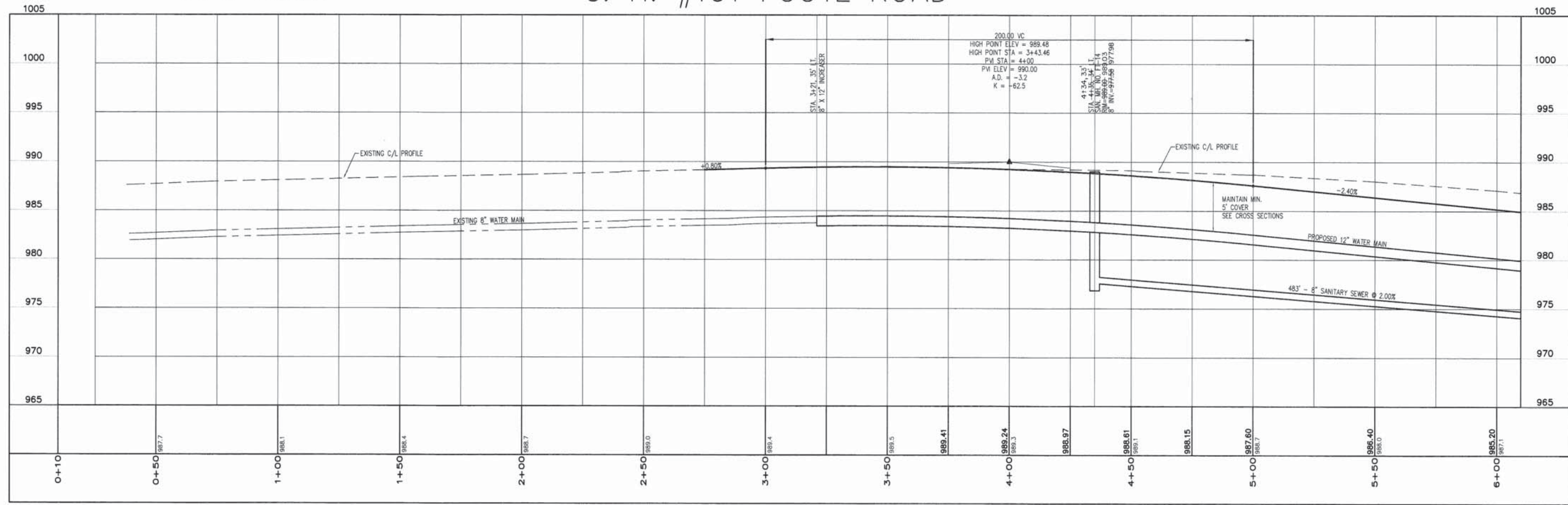
MATCHLINE STATION 6+00



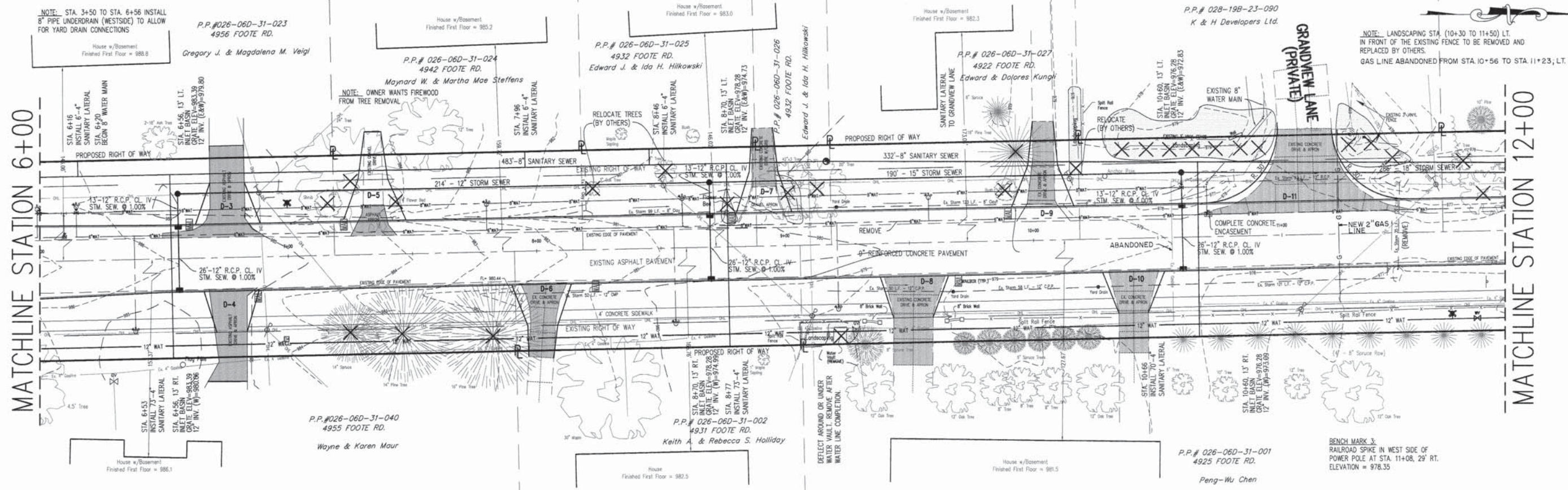
**LEGEND**

○	MANHOLE	□	CATCH BASIN
○	FLAGPOLE	○	GAS LINE MARKER
○	YARD DRAIN	○	POLE GUYWIRE
○	WATER VALVE	○	ELECTRIC METER BOX
○	GAS VALVE	○	LIGHT POLE
○	MALBOX	○	PHONE
○	WATER SHUT OFF VALVE	○	TELEPHONE/POWER POLE
○	WATER HYDRANT	○	TELEPHONE POLE
○	TELEPHONE BOX		
○	PROPERTY LINE INDICATOR		
---	12" WAT	---	12" WATER LINE
---	8" WAT	---	8" WATER LINE
---	6" WAT	---	6" WATER LINE
---	OHL	---	OVERHEAD LINE
---		---	EXISTING STORM SEWER

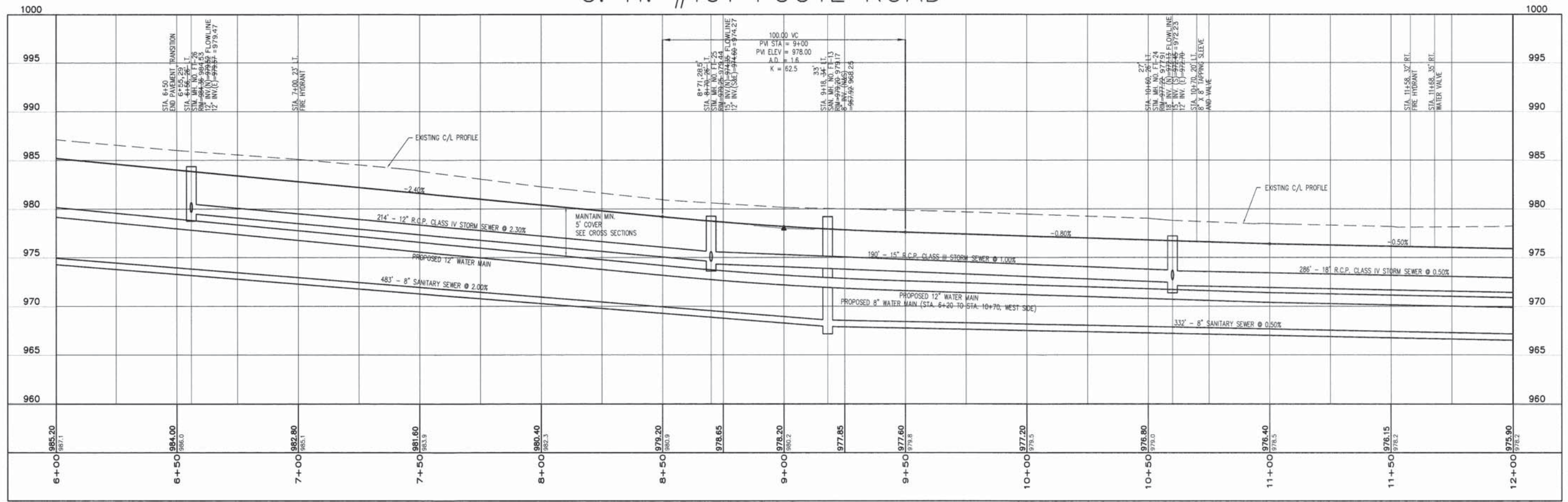
C. H. #191 FOOTE ROAD



- SURVEYING AND DRAFTING BY - <b>LEWIS LAND PROFESSIONALS INC.</b>		PROJECT: <b>C. H. #191 FOOTE ROAD IMPROVEMENTS</b>		SCALES: <b>HORIZONTAL 1"=20', VERTICAL 1"=5'</b>		DATE: <b>8/2/01</b>	
CIVIL ENGINEERING LAND SURVEYING 1219 HIGH STREET SUITE 108 WADSWORTH, OH 44281 (330) 335-8232		TITLE: <b>PLAN &amp; PROFILE: STATION 0+00 TO 6+00</b>		DRAWING FILE: <b>01-060.dwg</b>		PROJECT NUMBER: <b>01-060</b>	
REVISION TABLE 2-17-06 "AS BUILTS" W.P.S.		M.C.S.E. NUMBER: <b>500/10-66</b>		SHEET NUMBER: <b>4 of 42</b>			



### C. H. #191 FOOTE ROAD



— SURVEYING AND DRAFTING BY —  
**LEWIS LAND PROFESSIONALS INC.**  
 CIVIL ENGINEERING LAND SURVEYING  
 1219 HIGH STREET SUITE 108  
 WADSWORTH, OH 44281 (330) 335-8232

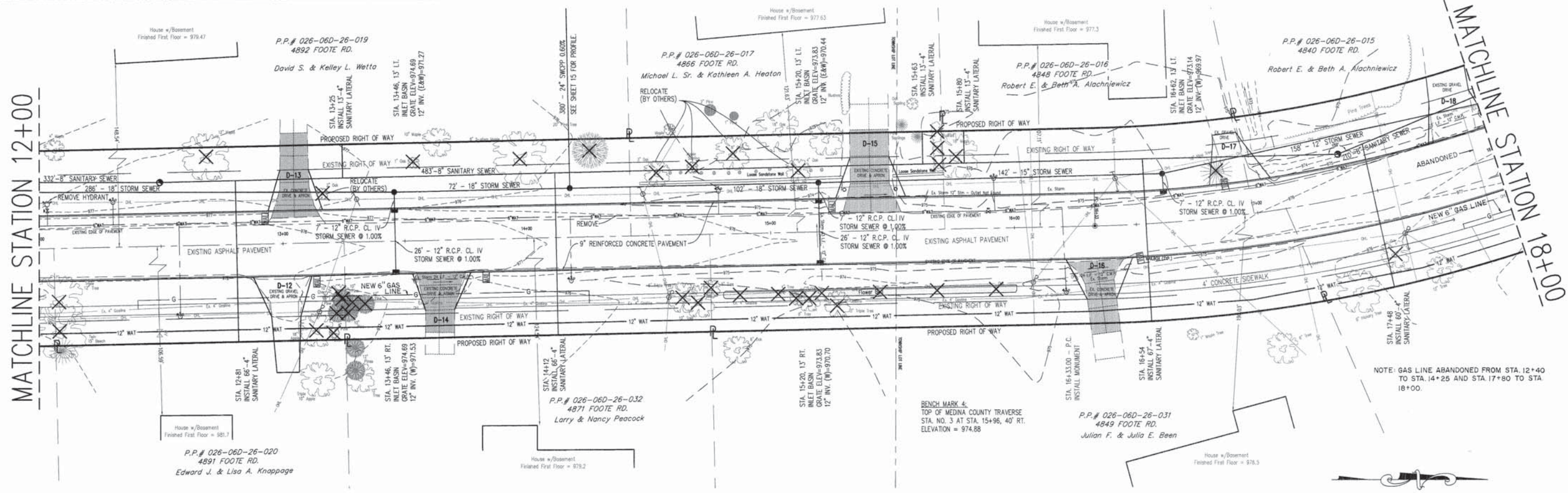
REVISION TABLE			
NO.	DATE	DESCRIPTION	BY
2-18-05		"AS BUILTS"	W.P.S.

PROJECT: **C. H. #191 FOOTE ROAD IMPROVEMENTS**  
 TITLE: **PLAN & PROFILE: STATION 6+00 TO 12+00**

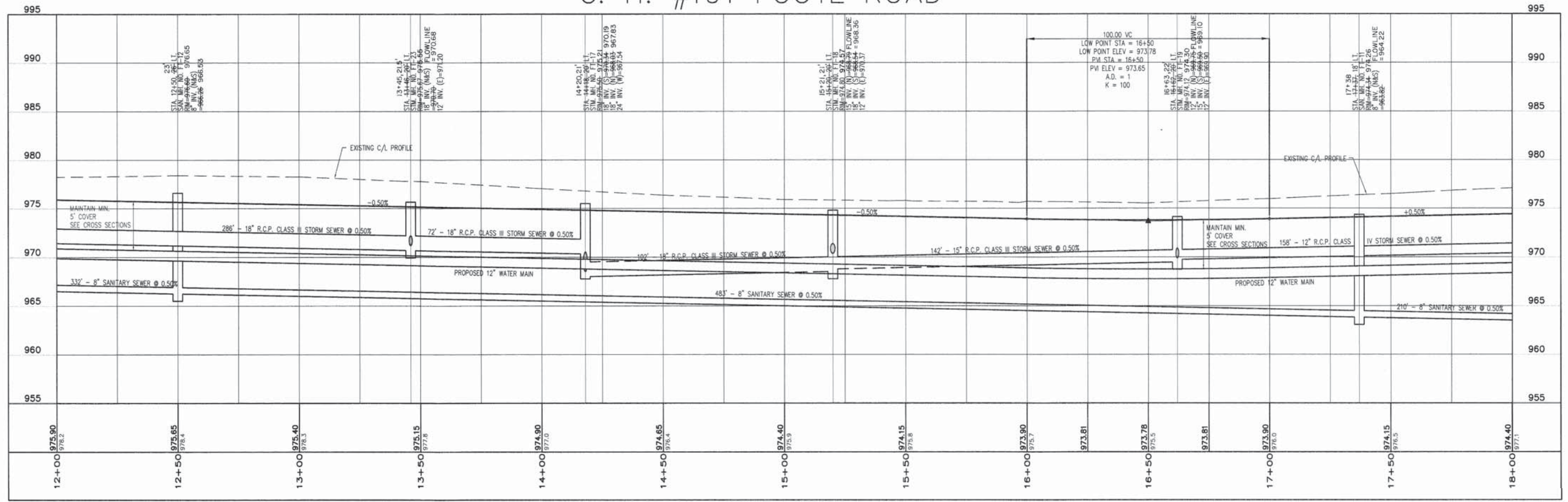
SCALES: **HORIZONTAL 1"=20', VERTICAL 1"=5'**  
 DRAWING FILE: **01-060.DWG**  
 M.C.S.E. NUMBER: **500/10-66**  
 DATE: **8/2/01**  
 PROJECT NUMBER: **01-060**  
 SHEET NUMBER: **5 of 42**

MATCHLINE STATION 12+00

MATCHLINE STATION 18+00



### C. H. #191 FOOTE ROAD



— SURVEYING AND DRAFTING BY —  
**LEWIS LAND PROFESSIONALS INC.**  
 CIVIL ENGINEERING LAND SURVEYING  
 1219 HIGH STREET SUITE 108  
 WADSWORTH, OH 44281 (330) 335-8232

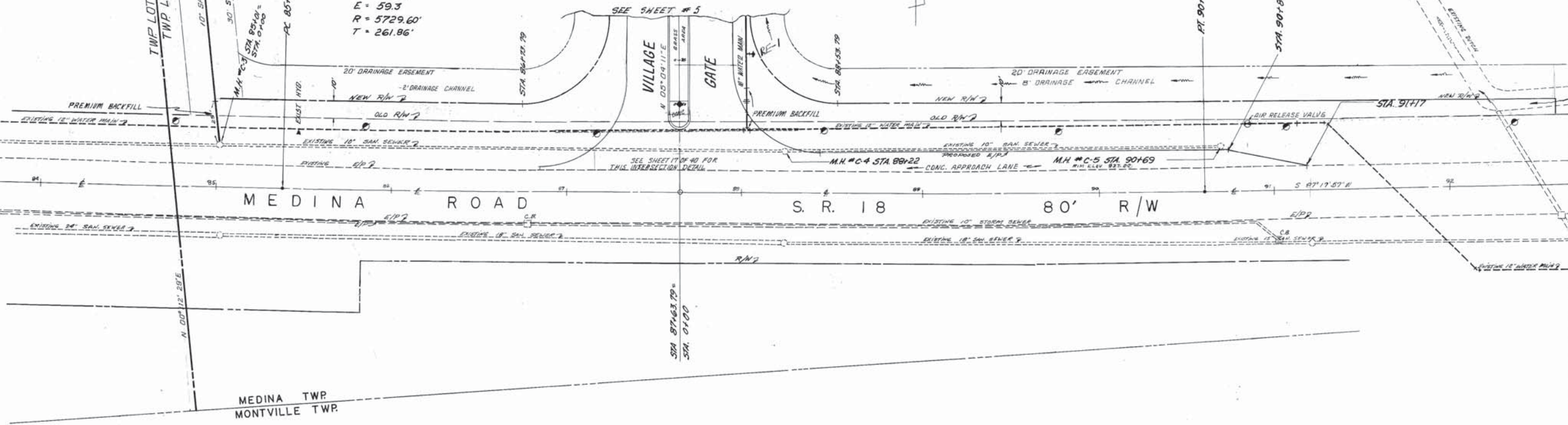
REVISION TABLE			
NO.	DATE	DESCRIPTION	BY
2-19-05		"AS BUILT"	W.P.S.

PROJECT: **C. H. #191 FOOTE ROAD IMPROVEMENTS**  
 TITLE: **PLAN & PROFILE: STATION 12+00 TO 18+00**

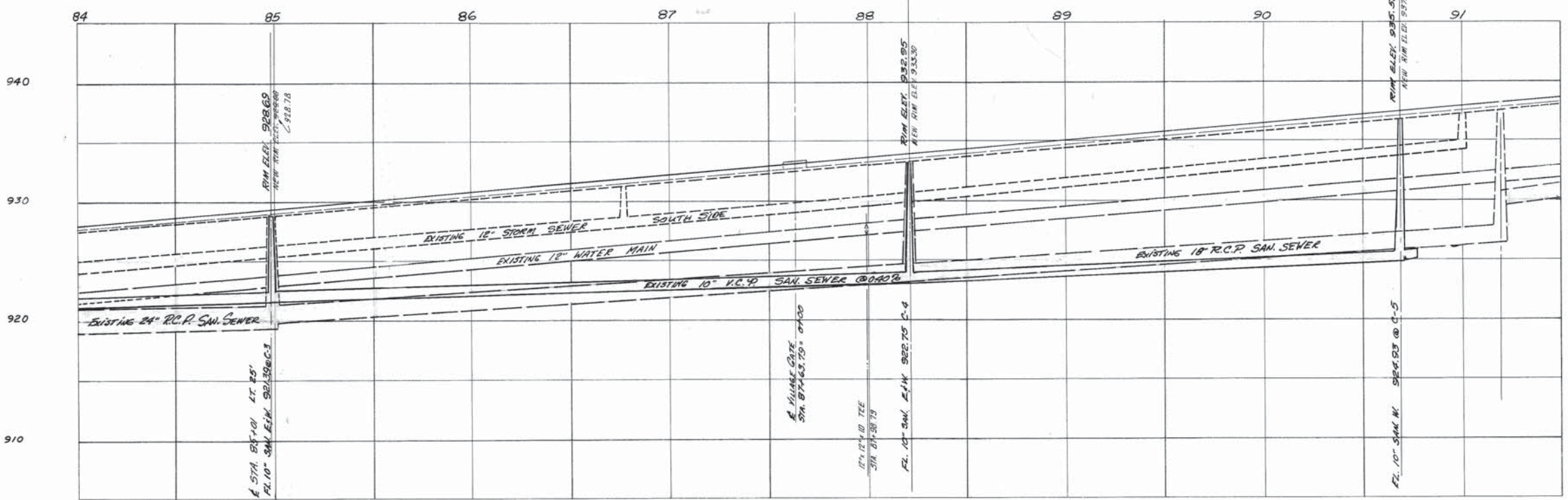
SCALES: **HORIZONTAL 1"=20', VERTICAL 1"=5'**  
 DRAWING FILE: **01-060.DWG**  
 M.C.S.E. NUMBER: **500/10-66**  
 DATE: **8/2/01**  
 PROJECT NUMBER: **01-060**  
 SHEET NUMBER: **6 of 42**

SEE SHEET #3

S.R. #18 & CURVE DATA  
Δ = 5°14' LT.  
D = 1°-00'  
L = 523.33'  
E = 59.3  
R = 5729.60'  
T = 261.86'



PLAN & PROFILE  
SCALE  
HORZ. 1"=30'  
VERT. 1"=5'



SR.#18 MEDINA RD.  
84+00 — 91+50  
"AS BUILT" 7-23-80  
2-20-80

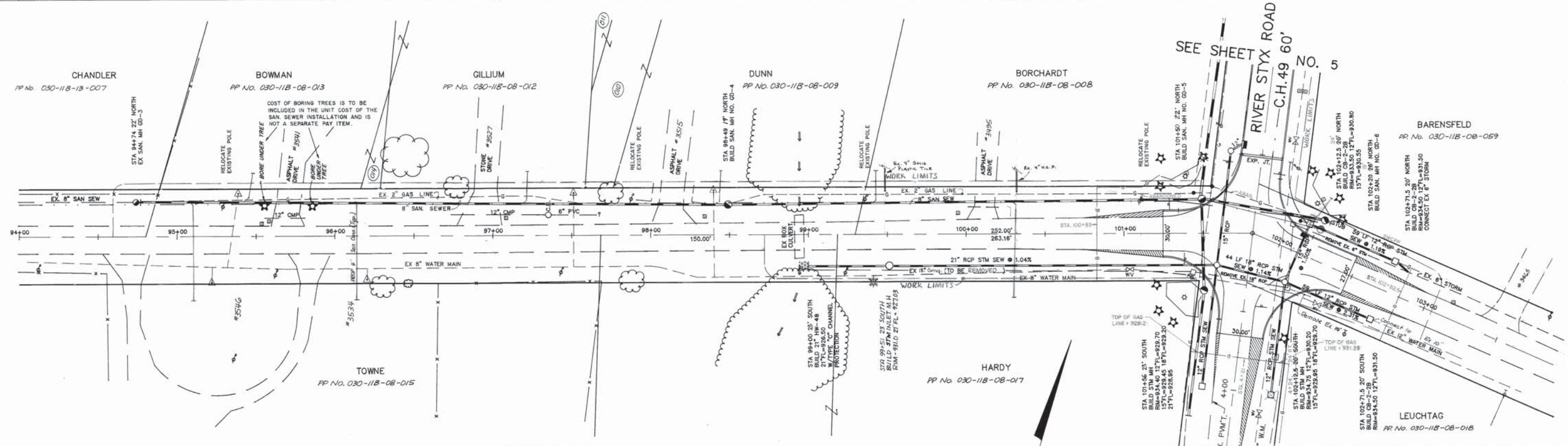
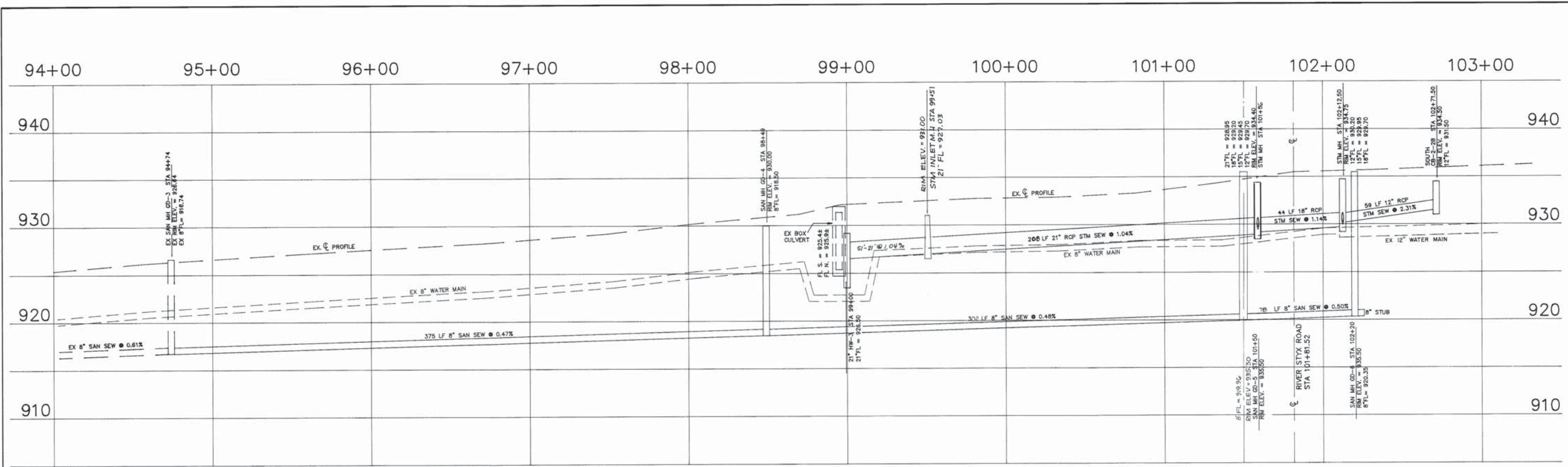
RECEIVED  
FEB 29 1980  
COUNTY ENGINEER

**SANTEE ASSOCIATES**  
• Consulting Engineers  
• Civil Engineers • Surveyors  
Medina, Ohio 725-4981



BRUNING 44-550 25867.1 PL.





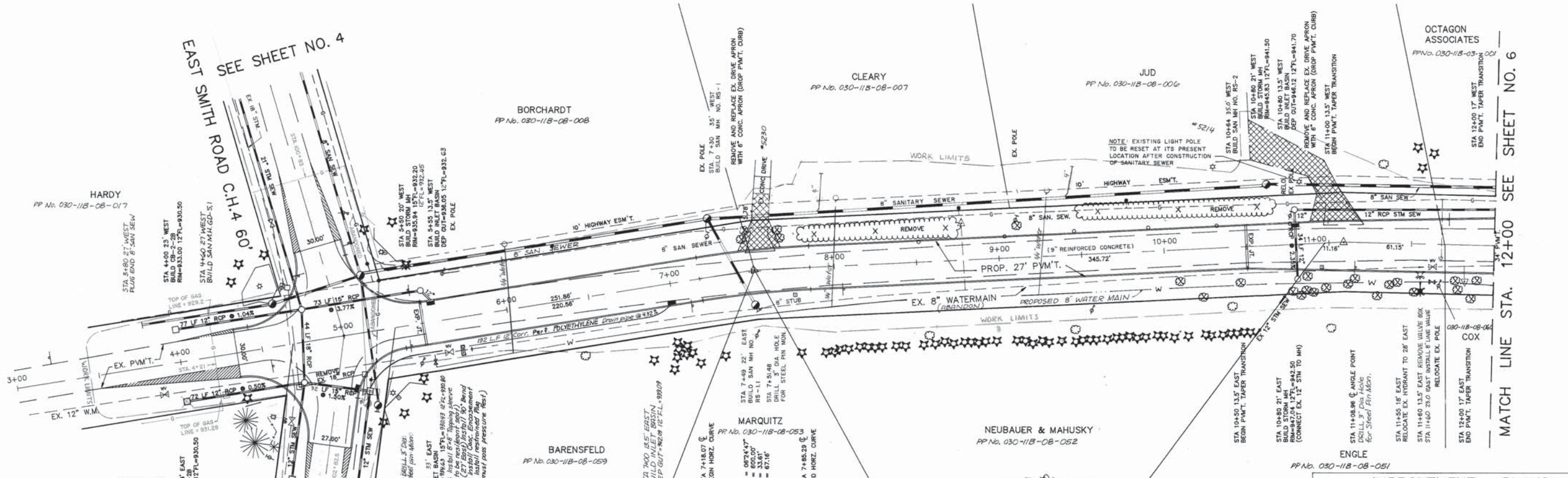
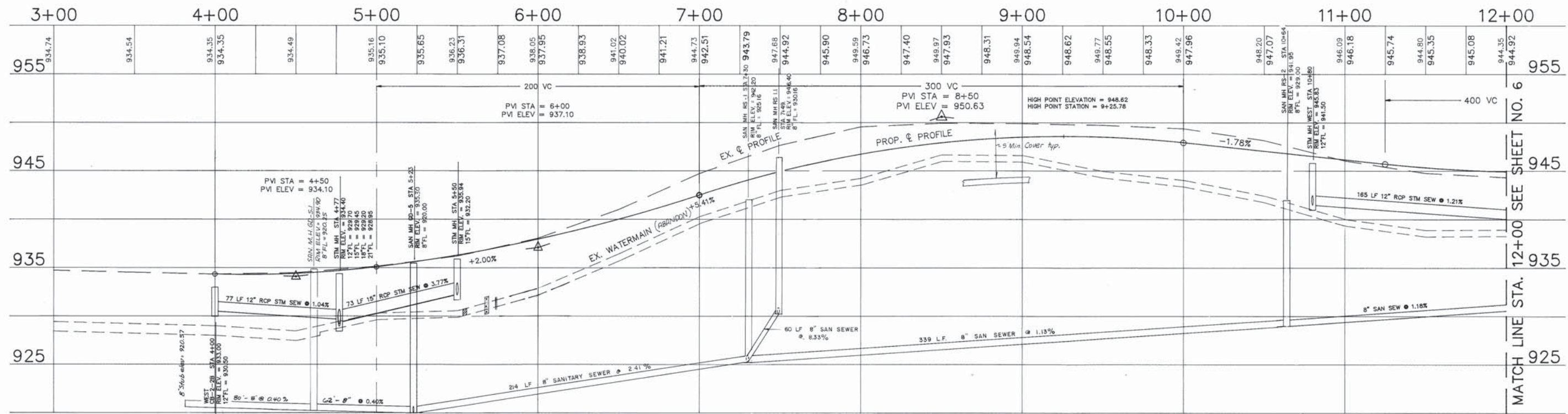
EAST SMITH ROAD C.H.4 60'

**IMPROVEMENT PLANS**  
FOR  
**RIVER STYX ROAD C.H. 49**  
IN  
MONTVILLE TWP. MEDINA COUNTY

*ROLLING, HOCEVAR & ASSOCIATES INC.*

CIVIL ENGINEERING SURVEYING  
251 1/2 SOUTH COURT STREET  
MEDINA, OHIO (216)723-1828

SCALES: PLAN 1"=30'	PROFILE HORIZ. 1"=30', VERT. 1"=5'
REVISIONS: 2-9-94 "AS BUILT"	PROJECT NO. 20,203 SHEET NUMBER 4 OF 18

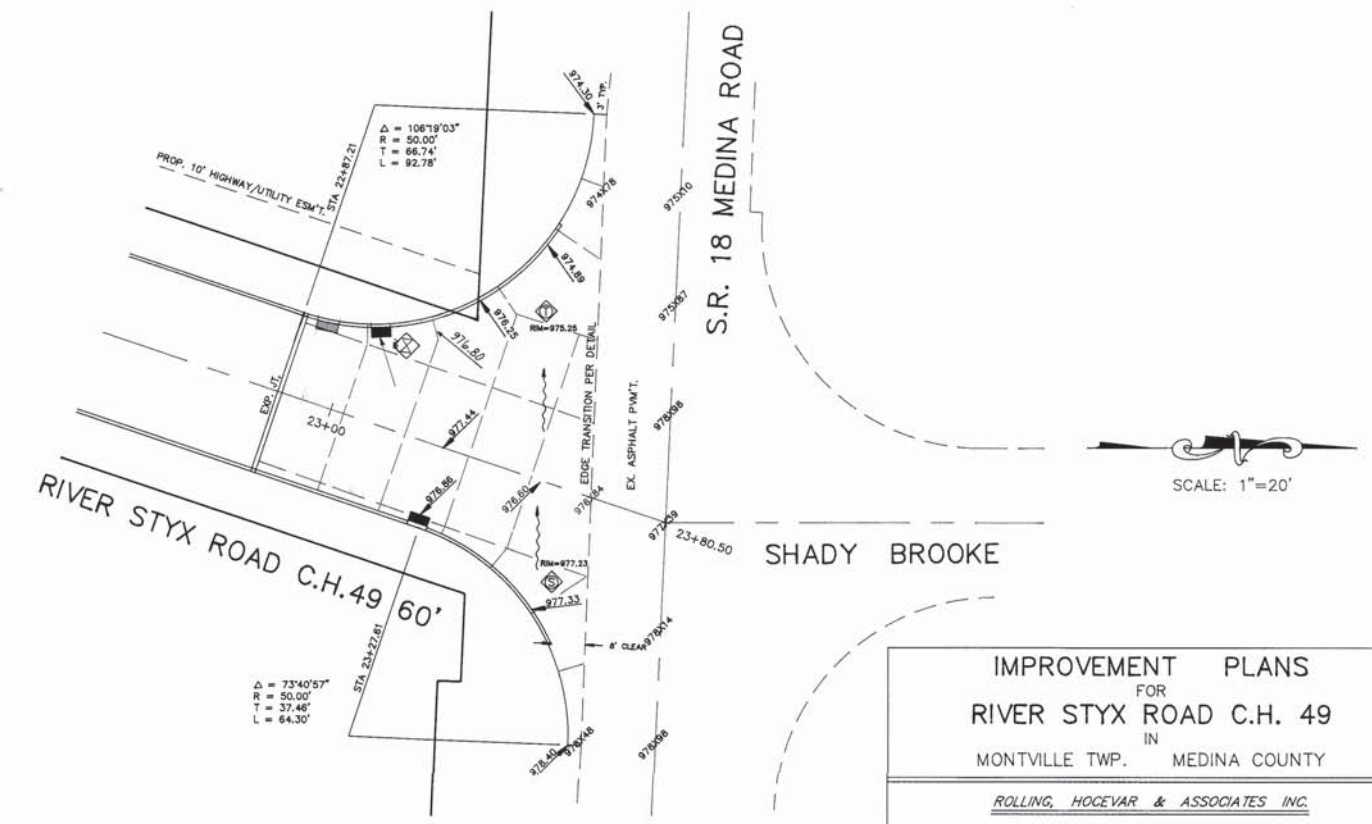
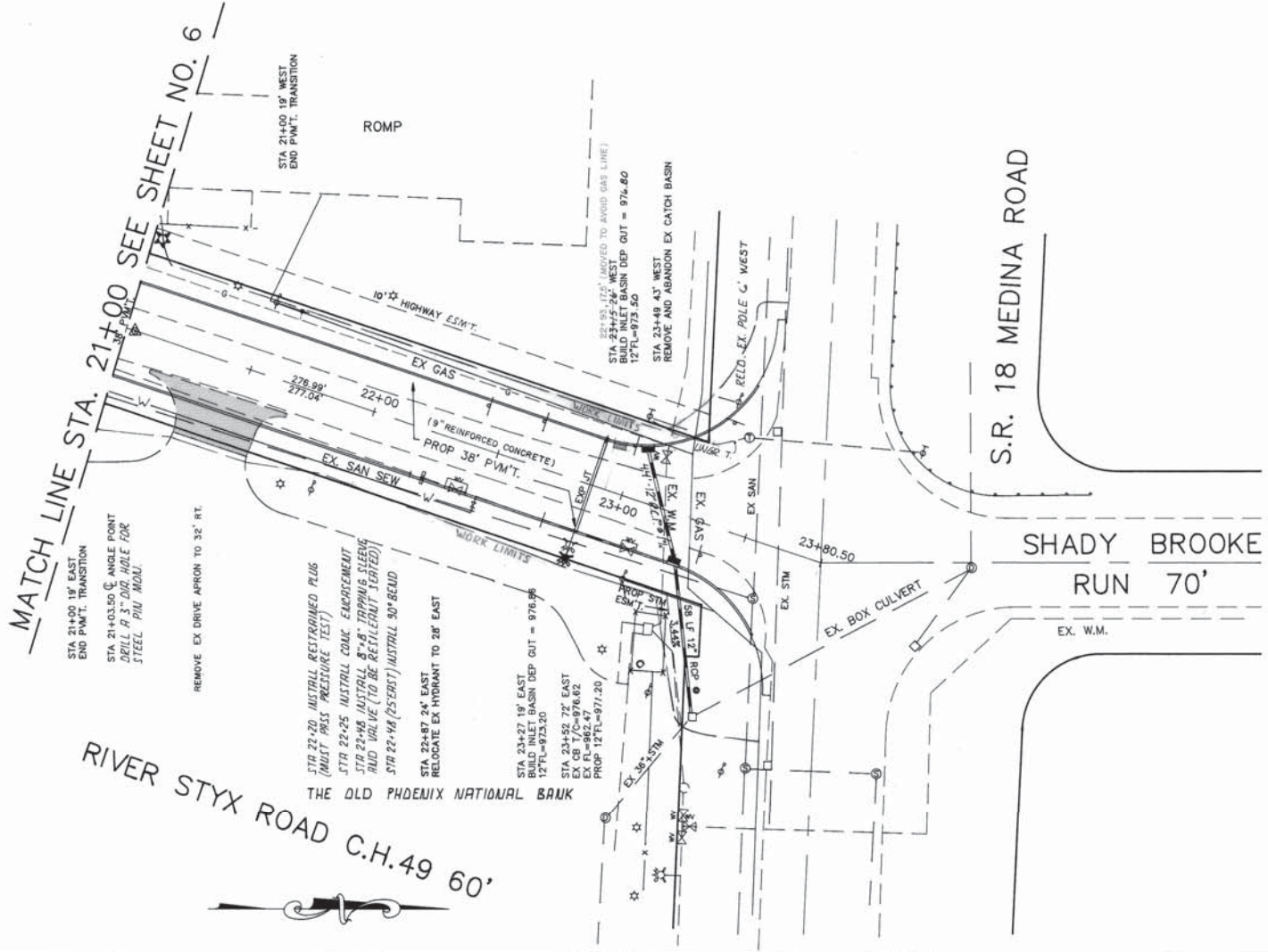
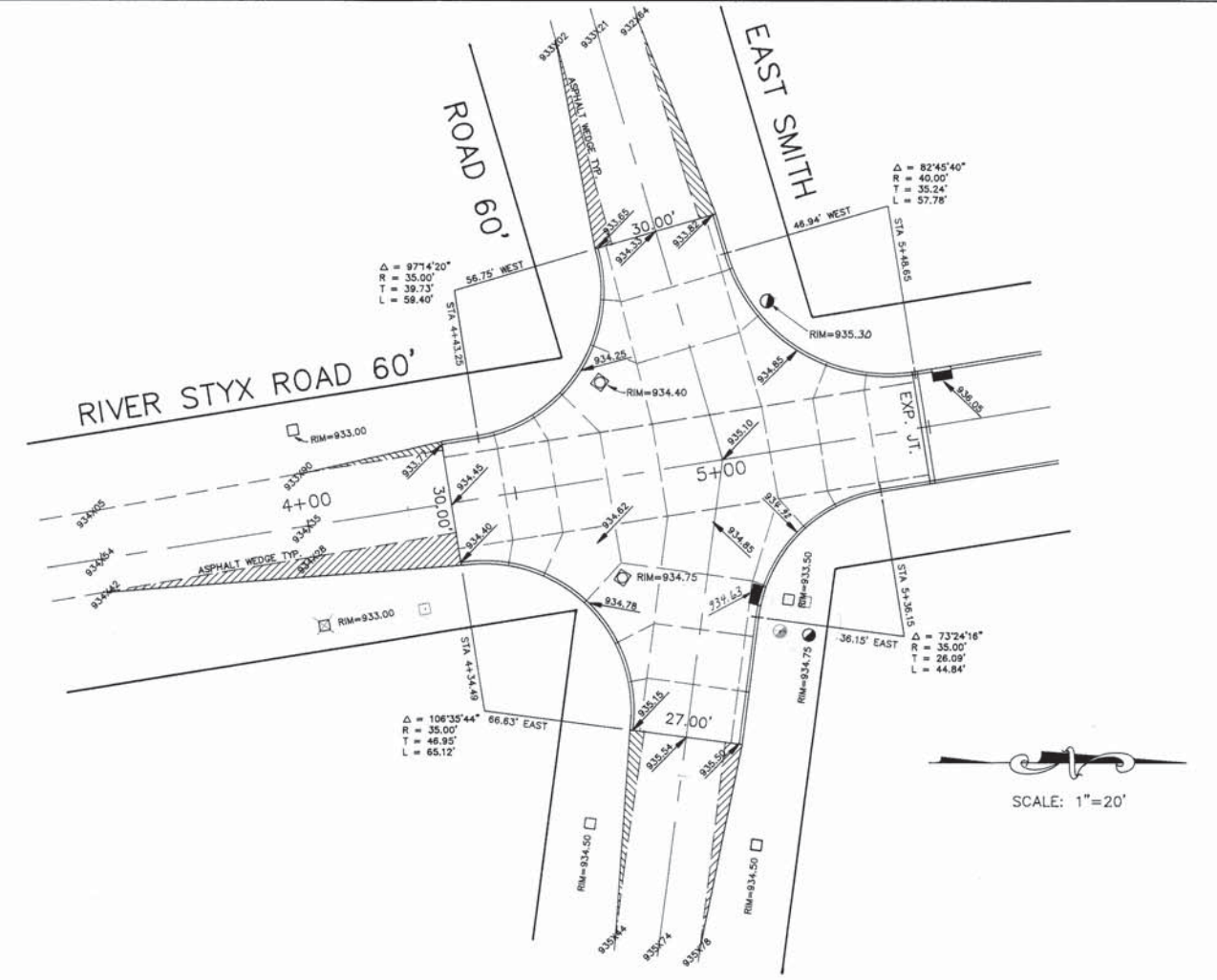
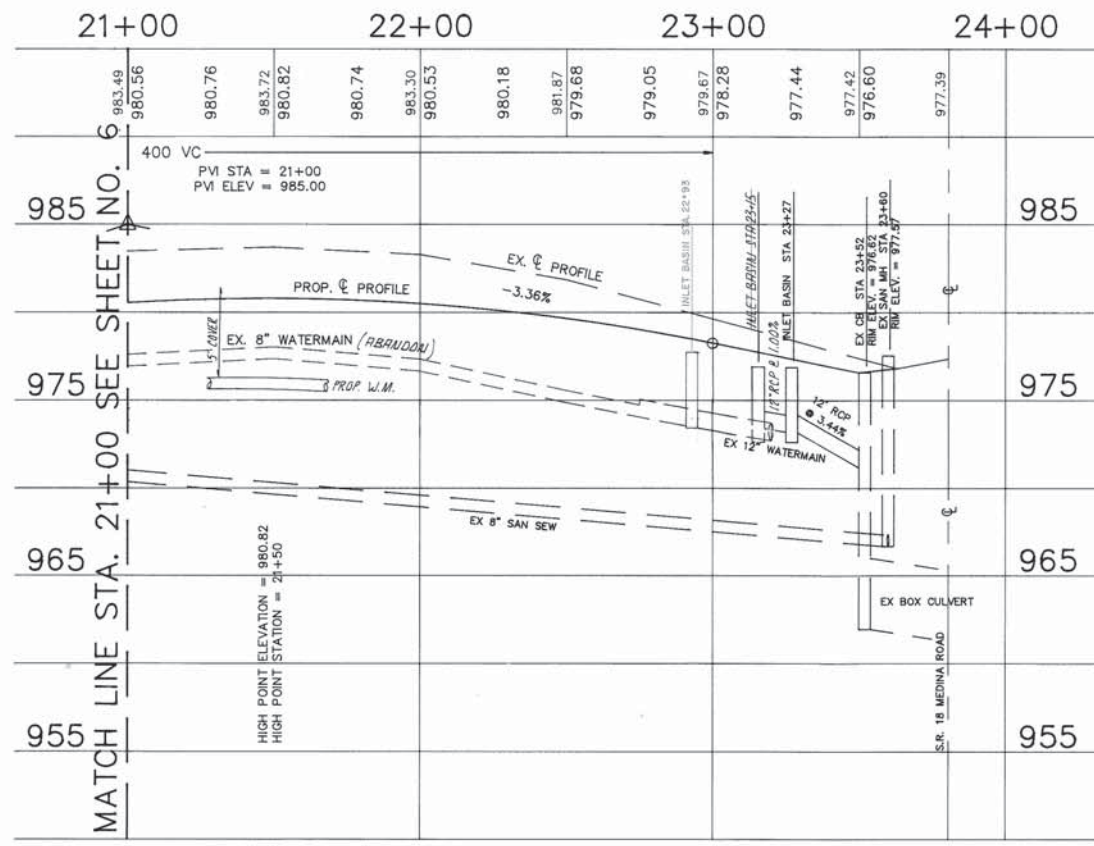


**IMPROVEMENT PLANS**  
FOR  
**RIVER STYX ROAD C.H. 49**  
IN  
MONTVILLE TWP. MEDINA COUNTY

ROLLING, HOGEVAR & ASSOCIATES INC.  
CIVIL ENGINEERING SURVEYING  
251 1/2 SOUTH COURT STREET  
MEDINA, OHIO (216)723-1828

SCALES: PLAN 1"=30' PROFILE HORZ. 1"=30', VERT. 1"=5'  
REVISIONS: JULY 27, 1971 - SAN SEWER PROJECT NO. 20,203 SHEET NUMBER 5 OF 18  
2-9-94 "AS BUILT" W.P.S.





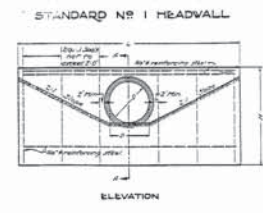
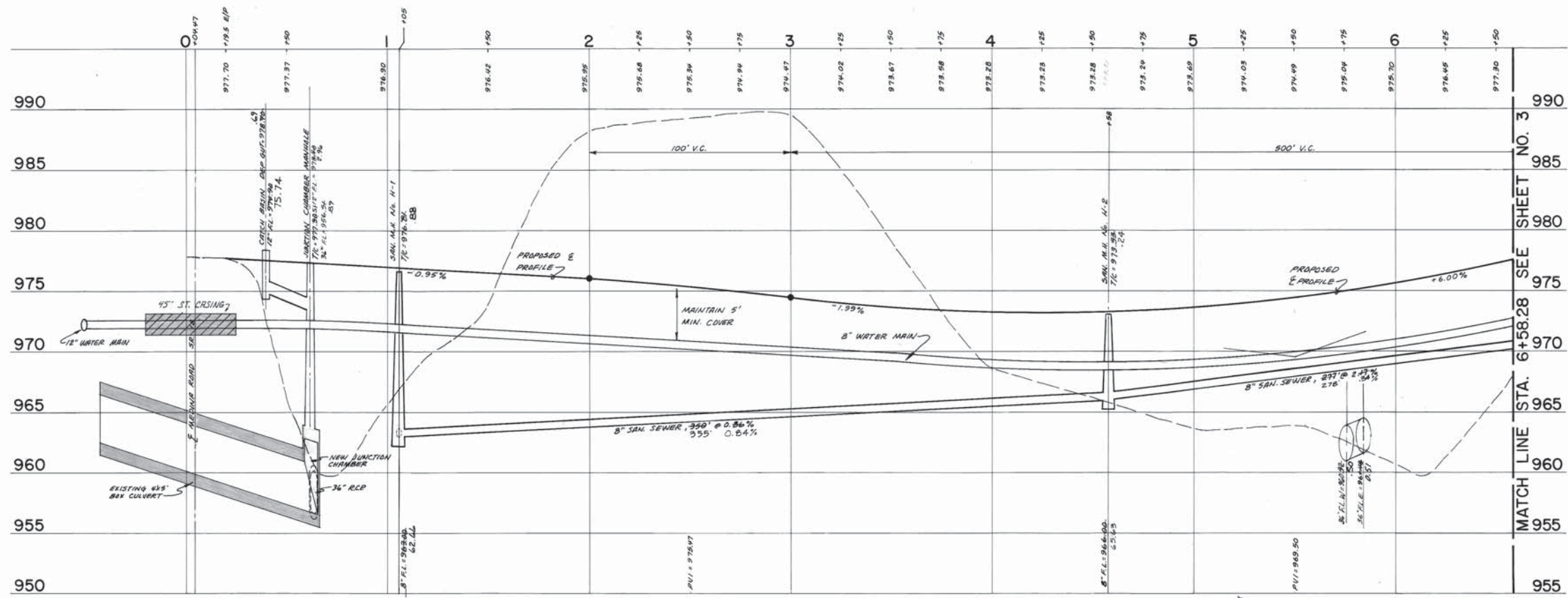
**IMPROVEMENT PLANS**  
FOR  
**RIVER STYX ROAD C.H. 49**  
IN  
MONTVILLE TWP. MEDINA COUNTY

*ROLLING, HOCEVAR & ASSOCIATES INC.*

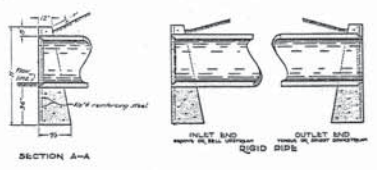
CIVIL ENGINEERING SURVEYING  
251 1/2 SOUTH COURT STREET  
MEDINA, OHIO (216)723-1828

SCALES: PLAN 1"=30' PROFILE HORZ. 1"=30' VERT. 1"=5'

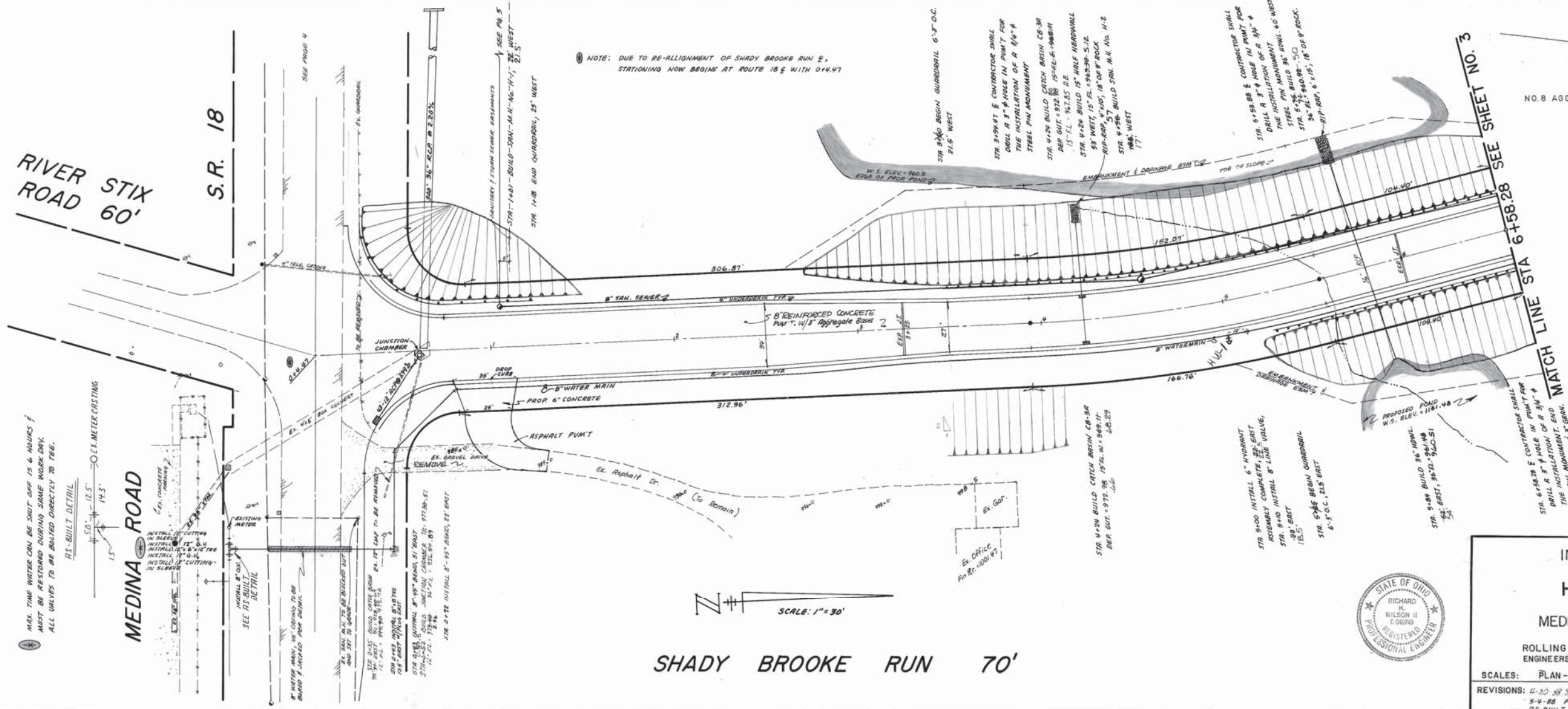
REVISIONS:	PROJECT NO.	SHEET NUMBER
2-10-04 "AS BUILTS" W.P.S.	20,203	7 OF 18



DIAMETERS		QUANTITIES ONE HEADWALL	
DIAMETER	L	CONCRETE CU YDS	REINFORCING STEEL LBS
18"	4'-0"	1.1	41
21"	5'-0"	2.2	82
24"	6'-0"	3.3	99
30"	8'-0"	6.7	92
36"	10'-0"	10.8	108



PIPE UNDERDRAINS



MAX. TIME WATER CAN BE SHUT OFF IS 6 HOURS. MUST BE RESTORED DURING SAME WORK DAY. ALL VALVES TO BE BUILT DIRECTLY TO TREE.

MEDINA ROAD

RIVER STIX ROAD 60'

S.R. 18

SHADY BROOKE RUN 70'



NOTE: DUE TO RE-ALIGNMENT OF SHADY BROOKE RUN E, STATIONING NOW BEGINS AT ROUTE 18 E WITH 0+00.47



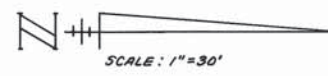
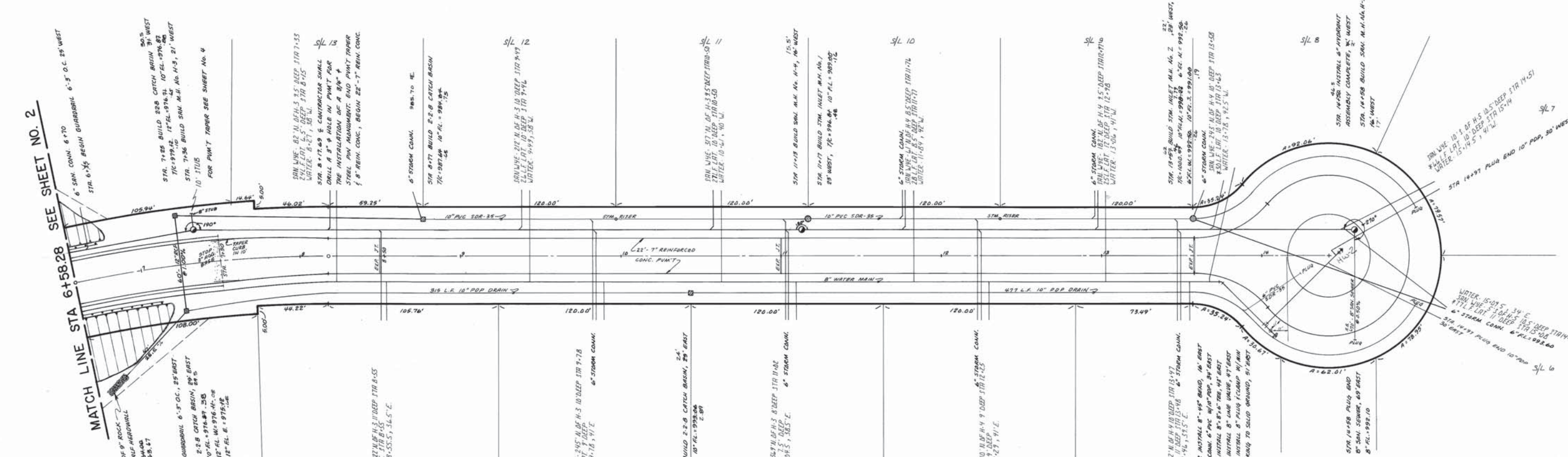
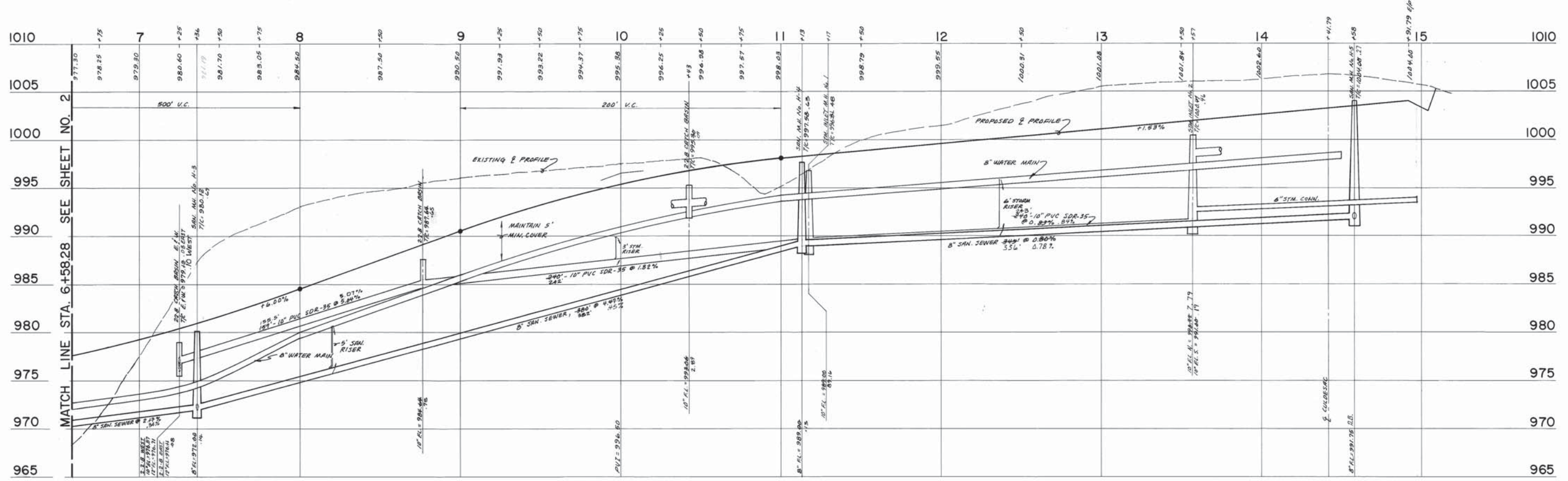
IMPROVEMENT PLANS FOR HICKORY WOODS IN MEDINA TWP., MEDINA, OHIO

ROLLING, HOCEVAR and ASSOCIATES, INC. ENGINEERS SURVEYORS

SCALES: PLAN - 1" = 30' PROFILE - HORIZ. 1" = 30' VERT. 1" = 5'

REVISIONS: 4-20-88 Shady Brooke Run Reloc. 5-9-88 P.M.T. WIDTH CHANGE 12-BUILT OCT. 1988

PROJECT NO. 2745 SHEET NUMBER 2 OF 14



SHADY BROOKE RUN 60'

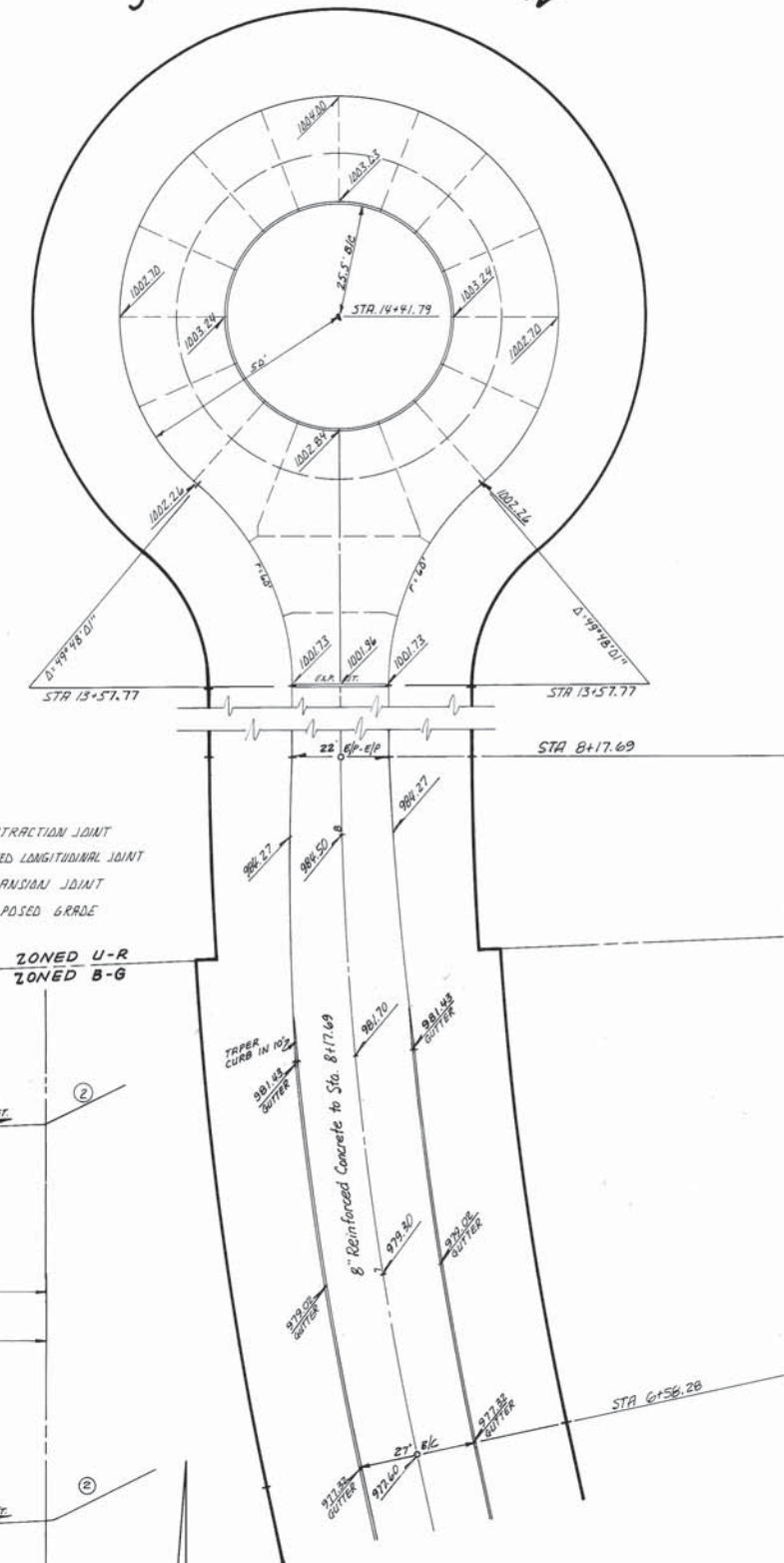
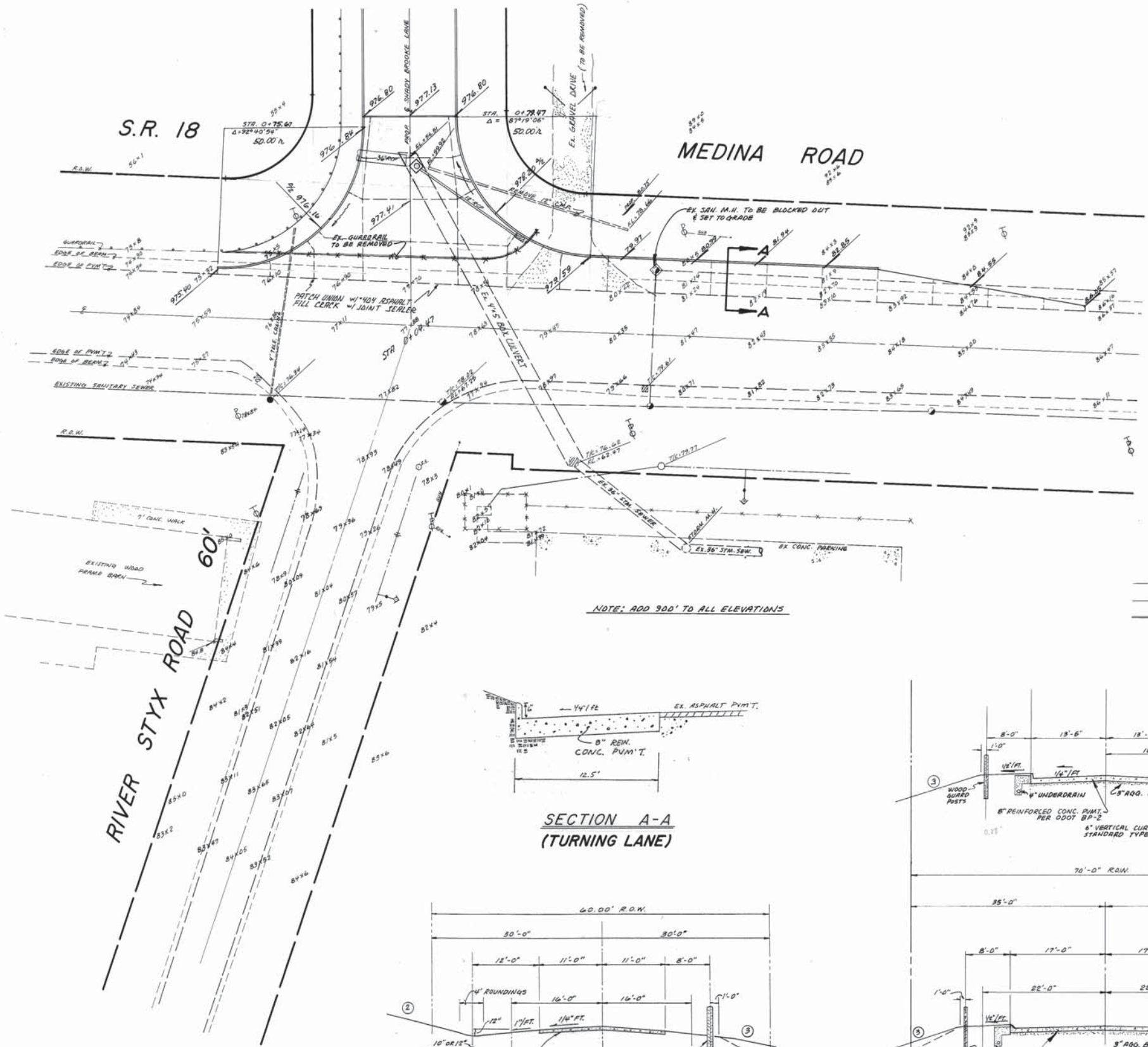


IMPROVEMENT PLANS  
FOR  
**HICKORY WOODS**  
IN  
MEDINA TWP., MEDINA, OHIO

ROLLING, HOCEVAR and ASSOCIATES, INC.  
ENGINEERS SURVEYORS

SCALES: PLAN - 1" = 30'	PROFILE - HORIZ. 1" = 30'	VERT. 1" = 5'
REVISIONS: 4-20-88 Shady Brooke Run Re/oc. 8'-2'-88 POINT WITH CHAIRS AS-BUILT OCT. 1988	PROJECT NO. 2745	SHEET NUMBER 3 OF 14

SHADY BROOKE RUN

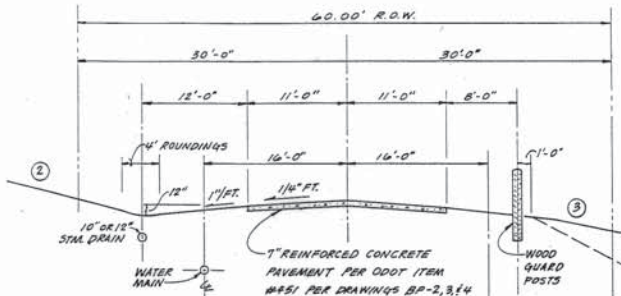


NOTE: ADD 900' TO ALL ELEVATIONS

- CONTRACTION JOINT
- KEYS LONGITUDINAL JOINT
- EXPANSION JOINT
- PROPOSED GRADE

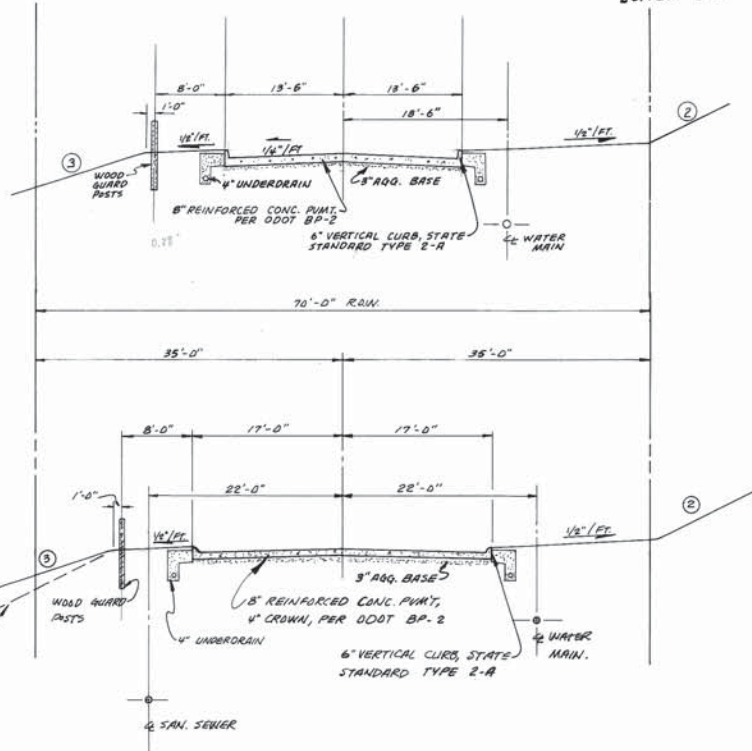
ZONED U-R  
ZONED B-G

SECTION A-A  
(TURNING LANE)



- BACKSLOPES**
- 4:1 2' UNDER
  - 3:1 OVER 2' LESS THAN 3'
  - 2:1 OVER 3'
- FILLSLOPES**
- 4:1 5' UNDER
  - 3:1 OVER 3'
  - 2:1 WHEN APPROVED BY COUNTY ENGINEER

TYPICAL RESIDENTIAL PVM'T SECTION



TYPICAL COMMERCIAL PVM'T SECTION



SCALE: 1" = 20'

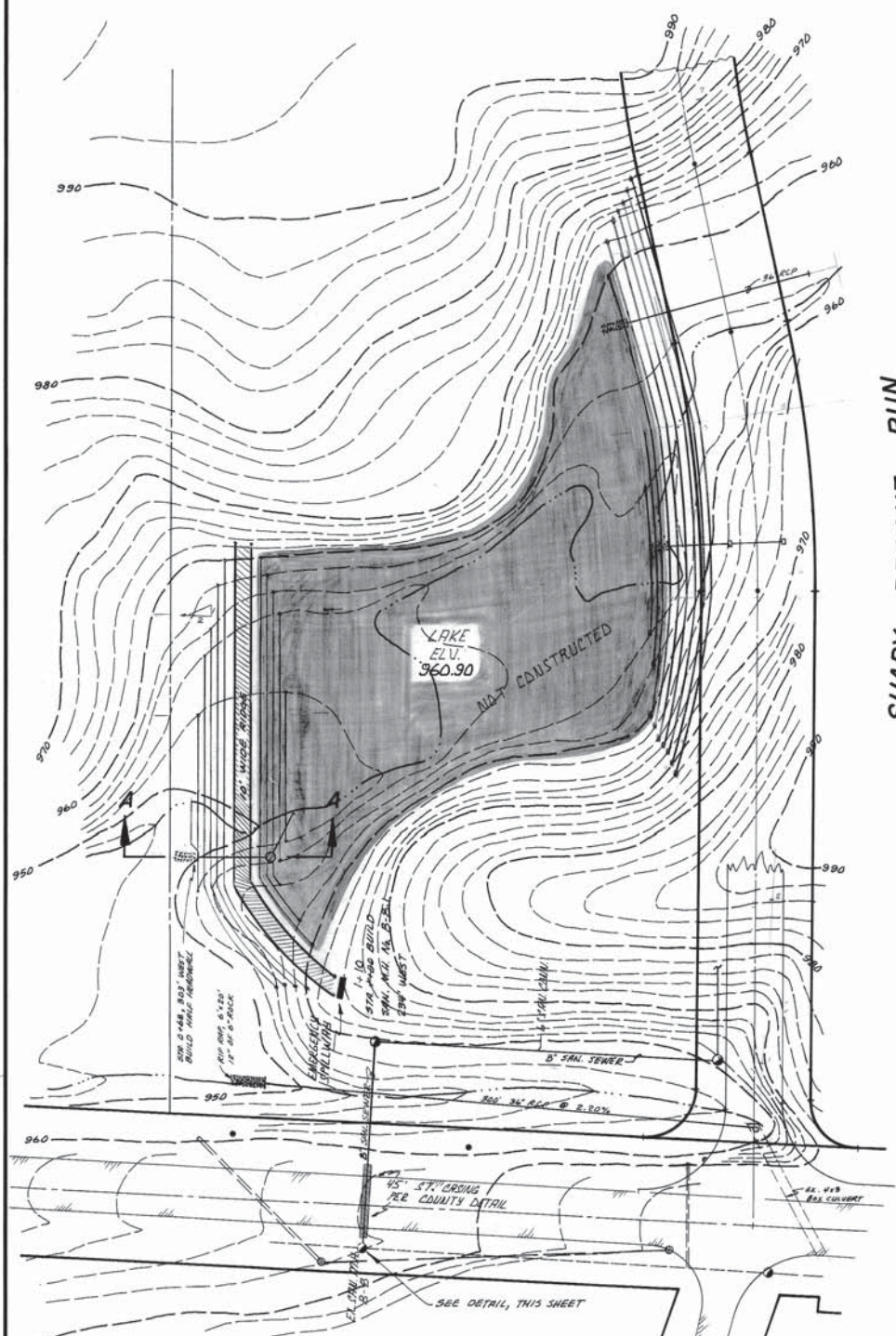
IMPROVEMENT PLANS  
FOR  
**HICKORY WOODS**  
IN  
MEDINA TWP., MEDINA, OHIO

ROLLING, HOCEVAR and ASSOCIATES, INC.  
ENGINEERS SURVEYORS

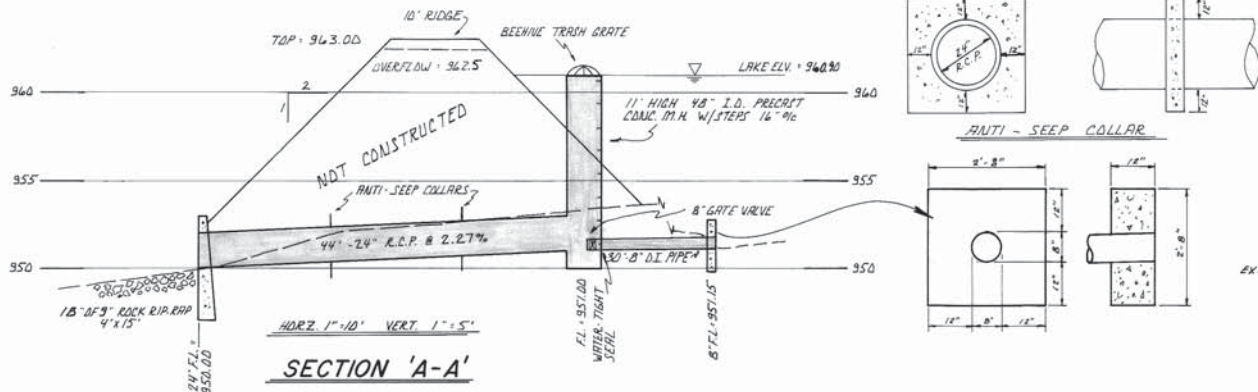
SCALES: PLAN - PROFILE - HORIZ. VERT.

REVISIONS: 4-20-88 ShadyBrooke Run Reloc.  
5-4-88 PVM'T WIDTH CHANGE

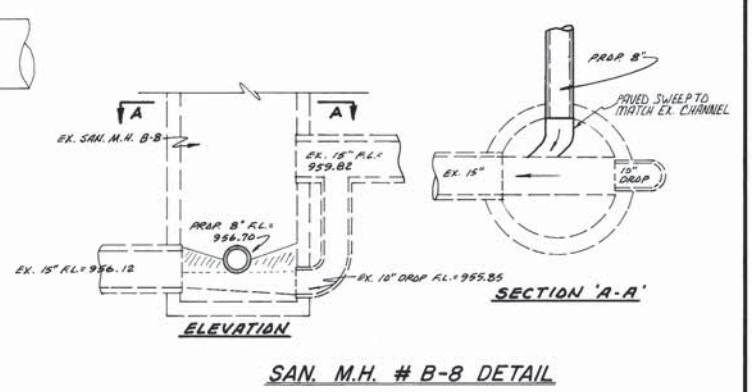
PROJECT NO. 2745 SHEET NUMBER 4 OF 14



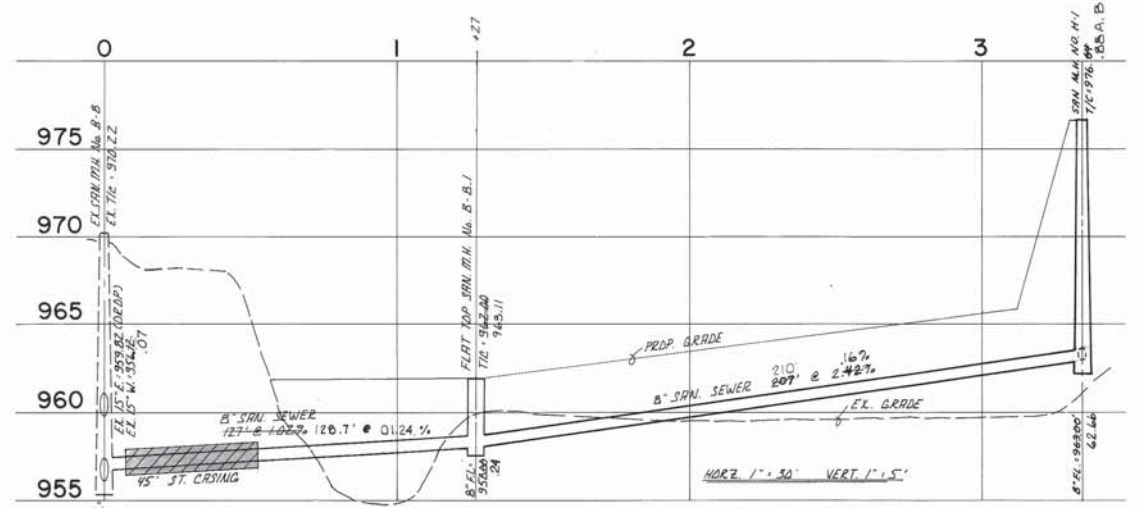
SHADY BROOKE RUN



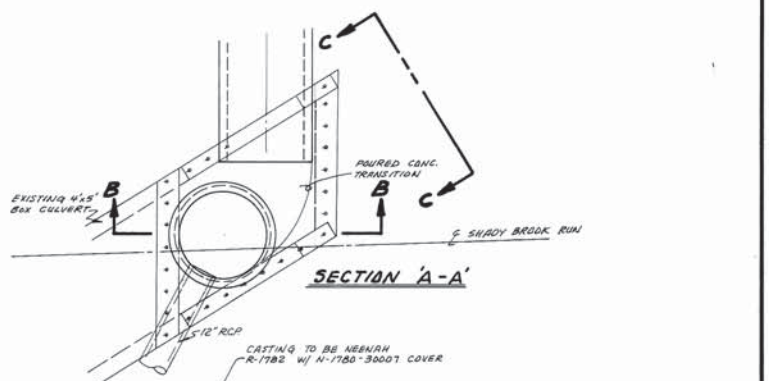
SECTION 'A-A'



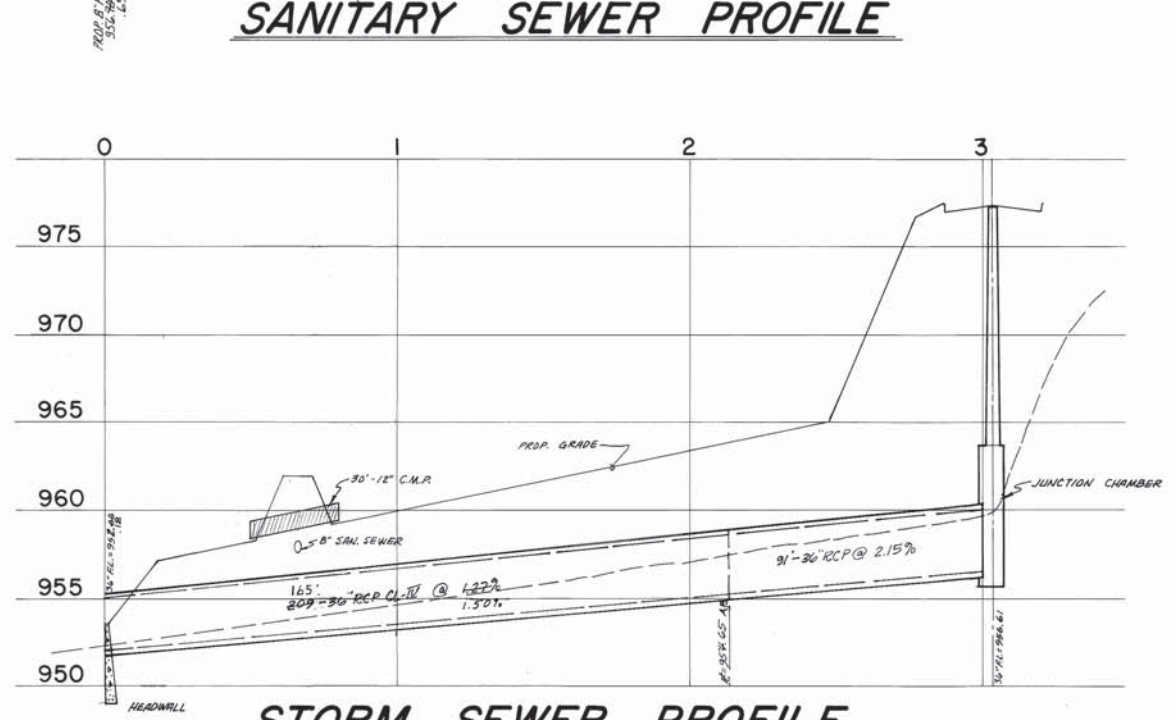
SAN. M.H. # B-8 DETAIL



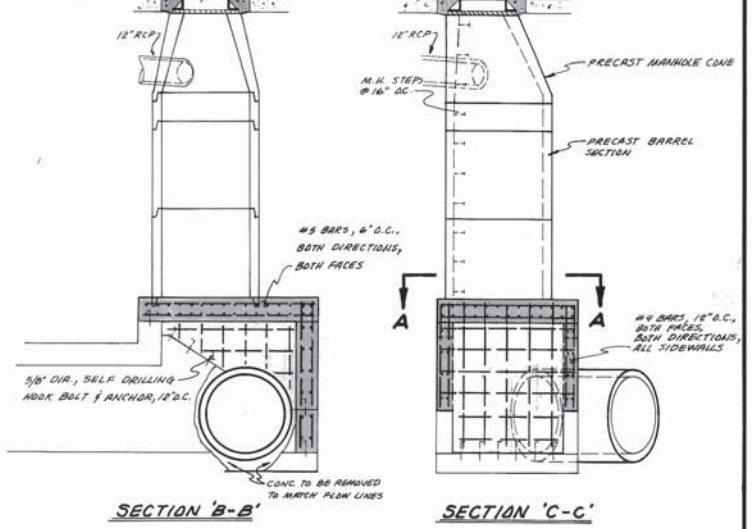
SANITARY SEWER PROFILE



SECTION 'A-A'



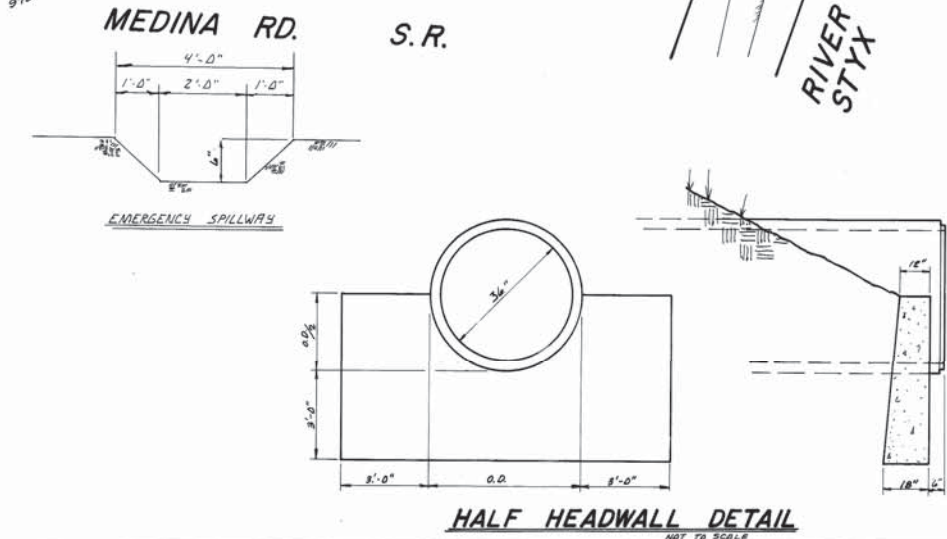
STORM SEWER PROFILE



SECTION 'B-B'

SECTION 'C-C'

JUNCTION CHAMBER DETAIL



HALF HEADWALL DETAIL

REVISED 4-20-88



IMPROVEMENT PLANS FOR <b>HICKORY WOODS</b> IN MEDINA TWP., MEDINA, OHIO		
ROLLING, HOCEVAR and ASSOCIATES, INC. ENGINEERS SURVEYORS		
SCALES: PLAN - 1" = 30'	PROFILE - HORIZ. 1" = 30'	VERT. 1" = 5'
REVISIONS: 4-20-88 Shady Brooke Run Poles 5-4-88 P.M.X. WIDTH CHANGE RS-BUILT OCT. 1988	PROJECT NO. 2745	SHEET NUMBER 5 OF 14



# ENGINEERED SITE PLAN FOR PROPOSED MEDINA LASER CAR WASH

LOCATED IN MEDINA TOWNSHIP,  
IN THE COUNTY OF MEDINA,  
AND THE STATE OF OHIO

## STORM SEWER CONSTRUCTION NOTES

- ① BUILD CONC. FULL HEADWALL  
12" F.L. = 1028.80
- ② BUILD 2-2-B INLET BASIN  
T/CAST = 1035.00  
12" F.L. = 1031.02
- ③ BUILD 2-2-B INLET BASIN  
T/CAST = 1034.60  
12" F.L. = 1030.77
- ④ BUILD 2-2-B INLET BASIN  
T/CAST = 1033.80  
12" F.L. = 1029.33
- ⑤ BUILD 2-2-B INLET BASIN  
T/CAST = 1032.30  
12" F.L. = 1029.82
- ⑥ BUILD 60" STORM MANHOLE  
36" F.L. (S) = 1022.31  
36" F.L. (E) = 1024.40
- ⑦ BUILD 2-4 INLET BASIN  
T/CAST = 1032.50  
18" F.L. = 1024.88  
36" F.L. = 1024.50
- ⑧ BUILD CONCRETE FULL HEADWALL  
18" F.L. = 1025.00

PROPOSED ELEV.  $\frac{1000.00}{1000.00}$   
EXST. ELEV.  
TYPICAL SPOT ELEVATION

NOTE: ALL ELEVATIONS SHOWN ARE TOP OF  
PAVEMENT OR GUTTER UNLESS OTHERWISE NOTED.

### NOTES:

- 1.) DETENTION BASIN TO BE USED AS A SEDIMENT TRAP DURING CONSTRUCTION.
- 2.) SEED ALL DISTURBED AREAS AS SOON POSSIBLE AFTER FINAL GRADE.
- 3.) CATCH BASINS #3, 4 & 5 SHALL HAVE AN 18" SUMP AND HOOD (E.J.T.W. # 5954-6 OR EQUAL)
- 4.) INSTALL STABILIZED STONE CONSTRUCTION ENTRANCE TO SITE

- CONCRETE PAVEMENT  
8" ODOT #452
- ASPHALT PAVEMENT

LEGEND	
EXISTING	PROPOSED
	SANITARY SEWER
	SANITARY MANHOLE
	SANITARY MANHOLE No.
	STORM SEWER
	STORM MANHOLE
	STORM INLET MANHOLE
	CURB INLET BASIN
	2-2-B INLET BASIN
	STORM STRUCTURE No.
	WATER MAIN
	HYDRANT ASSEMBLY
	LINE VALVE
	DRAINAGE ARROW
	EXISTING FENCE
	SILT FENCE



SCALE: 1" = 20'

*copy of notes 11/20/07*

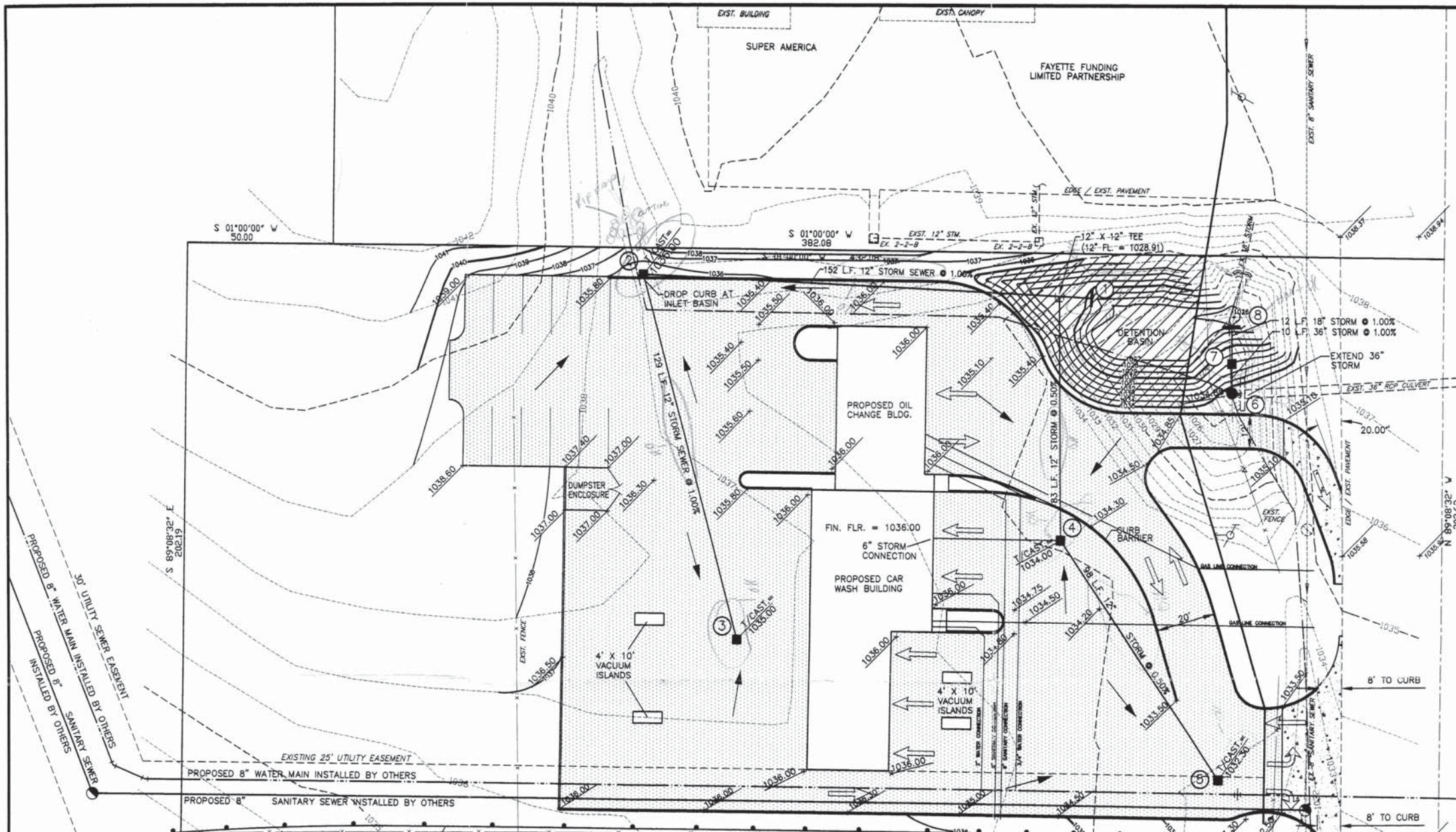


REVISED 11/24/97  
REVISED 11/19/97  
REVISED 11/3/97  
REVISED 10/31/97  
REVISED 10/28/97

**CUNNINGHAM & ASSOCIATES, INC.**

CIVIL ENGINEERING and SURVEYING  
203 W. LIBERTY ST. MEDINA, OHIO 44256 725-5980

DATE	ACAD FILE No.	PROJECT No.	SHEET No.
10-10-97	M:\97-173\SITEALT3	97-173	1 OF 1



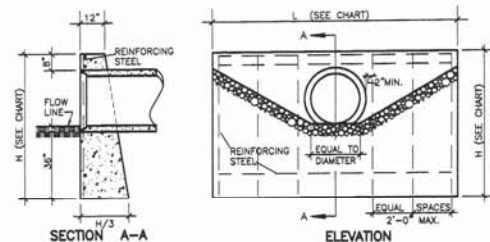
MEDINA ROAD S.R. 18

### NOTES

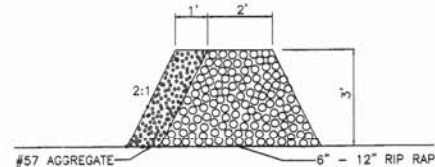
- CONCRETE HEADWALL, WHERE REQUIRED, WILL BE PROVIDED FOR CULVERTS AND STORM OUTLETS.
- CONCRETE SHALL BE CLASS "C". STEEL REINFORCING BARS SHALL BE 5/8 INCH DIAMETER. AT 2 INCH MINIMUM COVER IN CONCRETE. CHAMFER ALL EXPOSED CORNERS 3/4 INCH.
- DIMENSIONS ARE SHOWN FOR CIRCULAR SECTIONS ONLY. IT WILL BE NECESSARY TO DETERMINE DIMENSIONS FOR THE HEADWALL REQUIRED FOR REINFORCED ELLIPTICAL CONCRETE PIPE IN ACCORDANCE WITH THE EQUATIONS LISTED WITH THIS DETAIL.
- WHERE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2800 POUNDS PER SQUARE FOOT, IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE BASE.
- FOR REINFORCED CONCRETE PIPE SECTIONS, THE GROOVE END SHALL FACE UPSTREAM AT INLET, AND THE TONGUE END OR CUT END SHALL FACE DOWNSTREAM AT THE OUTLET.

DIMENSIONS		
DIA.	H	L
12"	4'-10"	5'-8"
15"	5'-2"	6'-3"
18"	5'-5"	6'-8"
21"	5'-8"	7'-6"
24"	5'-11"	8'-0"
27"	6'-2"	8'-8"
30"	6'-5"	9'-8"
36"	7'-0"	11'-0"
42"	7'-7"	12'-6"

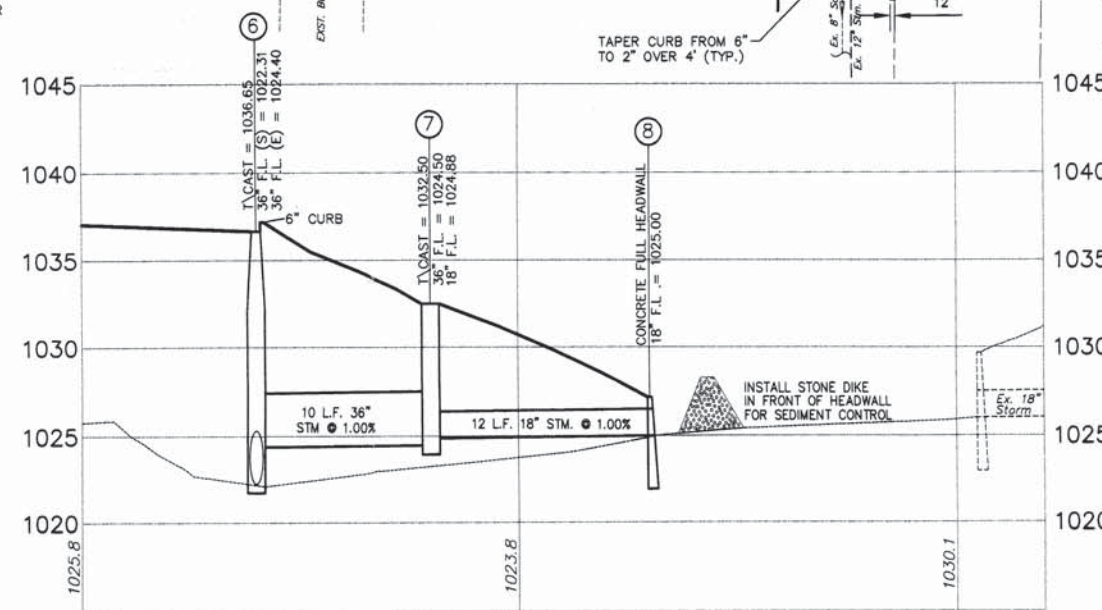
EQUATIONS  
 L ELLIPTICAL SECTIONS = 4R + 4T + S  
 H ELLIPTICAL SECTIONS = R + T + 44"  
 R = RISE OF PIPE  
 S = SPAN OF PIPE  
 T = THICKNESS OF PIPE WALL  
 L = LENGTH OF HEADWALL  
 H = HEIGHT OF HEADWALL



STANDARD HW-1 CONCRETE HEADWALL



STONE DIKE DETAIL



DETENTION BASIN OUTLET PROFILE

SCALE: 1" = 5'

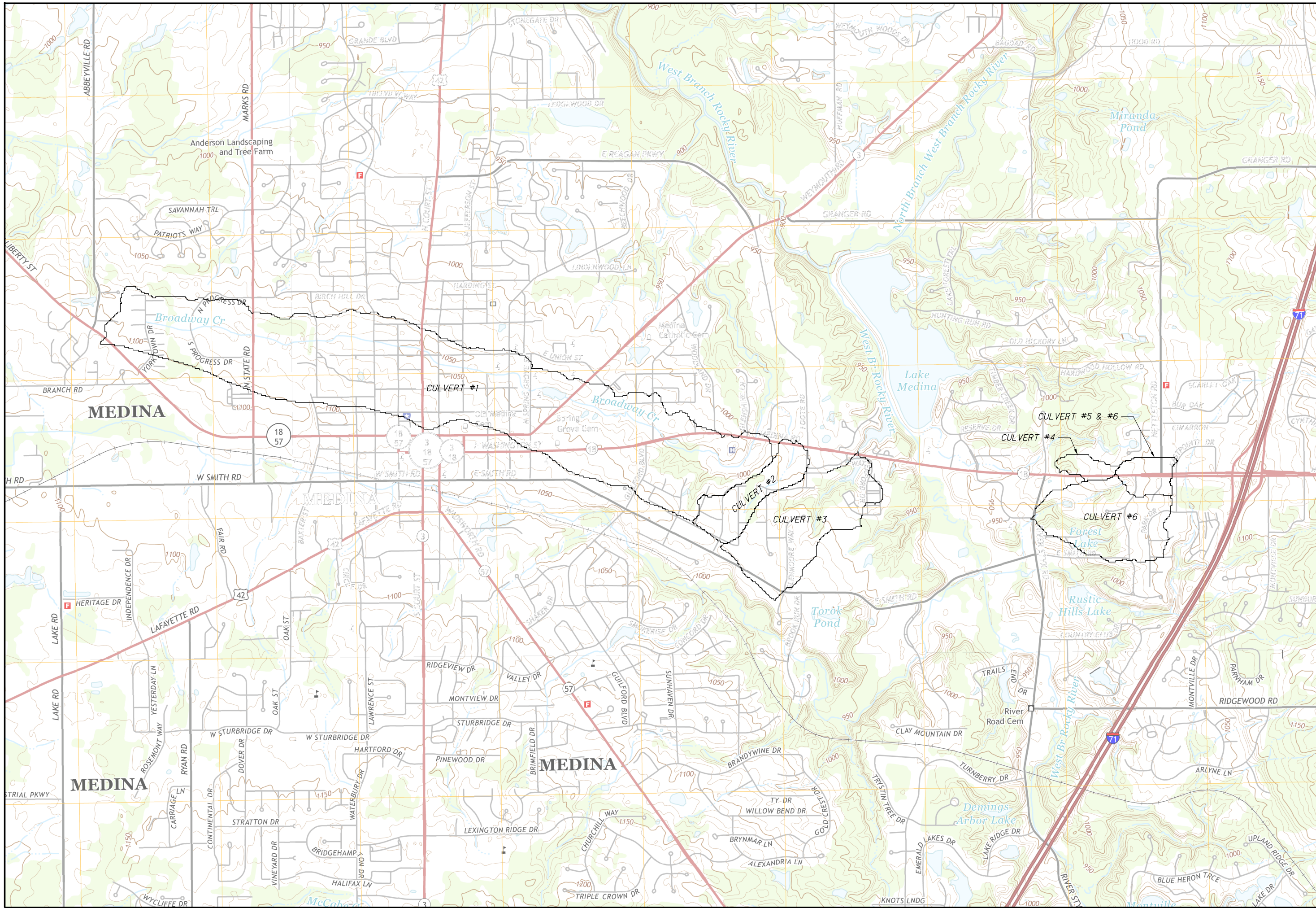
RFCW 11-26-07

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## APPENDIX K – DRAINAGE AREA MAPS

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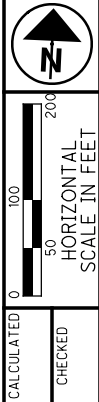
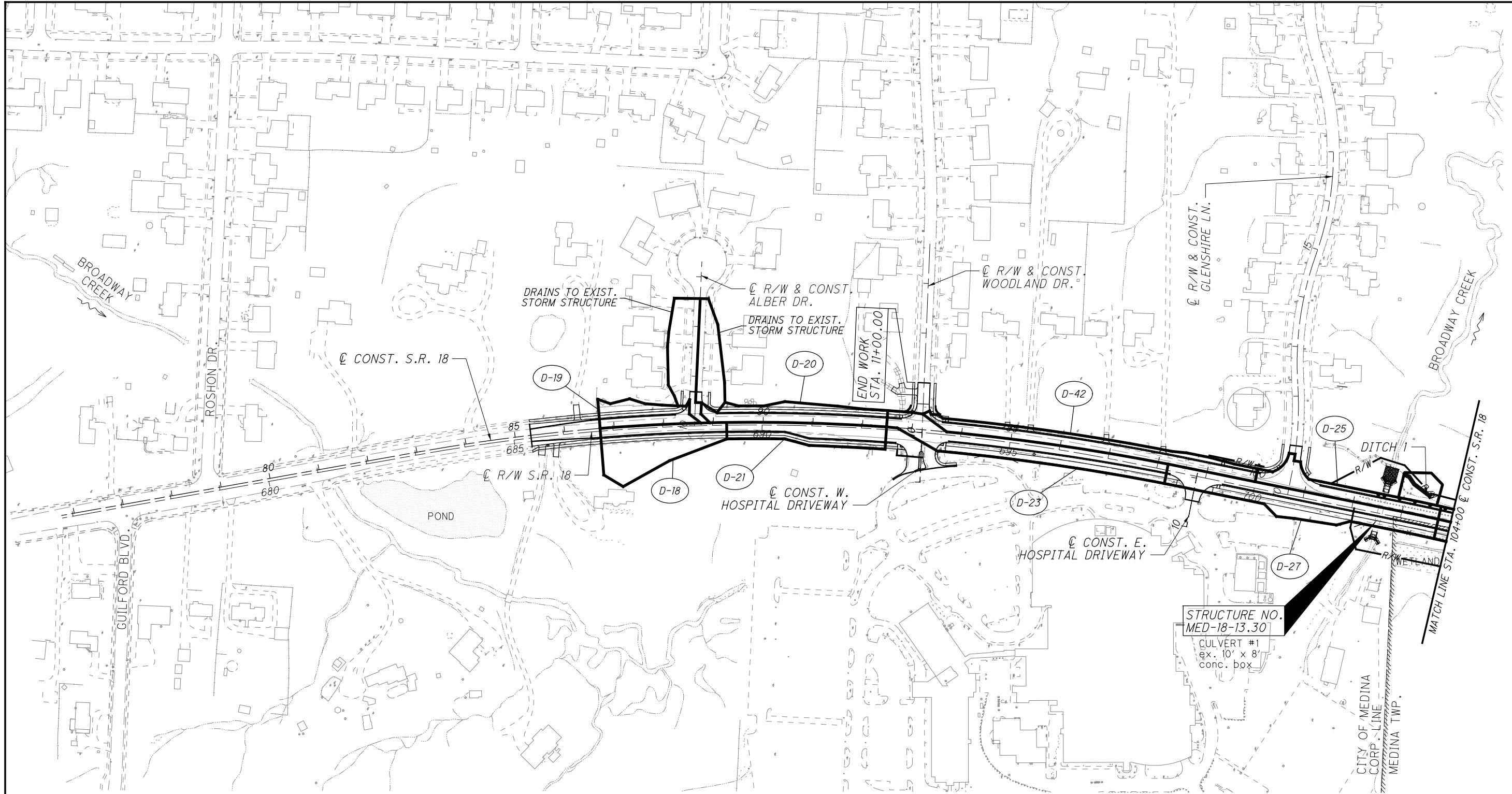
CALCULATED

CHECKED

**DRAINAGE AREA MAPS  
CULVERT DRAINAGE AREAS**

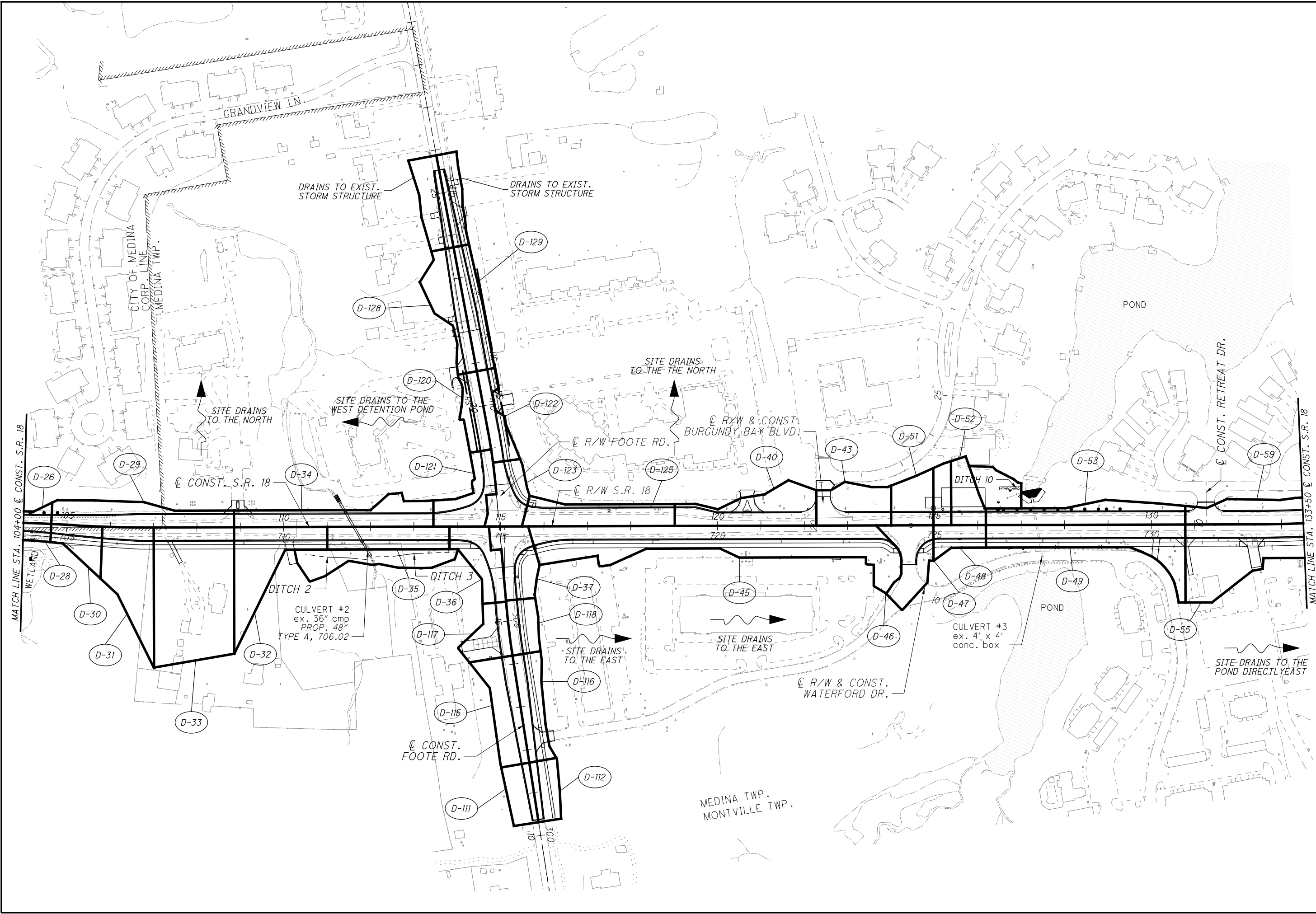
**MED-18-12.99**

K  
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**DRAINAGE AREA MAP**  
**STA. 75+74.51 TO STA. 104+00.00**

**MED-18-12.99**



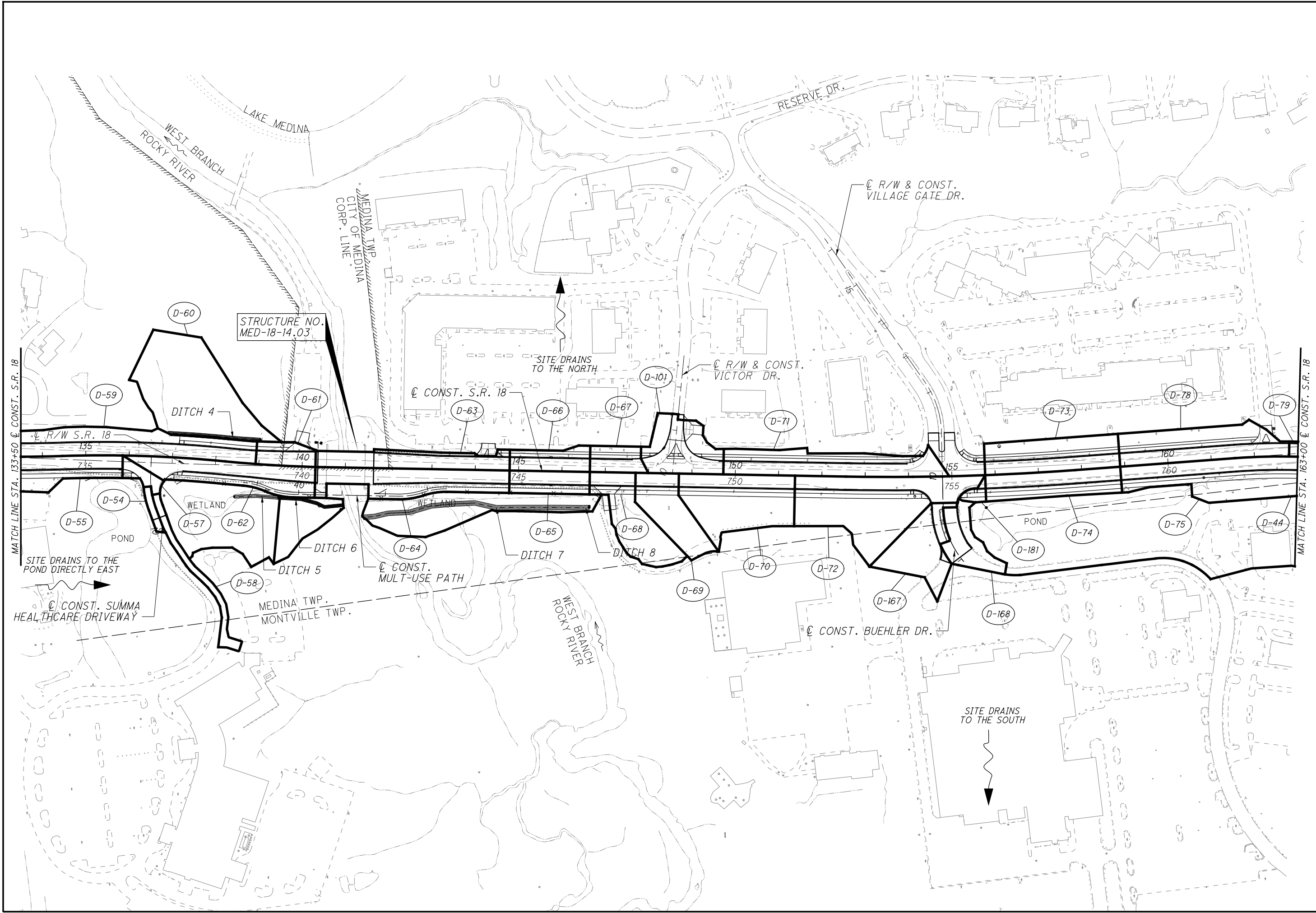
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 CHECKED \_\_\_\_\_

**DRAINAGE AREA MAP**  
**STA. 104+00.00 TO STA. 133+50.00**

**MED-18-12.99**

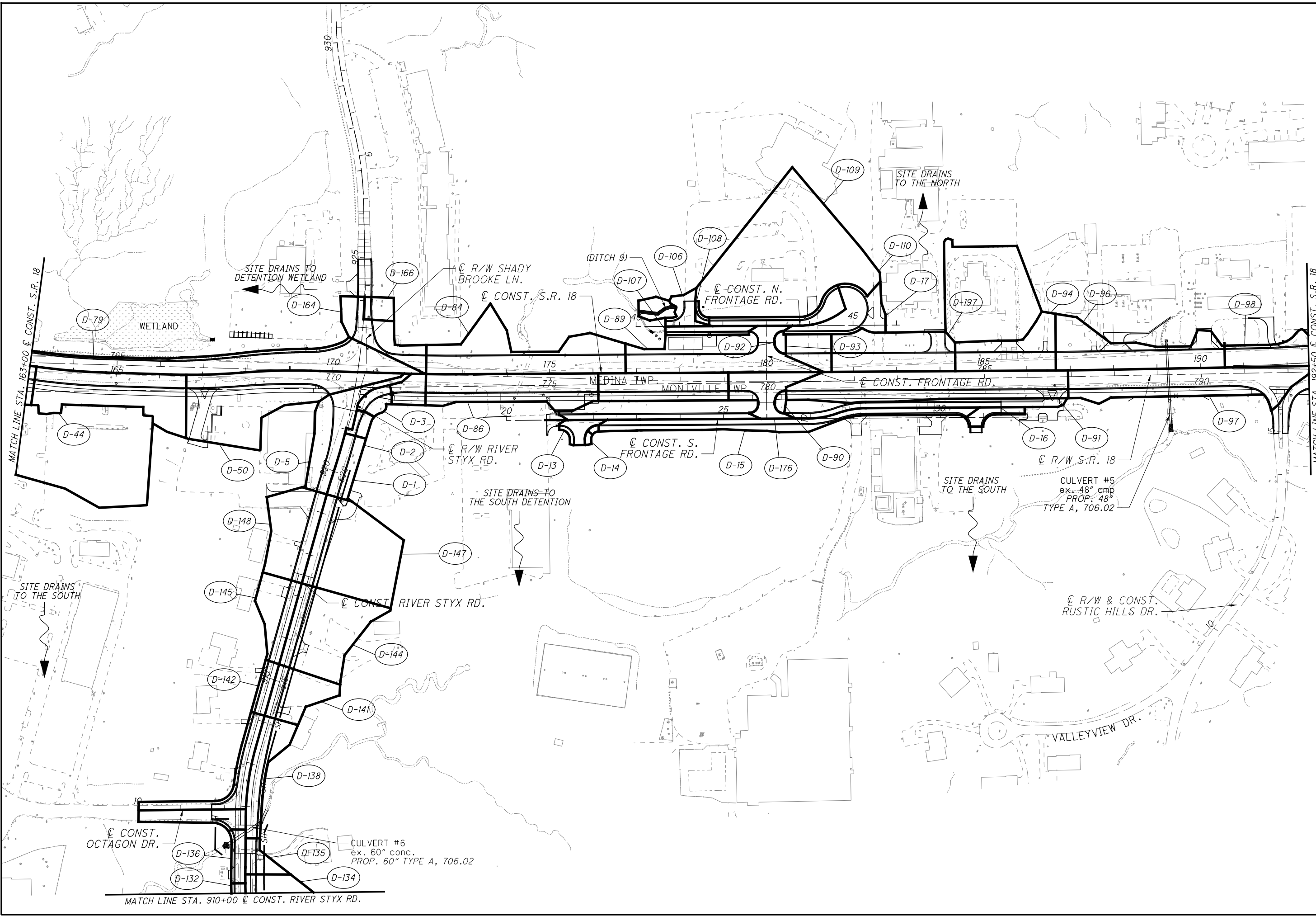
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D00TY81STD\_USER



CALCULATED		0 100 200 HORIZONTAL SCALE IN FEET
CHECKED		
<b>DRAINAGE AREA MAP</b>		
<b>STA. 133+50.00 TO STA. 163+00.00</b>		
<b>MED-18-12.99</b>		K 4

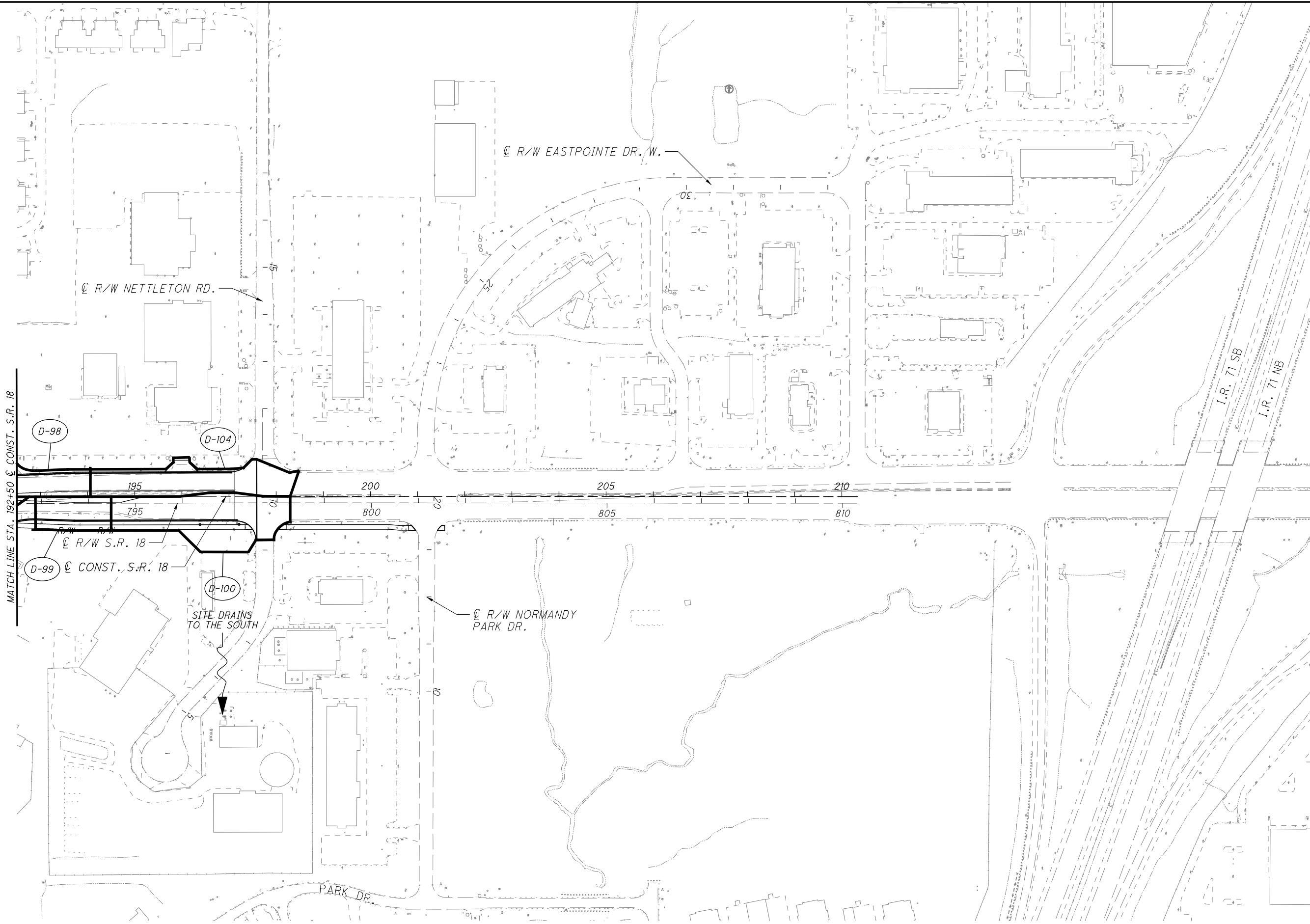
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**DRAINAGE AREA MAP**  
**STA. 163+00.00 TO STA. 192+50.00**

**MED-18-12.99**

K  
5



CALCULATED  
CHECKED

**DRAINAGE AREA MAP**  
**STA. 192+50.00 TO END**

**MED-18-12.99**

6 K



