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PROPOSED VICTORIA ON THE LAKE DEVELOPMENT
12433 Dillon Drive
TOWN OF TECUMSEH, ONTARIO

DESIGN BRIEF

Prepared For:

Briday Inc.

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1. INTRODUCTION:

The property under study is a 2.28 Ha (5.66 acre) site located south of Dillon Drive, on the site of the former Victoria Public School in the Town of Tecumseh. The proposed development will comprise Residential land use with a parkland dedication. The site is bounded by Dillon Drive to the north, detached-house residential properties to the east, Little River Blvd. and detached-house properties to the south, and detached-house properties to the west. The lot comprises an unopened R.O.W. called McColl Avenue which passes through the site from Dillon Drive to Little River Boulevard.

The site is presently the site of Victoria Public School, a 1-storey brick school building. The topography is generally flat, with less than 0.30m grade change across the site. Presently there is a drainage ditch serving the adjacent lots draining to an existing inlet in the McColl Avenue R.O.W.

Refer to the Site Plan by L360 Architecture for the internal road and lot layout. Refer to the topographic survey by Clarke Surveyors Inc. for detailed topography of the existing site.

It is proposed to develop the parcel of land for residential land use comprising conventional and stacked townhouses as shown on the Site Plan.

This report will evaluate the serviceability of the site with respect to sanitary, water and storm services and also evaluate the storm water management (SWM) strategy that will be implemented to meet the Town of Tecumseh's and ERCA (Essex Region Conservation Authority) SWM requirements.

2. SCOPE OF WORK

THE ODAN/DETECH GROUP INC. was retained by the owner, Briday Inc., to review the site, collect data, evaluate the site for the proposed land use (Residential) and present the findings in a Design Brief and Site Servicing Plan. The scope of work in brief involves the following:

a) Review existing Field work to establish existing features and elevations on the site.

b) Review an existing soils report to establish the suitability of the proposed development.

c) Collecting existing servicing drawings from the Town of Tecumseh in order to establish availability and feasibility of site servicing.

d) Meetings/conversations with the Town of Tecumseh and ERCA Engineers.

e) Evaluation of the data.

f) Prepare Design Brief in support of the Site Plan and rezoning applications.

3. SERVICING DESIGN CONSIDERATIONS

A. SANITARY WASTE WATER DISPOSAL

Existing Conditions

There are existing sanitary sewers beneath both Dillon Drive and Little River Boulevard, adjacent to the site's north and south boundaries.

There is a 250mm sanitary sewer flowing easterly beneath Dillon Drive, adjacent to the site's north frontage, which drains into a 300mm sanitary sewer flowing southerly beneath Lacasse Boulevard and thereafter discharges into a 900mm trunk sanitary sewer beneath Little River Boulevard. The 900mm trunk sanitary sewer beneath Little River Boulevard flows westerly adjacent to the site's south boundary downstream from the foregoing 300mm Lacasse Boulevard 300mm sewer. Refer to the Servicing Plan for the location of the existing sanitary sewers adjacent to the site.

The existing school building on the site presently has a 200mm sanitary service connection to the foregoing 250mm sanitary sewer beneath Dillon Drive.

A calibrated sanitary-sewer hydraulic model for the Town of Tecumseh's sanitary sewer system has been prepared by Dillon Consulting. A memorandum was provided by Dillon Consulting, dated November 26, 2018 addressing existing sanitary sewer capacity and capacity for the subject proposed development. The memorandum is derived from a dynamic hydraulic model prepared using the software *XPSWMM* which considers both dry-weather flow (DWF) and wet-weather flow (WWF) scenarios to assess the risk of basement flooding in existing and proposed conditions. The memorandum is provided here in Appendix B.

Dillon's memorandum concludes in the section titled *Conclusions and Recommendations* on page 10 that the net-increase in flows by the proposed development may be safely accommodated by the existing sanitary sewer systems and no sanitary sewer infrastructure upgrades are necessary to accommodate the proposed development.

The conclusions in Dillon's memorandum were based on a prior iteration of the subject development which comprised 110 units, whereas the present proposal comprises 63 units. It follows that Dillon's assessment remains conservative for the proposed development and its conclusion holds for the current statistics.

Proposed Waste Water Flow

The following are the Town of Tecumseh requirements for sanitary sewer design:

Area for inflow/infiltration:	2.200 ha
Peak extraneous flow (I/I) rate:	13.48 m^3/d/Ha = 0.16 L/sec./ha.
From Dillon Memo, Table 1, Appendix B	
Average daily sewage of:	450 L/cap/day.
Harmon peaking factor for peak day flow:	M=1 + [14 / (4 + (P/1000,1/2))]
Medium density residential population:	2 person/unit

Sanitary sewage flow is therefore calculated as follows:

$$Population_{Prop} = 63\ units * 2\frac{person}{unit} = 126\ p$$

$$Q - Average_{DWF} = 63\ units * 2\frac{person}{unit} * \frac{450\frac{L}{p}}{d} = 56{,}700\frac{L}{d} = 0.67\frac{L}{s}$$

$$M = 1 + \left(\frac{14}{4 + \sqrt{0.126}}\right) = 4.21$$

$$Q - Peak_{DWF} = 0.67\frac{L}{s} * 4.21 = 2.82\frac{L}{s}$$

$$Q_{I/I} = 2.200\ Ha * \frac{0.16\frac{L}{s}}{Ha} = 0.35\ L/s$$

Therefore,

$$Q_{Total} = Q - Peak_{DWF} + Q_{I/I} = 2.82\frac{L}{s} + 0.35\frac{L}{s} = 3.17\frac{L}{s}$$

The peak sanitary flow generated by the proposed development, 3.17 L/s, represents an approximately 0.77 L/s increase relative to the pre-development flow (2.4 L/s, as per Dillon Memo, Table 2, Appendix B).

Refer to the Servicing Plan for the layout of sanitary sewers within the site and proposed sewer connection location.

B. WATER DISTRIBUTION

Domestic water and fire protection for the proposed townhouse development will be provided by a private 200mm watermain within the site, connected to both the existing 300mm watermain beneath Little River Boulevard and the 150mm watermain beneath Dillon Drive.

Town engineering staff have stated that the site may not connect to the 400mm watermain beneath Dillon Drive.

Town staff engineering staff have stated that the townhouses units may be either individually metered for domestic water, or metered block-by-block. It is therefore proposed that each townhouse unit will be individually metered.

The pressures and volumes must be sufficient for Peak hour conditions and under fire conditions as established by the Ministry of Environment and the Fire Underwriters Survey booklet (1999). The minimal residual pressure under fire conditions is 140 kpa (or 20.3 psi).

According to the MOE criteria the allowable pressures are as follows:

Condition	**Allowable Pressures (kpa)**	
	min.	**max.**
1) Min. Hour	275	700
2) Peak Hour	275	700
3) Peak Day + Fire Flow	140	700

The required fire flow for the proposed development has been estimated using the manual *Water Supply for Public Fire Protection (1999)* by the Fire Underwriters Survey. The calculation is provided on the following page. The fire flow demand is estimated as 3698 USGM and 3170 USGM for the north and south stacked townhouse blocks, respectively. The following assumptions were made in the FUS calculation:

- The proposed townhouses are of ‘ordinary’ construction (wood frame with masonry exterior)
- The proposed townhouses are not sprinklered
- The proposed townhouses’ contents are non-combustible (residential)
- Building footprints and separations from existing buildings are as per the architectural Site Plan

Residential peak day flow is 1.3 L/sec is based on a population of 126 people (above) and a 330 l/cap/day domestic water consumption. A peaking factor for peak day is 2.75 x average domestic.

Peak Hour flow is 1.9 L/sec. A peaking factor of 4.0 x average domestic was used for peak hour calculations for both commercial and residential.

There is adequate flow available in the 300mm Little River Blvd. watermain to provide domestic water and fire protection to the proposed development via the proposed internal watermains. This was determined based on hydrant flow tests conducted on both watermains by Town staff. The hydrant flow tests are provided in Appendix B.

Available flow at 20 psi (140 kPa), minimum pressure at fire flow, is determined for each of the watermains using NFPA Section 4.10.1.2 calculation, as follows.

$$Q_R = Q_F * \frac{h_r^{0.54}}{h_f^{0.54}}$$

Where:

Q_R = Flow at 20 psi
Q_F = Total flow measured during test
h_r = Pressure drop to 20 psi
h_f = Pressure drop measured during test

The available flow at 20psi in the 300mm Little River Boulevard watermain is 4,629 GPM based on the NFPA 4.10.1.2 calculation and the flow test in Appendix B.

Town of Tecumseh staff conducted a flow test on the 150mm Dillon Drive watermain and stated that the available flow at 20psi is 530 GPM.

The 300mm Little River Blvd. watermain provides adequate fire flow to service the proposed development, therefore no existing watermain upgrades are required to accommodate the proposed development.

Town staff requested that the subject site watermain is connected to both the Little River Blvd. 300mm watermain and the Dillon Dr. 150mm watermain to loop the watermain.

C. STORMWATER MANAGEMENT

Background Data

Storm drainage and stormwater management criteria was established in discussions between Town staff, the Town's consultant (Dillon Consulting) and The Odan/Detech Group.

The town's storm sewer network has been analysed by Dillon Consulting, who provided stormwater management/storm drainage design criteria for this site based on their existing model. Design criteria includes allowable release rate criteria under the critical design storms as well as boundary conditions at the site's outlet.

There is additionally grading design criteria given by Essex Region Conservation Authority (ERCA) with respect to lake flooding elevations.

Existing Conditions

Presently the site drains into an existing 750mm storm sewer commencing near the site's northeast corner, which drains into a 900mm storm sewer on the north side of Dillon Drive. The 750mm storm sewer commences at manhole STM7080, which drains into downstream MH J27.

Presently the site drains by two 150mm inlets to storm MH STM7080; one serving the unopened McColl Avenue R.O.W., and one the school site.

Presently the rear yards of the adjacent detached-house lots drain by sheet flow onto the subject site and that external runoff is conveyed to the foregoing existing outlet to Dillon Drive. The site's drainage design therefore provides outlet for this existing external drainage condition.

Existing Topography

The topography of the existing site conditions was surveyed by Clarke Surveyors Incorporated. The survey was completed on October 23, 2018 (updated April 17, 2019) and will be submitted as part of the final design and application of the Site Plan Application. High to low elevation are 176.3 +/- and 175.0 +/-.

DESIGN CRITERIA

Flood and Fill regulations as per ERCA Regulations

Essex Region Conservation Authority (ERCA) has provided lake-flood elevation of 176.40. Building entrances are therefore to be provided with a 0.30m freeboard above that elevation at 176.70. The lowest building entrances (garages) have been set at 177.00 – 0.30m above the minimum elevation – such that there is a minimum cover ontop of the storm sewers within the site.

Refer to the Grading Plan for details.

Pre-Development Target Flow

Allowable flow rates have been established as the pre-development discharge rates from the site for the design storms given by Dillon Consulting from their existing-system model.

The allowable release rate criteria has been provided as 102 L/s in a 1:100-year, 24-hour storm. This comprises both a 58 L/s component (from the Victoria School site) and a 44 L/s (attributed to the unopened McColl Ave. R.O.W.). This was given in an email from Ryan Langlois, P.Eng., of Dillon Consulting Ltd. – provided here in Appendix D. This allowable release rate criteria has been applied to the following analysis.

Boundary conditions at MH J27 were additionally provided by Dillon Consulting for the 1:5-year, 4 hour storms, although there is no allowable release rate criteria for the 5-year storm. Those have been implemented in the site SWM Model.

We note that the pre-development catchment area tributary to each of the two subject site outlets identified in the allowable release rate appears to have been traced using polygons in the screenshot of the existing system model provided by Dillon Consulting (Appendix D). The polygons show that the pre-development catchment area used to establish pre-development flow rates was based strictly on the subject site, whereas in reality the rear lots of the adjacent detached houses bordering the site on all sides drains into and through the subject site.

This is evident in the Post-Development Storm Catchment Plan, below. Notwithstanding that the allowable release rate is given by flows attenuated at the two 150mm outlets, it follows that the flow rate would likely have been greater were the external areas considered (if they were not). Nonetheless, the external catchment areas were considered in the following stormwater quantity control analysis whereby the release rate criteria is complied-with.

Post-Development Storm Drainage Analysis

Stormwater management quantity controls are required to meet the foregoing quantity control criteria.

For the purposes of post-development analysis, the post-development storm tributary areas of the subject site have been identified as shown on the Post-Development Drainage Plan on the following page. In order to control the post-development flows to the pre-development peak flow rate, the proposed SWM facilities will be sized to provide sufficient storage for quantity control purposes.

The post-development storm tributary areas include tributary areas both within the site, and on the adjacent existing detached house lots. The adjacent/external lot tributary areas were delineated by examining the adjacent lots' topography to determine the high point (from the GIS topology), and portion of the site which drains by overland flow into the subject site. Flow arrows have been provided on the Post-Development Catchment Plan, below, illustrating adjacent lot overland flow patterns. The input parameters for the catchment areas comprising adjacent lots was determined by examination of the surface condition by desktop research of the areas.

The site's stormwater management measures were modelled using the computer hydraulic and hydrologic modelling software *XPSWMM 2019.1* by Innovyze. This methodology, rather than a conventional stormwater quantity control design methodology, is required to consider the boundary condition (backwater effect) in the receiving storm sewer system.

Boundary conditions were provided to The Odan/Detech Group by Dillon Consulting for use in the XPSWMM Model. The boundary conditions were provided for Urban Stress-Test, 100-year, 4-hour and 5-year, 4-hour Chicago storms at the downstream manhole J27. The boundary conditions are provided here in Appendix D.

Three storms were run: the 100-year, 4-hour, 5-year, 4-hour and Urban Stress Test (24-Hour, 150mm) storms from the *Windsor/Essex Region Stormwater Management Standards Manual* (Stantec, December 2018) – provided here in Appendix D.

The storm sewers, storm drainage conveyances and stormwater quantity controls were modelled using *XPSWMM's* 1D/2D integrated modelling, whereby the below-grade storm sewer-hydraulic network is dynamically linked to a 2D surface to accurately model above-grade stormwater spills and subsequent impacts.

The site's catchment areas were modeled in XPSWMM as follows in Table 1 using XPSWMM's *Runoff* hydrology routine. Refer to the Post-Development Drainage Plan for the catchment areas. Refer to Table 1, below, for the hydrological parameters inputted into the XPSWMM Model to generate runoff using the *Runoff* hydrology routine.

Infiltration was calculated using the Green-Ampt method in XPSWMM, based on the input parameters described below. The input parameters (Hydrologic Group C) is as per the Geotechnical boreholes which show clay soil as the native soil through the site.

The XPSWMM model showing the structures and pipes is as follows in Figure 1.

The topology in the following *XPSWMM* model of the development comprises the proposed grading, merged with the existing adjacent topology (from GIS information provided by the Town). The TIN used in the XPSWMM Model is provided as follows in Figure 2.

The 2D grid extents of the XPSWMM Model are shown in Figure 3.

Stormwater Storage Volume Modelling

Stormwater storage volume is provided on-site by three measures: storage in the swales around the site's borders, the storm pond in the northeast corner, and storage in the storm sewer pipes/culverts (particularly, the 1800mm x 900mm and 1800mm x 600mm culverts from STM MH4-MH2, MH6-MH2, CBMH8-MH6 and MH7-MH6).

Storage volume in the storm pond was modelled by dynamically linking the surface/TIN with the pond's inlet and outlet structures' inverts – HW1 (inlet) and the orifice tube's 'dummy' inlet structure, StartNullStruc0. The storage volume provided given the pond's geometry (bottom, slopes, etc.) is therefore given in the surface to which the structures are linked. Note that a 50mm 'dummy' pipe/conduit is provided across the pond (from inlet to outlet) so that the hydraulic model is continuous from the upstream reaches to MH J27.

Similarly, the ponding volume that is provided in the swales around the site's borders are modelled by 1D-2D linking between the ditch-inlets and the surface.

Site Parking & Laneway Catchbasin Hydraulic Design

The ditch inlets proposed in the ditches around the site's borders (DI1, DI2, DI3, DI4) have ponding in the ditches occurring in the 100-Year storm as shown on the following XPSWMM hydraulic modelling results.

The catchbasins in the parking and private driveways (CB1 through CB9) are designed such that there will be no ponding above them in any storm event. They have been designed to convey the 100-year storm without the grate inlet restricting flows. There will be no surcharge to the surface in these areas.

For example, in the extreme case, the 100-Y runoff from Catchment 'H' may be conservatively calculated using the Rational Method as follows.

$$Q = 2.78CiA = 2.78 * 0.90 * 172.7\frac{mm}{hr} * 0.22Ha = 95\ L/s$$

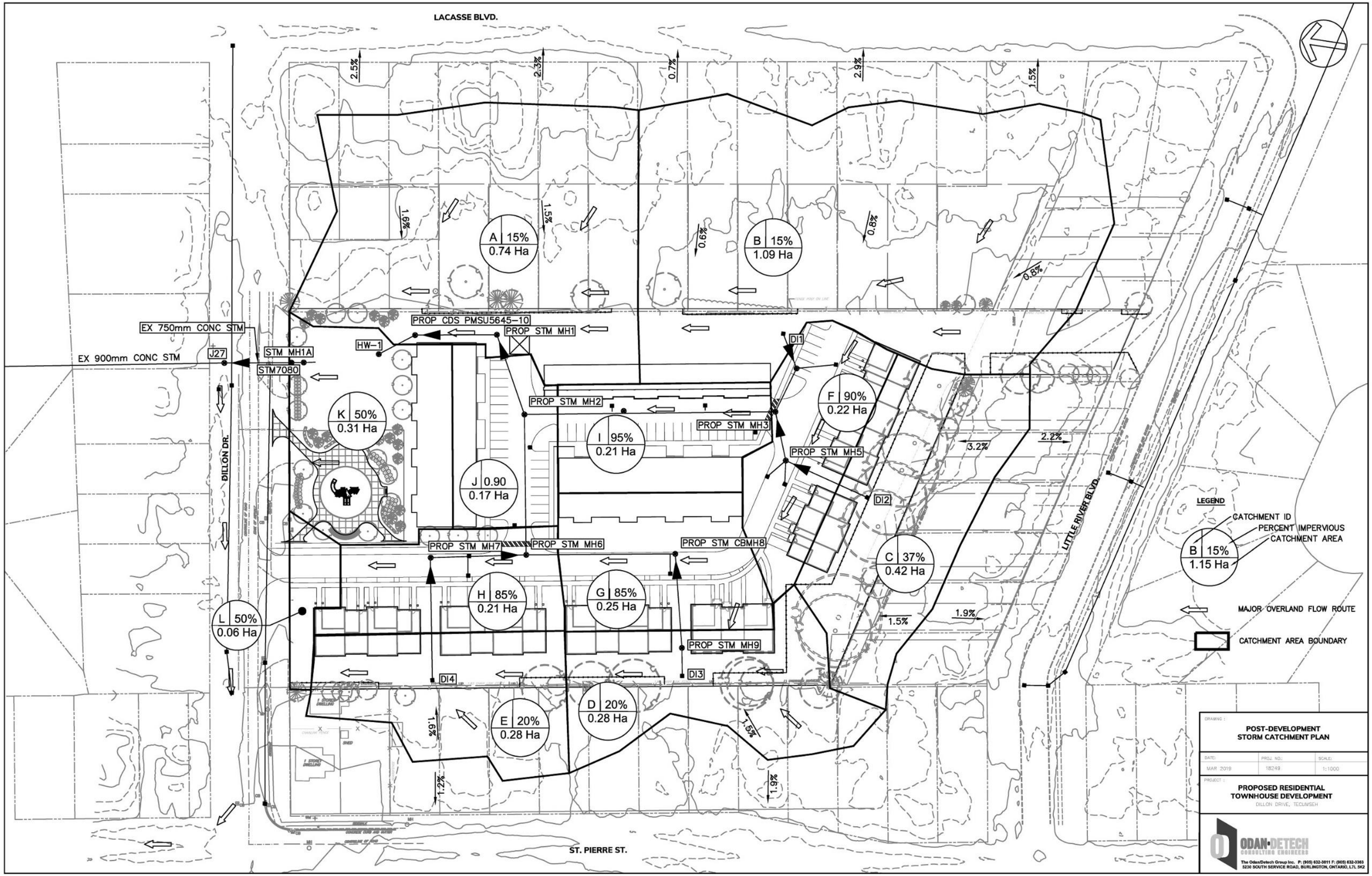
There are two catchbasins serving Catchment 'H' – PROP CB6 and CB7. Each catchbasin may conservatively be assumed to have an inlet capacity of 90 L/s (*Road and Bridge Deck Drainage Systems,* Ontario Ministry of Transportation), meaning there is a combined inlet capacity of 180 L/s – effectively twice the 100-Year runoff flow rate.

The 100-Year HGL in all road segments is below the catchbasin rim elevations, further, therefore there will be no surface ponding on parking areas or private laneways arising from surcharge in the site storm sewers. Note that the highest 100-Y HGL is 175.78 (Fig. 13), whereas the CB's RIM elevations are typically 176.50 – meaning there is approximately 0.72m freeboard.

The catchbasins have thereby been designed to receive the 100-year storms, uncontrolled, without any surface ponding.

Table 1 – Post-Development Receiving Storm Sewer Catchment Characteristics

Catchment ID	Inlet Structure	Hydrology Method	Trib Area (m^2)	Length (m)	Width (m)	Infiltration Losses Calculation	% Imperviousness	Catchment Slope	Trib Area (Ha)
A	Storm Pond	XPSWMM *Runoff* Method	7,400	129	29	Green-Ampt Method Hydrologic Group – ‘ C’ (Silty Clay Till Soil) Su = 250mm Ks = 1.8 mm/hr IMD = 0.26	15.0	1%	0.740
B	DI1		10,900	157	35		15.0	1%	1.090
C	DI2		4,200	97	22		37.0	1%	0.420
D	DI3		2,800	79	18		20.0	1%	0.280
E	DI4		2,800	79	18		20.0	1%	0.280
F	STM MH5		2,200	70	16		90.0	1%	0.220
G	STM CBMH8		2,500	75	17		85.0	1%	0.250
H	STM MH7		2,100	69	15		85.0	1%	0.210
I	STM MH4		2,100	69	15		95.0	1%	0.210
J	STM MH6		1,700	62	14		90.0	1%	0.170
K	Storm Pond		3,100	84	19		50.0	1%	0.310


LACASSE BLVD.
DILLON DR.
ST. PIERRE ST.
LITTLE RIVER BLVD.
EX 750mm CONC STM
EX 900mm CONC STM
J27
STM MH1A
STM7080
HW-1
PROP CDS PMSU5645-10
PROP STM MH1
PROP STM MH2
PROP STM MH3
PROP STM MH5
PROP STM MH6
PROP STM MH7
PROP STM CBMH8
PROP STM MH9
DI1
DI2
DI3
DI4
A 15% 0.74 Ha
B 15% 1.09 Ha
C 37% 0.42 Ha
D 20% 0.28 Ha
E 20% 0.28 Ha
F 90% 0.22 Ha
G 85% 0.25 Ha
H 85% 0.21 Ha
I 95% 0.21 Ha
J 0.90 0.17 Ha
K 50% 0.31 Ha
L 50% 0.06 Ha
2.5%
2.3%
0.7%
2.9%
1.5%
1.6%
1.5%
0.6%
0.8%
0.8%
3.2%
2.2%
1.9%
1.5%
1.6%
1.2%
1.6%
1.5%
LEGEND
CATCHMENT ID
PERCENT IMPERVIOUS
CATCHMENT AREA
B 15% 1.15 Ha
MAJOR OVERLAND FLOW ROUTE
CATCHMENT AREA BOUNDARY
DRAWING :
POST-DEVELOPMENT STORM CATCHMENT PLAN
DATE: MAR 2019
PROJ. NO.: 18249
SCALE: 1:1000
PROJECT :
PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT
DILLON DRIVE, TECUMSEH
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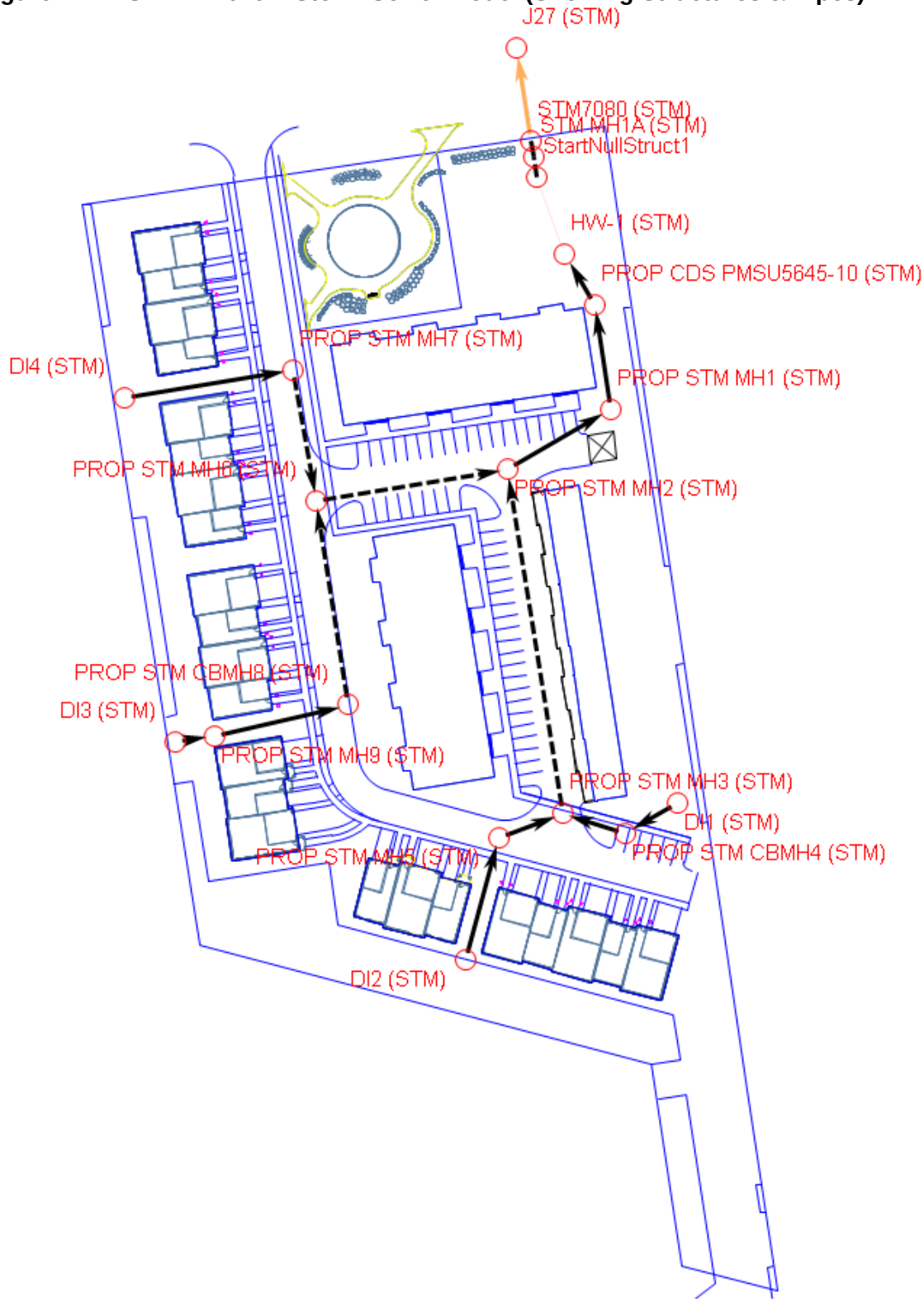
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

Figure 1 - XPSWMM 2019.1 Storm Sewer Model (Showing Structures & Pipes)



Legend: Δ - storage node, o –node/MH,

Link (pipe or open channel) Tan colour shows existing

Parallel Pipe or Link with pipe and channel above or orifice

Figure 2 - XPSWMM 2019.1 Storm Sewer Model (Showing Proposed Topography/Grading)

Figure 3 – 2D Grid Extents of XPSWMM Analysis

Storm Quantity Control Analysis Results

The stormwater management quantity control design comprises the following quantity control measures:

- 205mm orifice plate at inlet to STM MH1A – provides attenuation at outlet from storm pond.
- A backflow preventer will be provided at the outlet at STM MH1A to prevent backwater at MH J27 from flowing upstream into the site and occupying stormwater storage volume within the site. The backflow preventer has been modelled in the XPSWMM Model such that the pipe between STM7080 and STM MH1A is 'downhill only'.
- Dry Stormwater Volume Pond – a storm pond with volume 1,104m^3 (to top-of-bank elevation 175.90, or 1.57m storage depth provides volume upstream of the pond's outlet to the orifice (above). The storm pond storage volume is modelled as part of the 2D Surface in the XPSWMM Model, the ponding volume within the pond thereby dynamically modelled.
- Cultec Recharger 360HD Stormwater Storage device providing a total of 614m^3 storage volume is provided beneath the parking lot area at STM MH3 to STM MH4. Refer to the design report for the Cultec in Appendix D.

The results of the XPSWMM analysis, as follows, show that the above quantity control measures satisfy the quantity control criteria provided by Dillon Consulting.

Table 2 summarizes the quantity controls provided given the following results. Table 3 provides the stormwater storage conclusions whereby the quantity control criteria is satisfied.

It is shown that the 100-year peak flow, comprising controlled discharge from the 205mm orifice plate and uncontrolled flow (Catchment 'L'), is ***102 L/s***, whereas the allowable release rate given by Dillon Consulting is ***102 L/s***. The proposed stormwater quantity control measures are therefore in compliance with the design criteria.

Table 2 – Control Discharge Flows

Catchment Area	Quantity Control	5-Year Peak Flow	100-Year Peak Flow	Allowable Peak Flow
Site – Catchment 'A' through 'K'	205mm Orifice Plate at STM MH1A	74 L/s	89 L/s	-
Uncontrolled Runoff Area – Catchment 'L'	N/A - Uncontrolled	8 L/s	12 L/s	-
Total Peak Site Discharge		82 L/s	101 L/s	102 L/s

Table 3 – Stormwater Storage Volume			
Stormwater Storage Measure	5-Year Required Volume	100-Year Required Volume	Provided Volume
Storm Quantity Pond	640 m^3 (to el. 175.24) (depth 0.91m)	1,019 m^3 (to el. 175.78) (depth 1.45m)	1,104 m^3 (to el. 175.90) (depth 1.57m)
76.78m (x2) + 45.6m (x2) + 29.22m (x2) 1800mm x 600mm box culvert (STM MH3-MH2; MH8-MH6; MH7-MH6)	<327.4 m^3	327.4 m^3	327.4 m^3
42.9m (x2) 1800mm x 900mm box culvert (STM MH6-MH2)	<139.0 m^3	139.0 m^3	139.0 m^3
Total Volume	1,106 m^3	1,485 m^3	1,570 m^3

The results of the XPSWMM analysis are provided in the following pages.

Figures 4, 5 and 6 provide the stormwater ponding depth in the 5-year, 100-year and Urban Stress Test storms.

Figures 7-10 show the HGL Profile results through the site's storm sewers in the 5-year Storm. Figures 11-14 show the HGL Profile results through the site's storm sewers in the 100-year Storm. Figures 15-18 show the HGL Profile results through the site's storm sewers in the Urban Stress Test Storm.

Figures 19 and 20 show the hydrograph output at the site's outlet pipe from STM MH1A in the 100-Year and UST Storms, respectively.

The results may be read from the following figures as follows:

Results for Pipe Segments

pipes

	Pipe - (610) (STM)
Storm	5yr-4 hr
Conduit Slope	0.003
Diameter (Hei	0.300
Design Full Flo	0.050
Max Flow	0.016

Storm Event
Pipe Slope
Pipe Diameter
Max Flow Capacity
Proposed Flow

Results for MH/DIs

	DI4 (STM)
Storm	5yr-4 hr
Ground Elevati	175.435
Max Water Ele	175.374
Freeboard	0.060
Invert Elevatio	175.091
Max Volume	0.344

MH

Structure ID
Storm Event
Ground Elevation
Max Water Elevation
Invert Elevation

Site Storm Sewer Design

Given that the site's stormwater is necessarily attenuated by the orifice plate at the outlet, the pipes have been sized as shown in the following results to provide adequate storage volume in the design storms, rather than conveyance capacity.

Conclusions and Discussion

The following conclusions and discussion are drawn from the following results, and the XPSWMM output provided in Appendix D.

- The site's internal storm sewers are flowing at less than 100% capacity in the 5-Year (minor) storm event, therefore they have been adequately designed to provide conveyance for the minor storm event, however they are surcharged on account of the outlet attenuation – Figures 7-10.

- The controlled discharge rate through the 205mm Orifice Plate in STM MH1A (labelled *205mm Plate* in the following HGL Plots) is 89L/s in the 100-Year Storm (Figures 11-14, 19), whereby the allowable release rate criteria is complied-with.

- Figures 19 and 20 (hydrograph of outlet pipe) shows that the backflow preventer has been implemented in the model, as there is no reverse flow in the storm sewer connection.

- The max water elevation in the Storm Pond in the 5-Year storm is 175.24, therefore the 5-year ponding depth is 0.91m. There is effectively no ponding anywhere else on the site in the 5-year storm.

- The max water elevation in the ***Storm Pond*** in the 100-Year storm is 175.78, therefore the 100-year ponding depth is 1.45m. There is also up to 0.3m ponding in the ditches surrounding the borders of the site, however it is contained on the subject site and does not spill onto the adjacent properties.

- The maximum water elevation in the site's boundary ditches/swales is 175.78, as per Figures 11-18, as per the dynamic hydraulic modelling results. The max water elevation in the ditches can be read as the maximum water level at each of the respective DI's from Figures 11-18 in the 100-Year and Urban Stress Test Storms.

- From the XPSWMM 1D output Log (Appendix D), there was an overall mass error of 0.1%. This is considered excellent in dynamic modelling, meaning no significant water was 'lost' anywhere in the analysis. That is, virtually all of the water that entered the system subsequently left the system.

Figure 4 - XPSWMM 5-Year Storm Ponding Depth

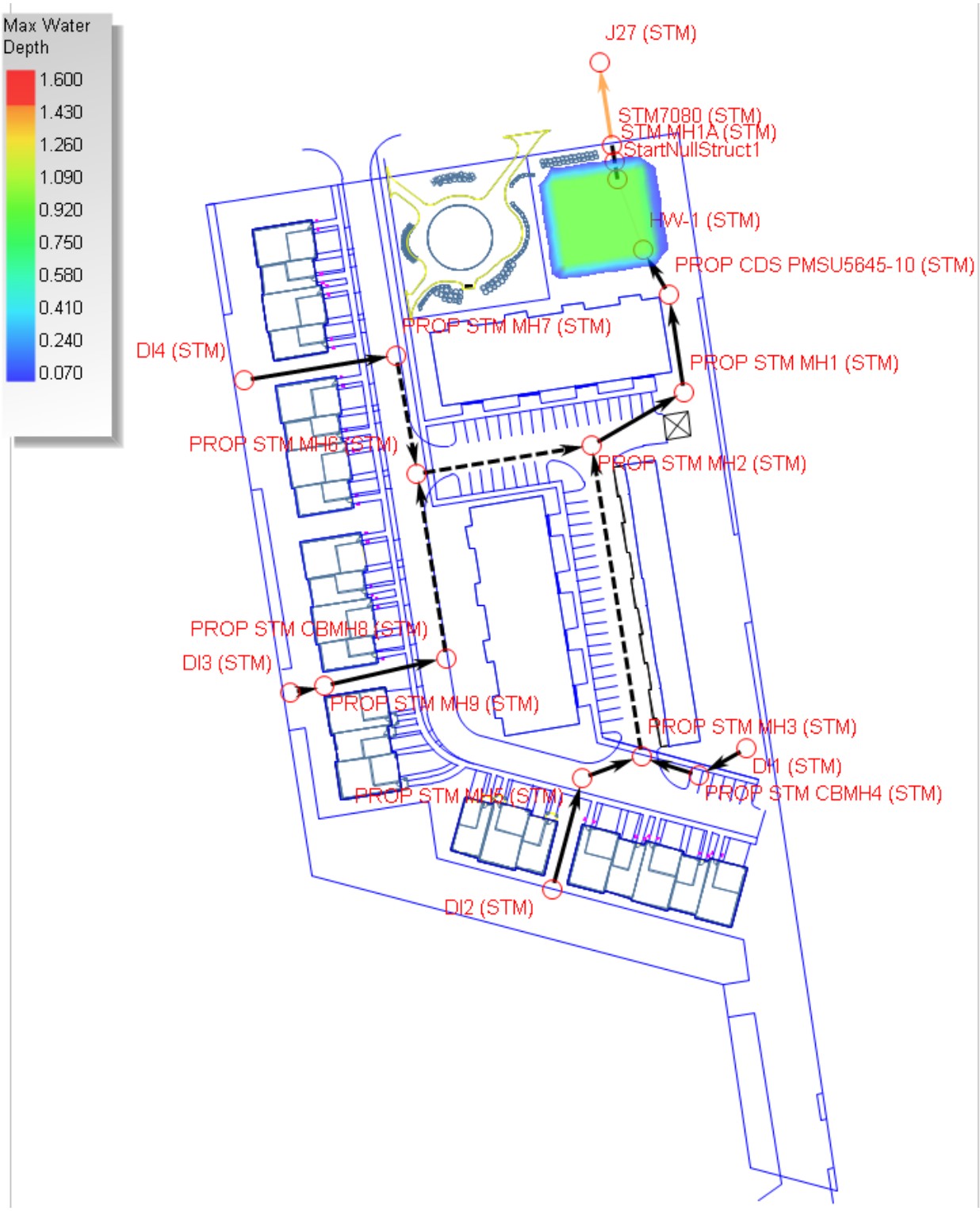


Figure 5 - XPSWMM 100-Year Storm Ponding Depth

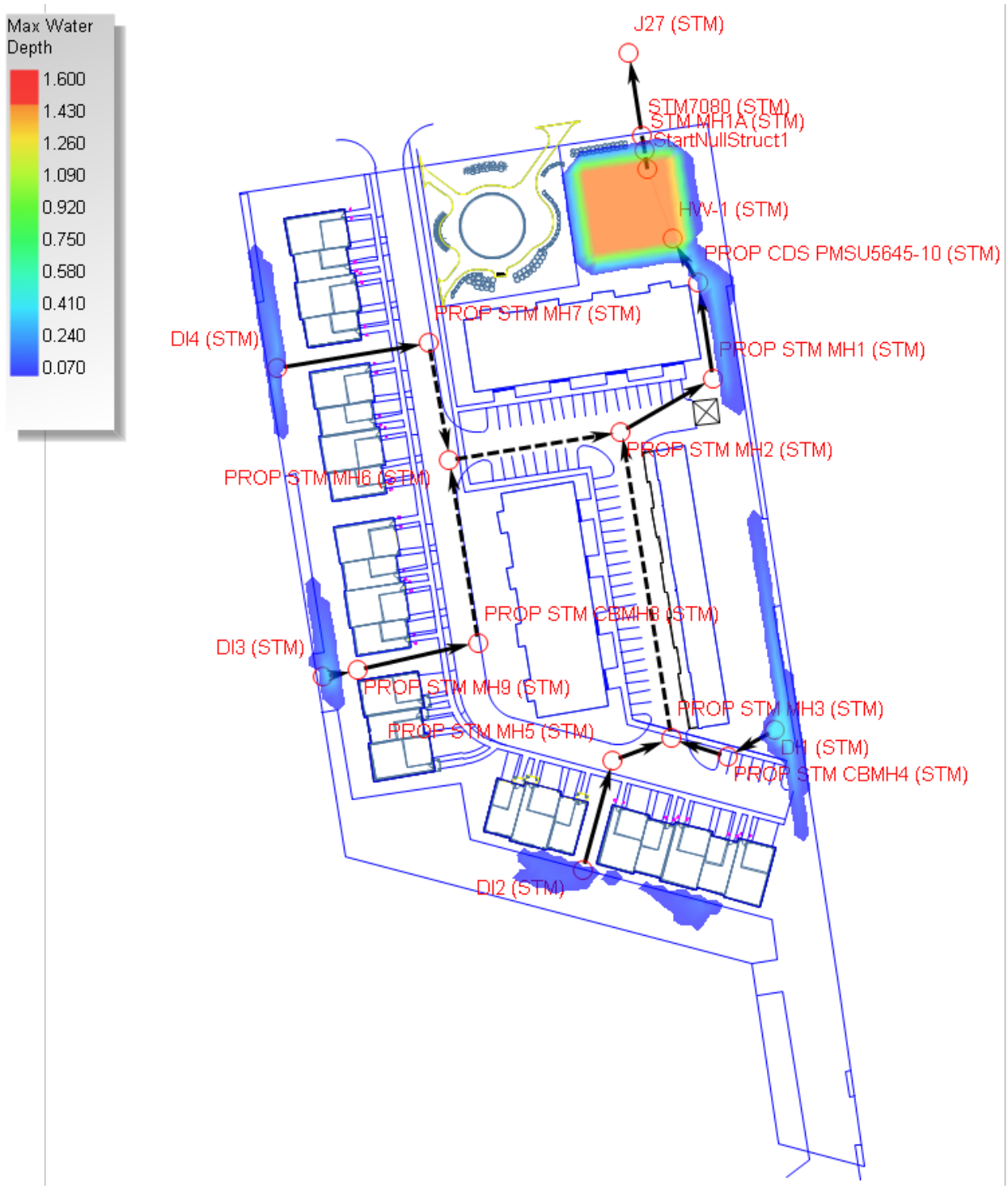


Figure 6 - XPSWMM Urban Stress Test Storm Ponding Depth

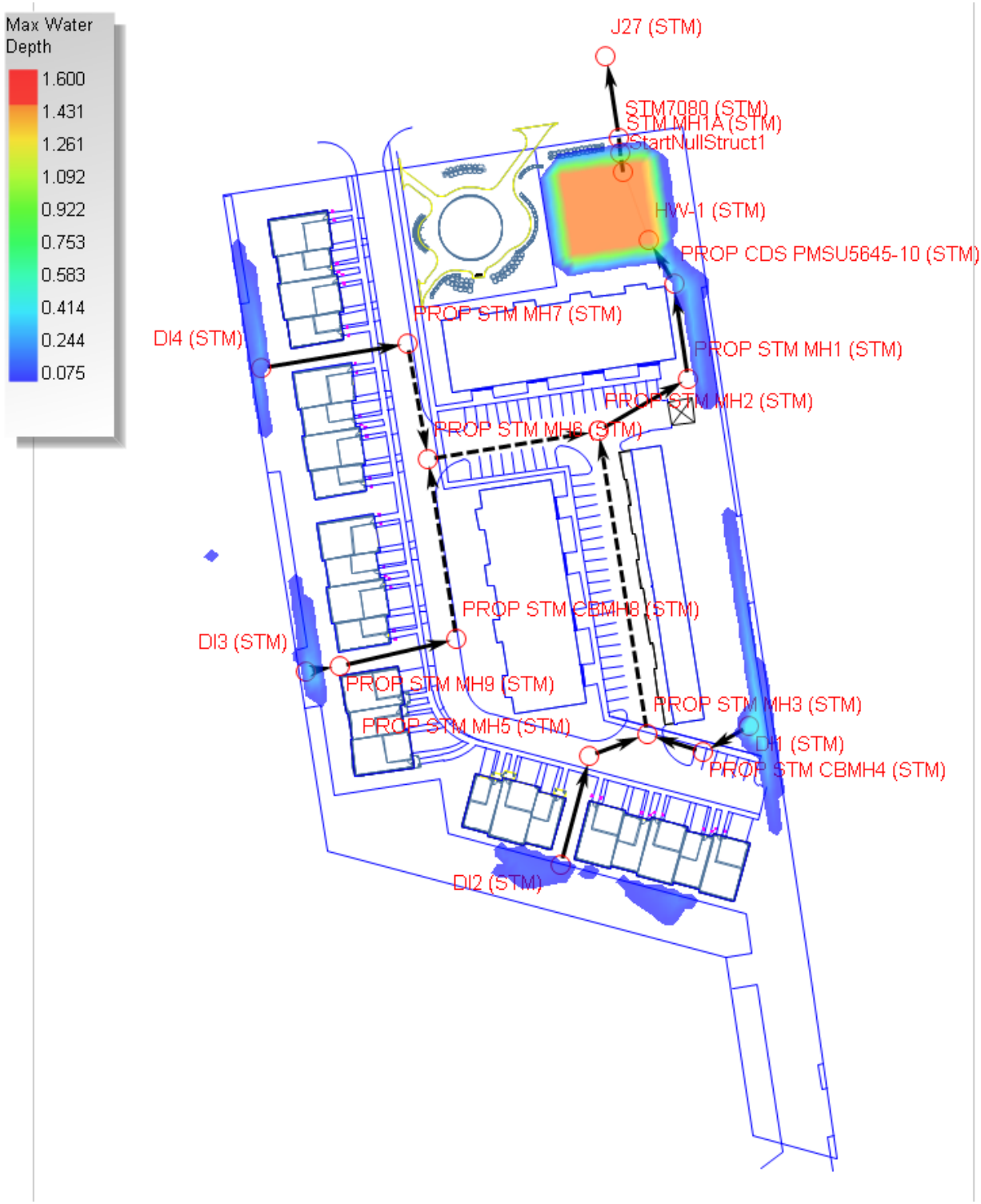


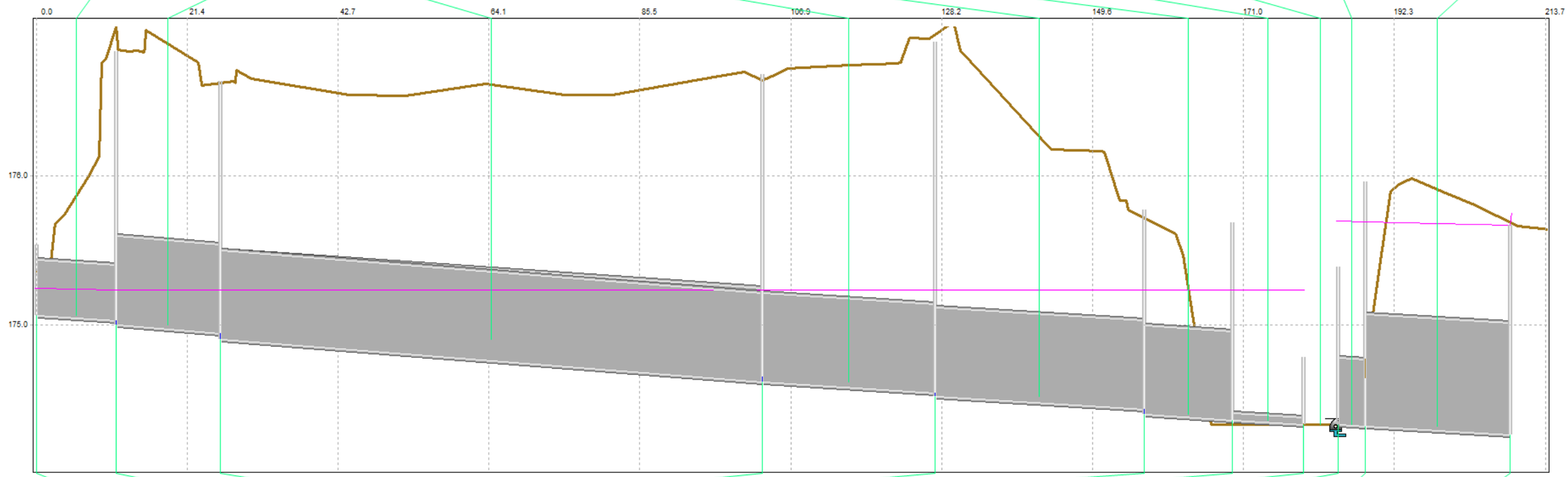
Figure 7 - 5-Year HGL Plot through DI1

pipes

	Pipe - (609) (STM)	Pipe - (676) (STM)	534.1	534.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Conduit Slope	0.003	0.004	0.326	0.374	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.375	0.600	0.600	0.600	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.090	1.920	1.750	1.880	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.049	0.049	0.086	0.098	0.296	0.282	0.265	0.000	0.074	-0.196	-0.269
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013

Multiple Link from PROP STM MH3 (STM) to PROP STM MH2 (STM)

Multiple Link from StartNullStruct1 to STM MH1A (STM)



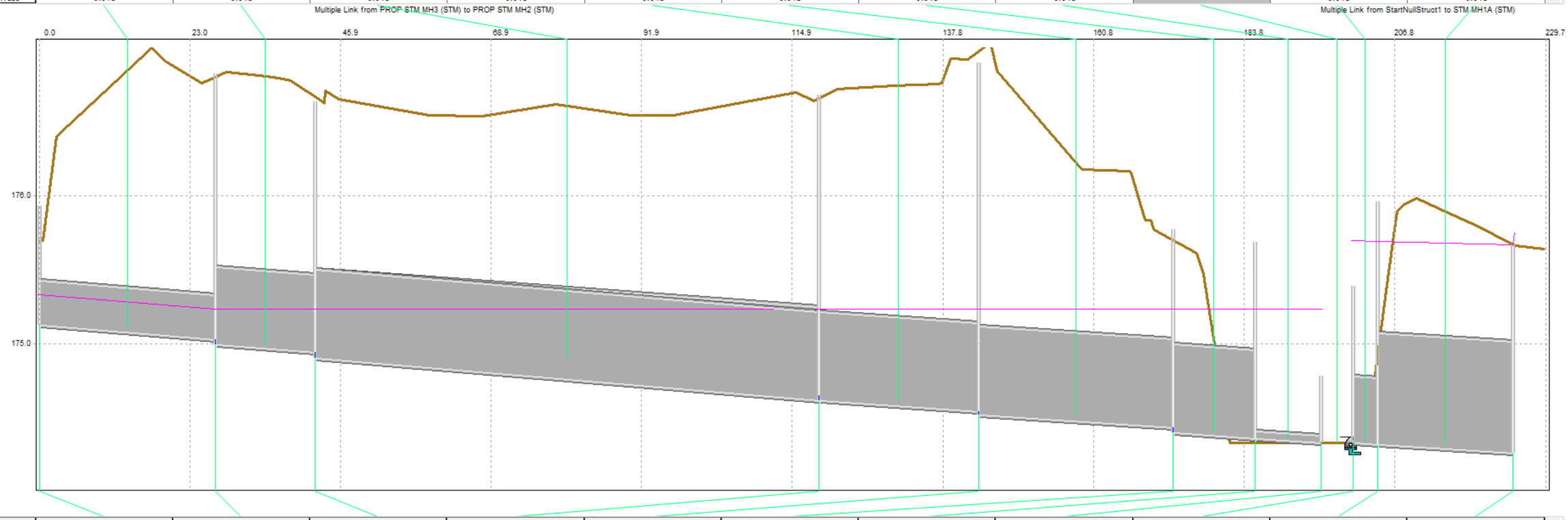
	DI1 (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Ground Elevati	175.538	176.840	176.634	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.244	175.236	175.236	175.236	175.236	175.236	175.235	175.235	175.698	175.690	175.757
Freeboard	0.290	1.600	1.400	1.450	1.670	0.540	0.450	-0.450	-0.310	0.270	-0.090
Invert Elevatio	175.063	174.997	174.900	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.221	0.292	0.411	0.760	0.875	1.022	1.067	1.104	1.672	1.672	1.826

MH

Figure 8 - 5-Year HGL Plot Through DI2

pipes

	Pipe - (607) (STM)	Pipe - (608) (STM)	534.1	534.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Conduit Slope	0.004	0.003	0.326	0.374	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.525	0.600	0.600	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.060	0.250	1.750	1.880	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.047	0.105	0.086	0.098	0.296	0.282	0.265	0.000	0.074	-0.196	-0.269
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



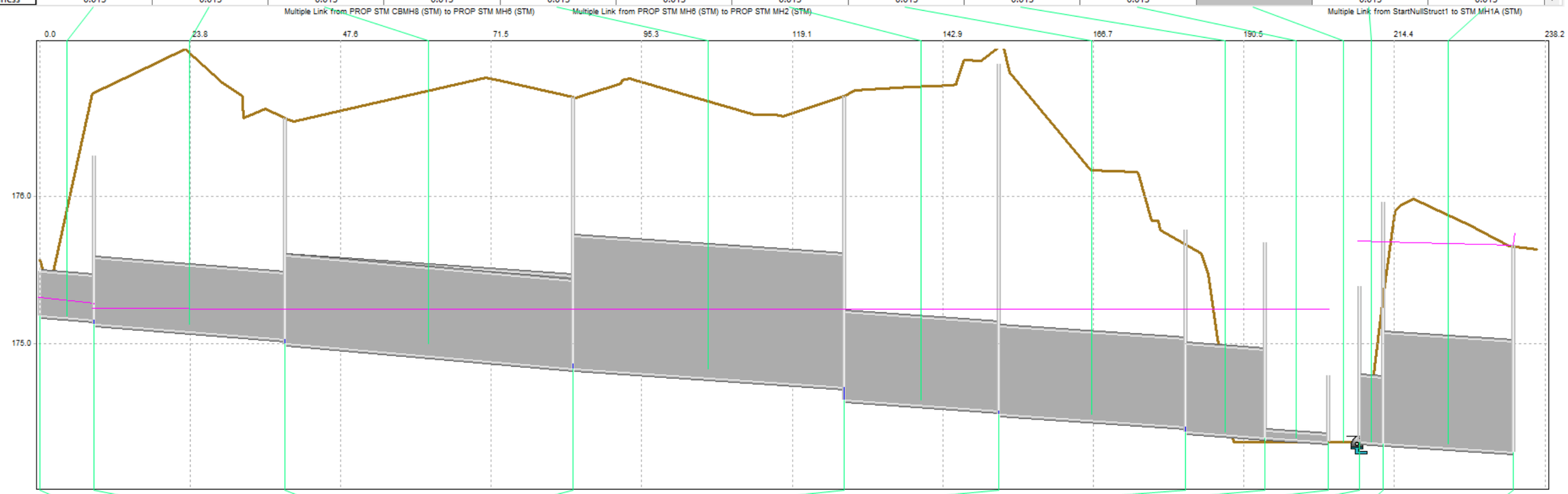
	DI2 (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Ground Elevati	175.932	176.823	176.634	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.330	175.237	175.236	175.236	175.236	175.236	175.235	175.235	175.698	175.690	175.757
Freeboard	0.600	1.590	1.400	1.450	1.670	0.540	0.450	-0.450	-0.310	0.270	-0.090
Invert Elevatio	175.127	174.993	174.900	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.247	0.298	0.411	0.760	0.875	1.022	1.067	1.104	1.672	1.672	1.826

MH

Figure 9 - 5-Year HGL Plot Through DI3

pipes

	Pipe - (611) (STM)	Pipe - (602) (STM)	537.1	537.2	535.1	535.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Conduit Slope	0.003	0.003	0.003	0.000	0.003	0.303	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.450	0.600	0.600	0.900	0.900	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.050	0.160	1.700	1.880	3.070	3.070	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.022	0.021	0.038	0.043	0.074	0.074	0.296	0.282	0.265	0.000	0.074	-0.196	-0.269
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



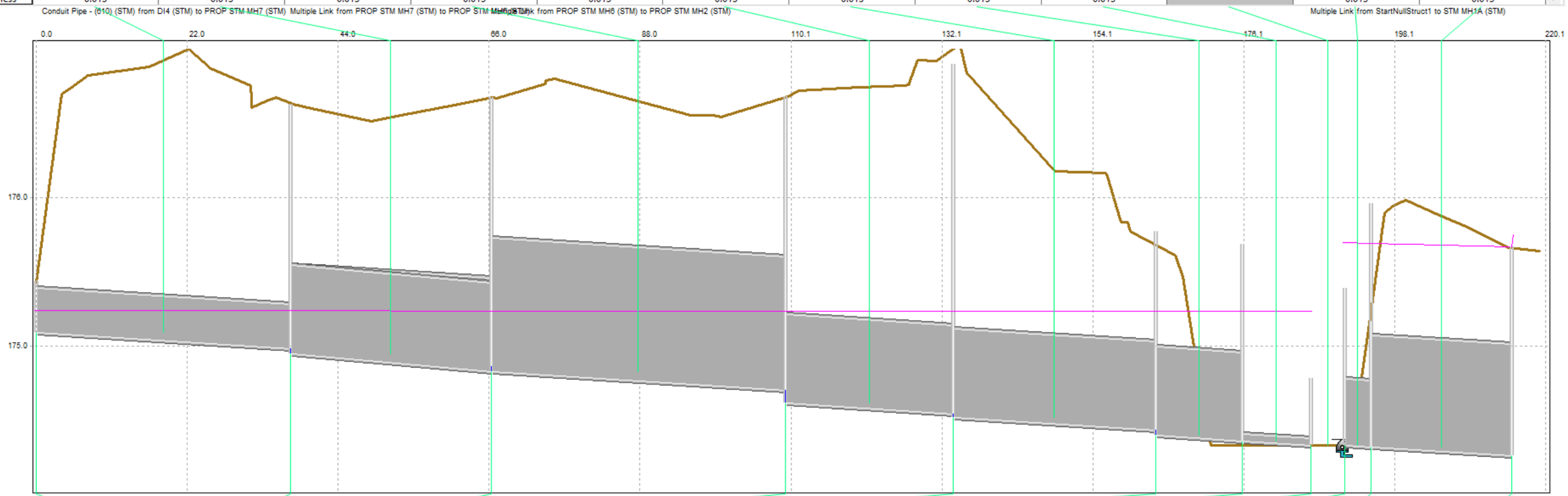
	DI3 (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (S	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Ground Elevati	175.492	176.278	176.533	176.677	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.313	175.241	175.237	175.237	175.236	175.236	175.236	175.235	175.235	175.698	175.690	175.757
Freeboard	0.180	1.040	1.300	1.440	1.450	1.670	0.540	0.450	-0.450	-0.310	0.270	-0.090
Invert Elevatio	175.185	175.128	175.000	174.830	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.156	0.138	0.289	0.496	0.760	0.875	1.022	1.067	1.104	1.672	1.672	1.826

MH

Figure 10 - 5-Year HGL Plot Through DI4

pipes

	Pipe - (610) (STM)	503.1	503.2	535.1	535.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Conduit Slope	0.003	0.300	0.000	0.003	0.303	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.600	0.600	0.900	0.900	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.050	1.680	1.950	3.070	3.070	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.020	0.030	0.036	0.074	0.074	0.296	0.282	0.265	0.000	0.074	-0.196	-0.269
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



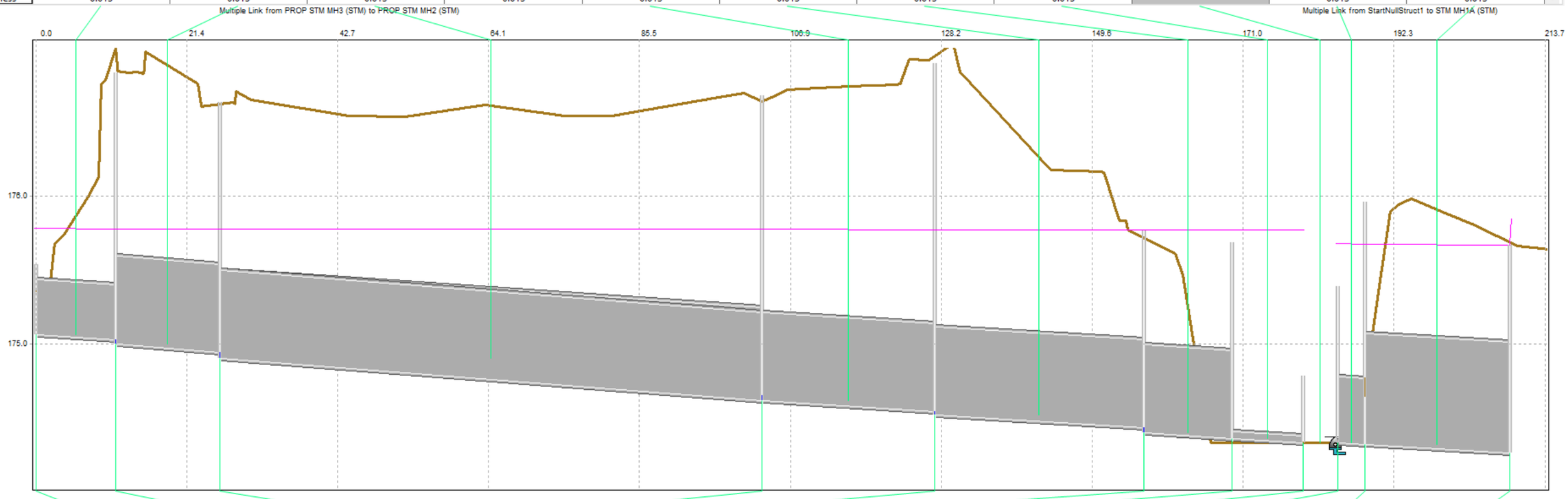
	DI4 (STM)	PROP STM MH7 (STM)	PROP STM MH6 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr	5yr-4 hr
Ground Elevati	175.435	176.629	176.677	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.237	175.237	175.237	175.236	175.236	175.236	175.235	175.235	175.698	175.690	175.757
Freeboard	0.200	1.390	1.440	1.450	1.670	0.540	0.450	-0.450	-0.310	0.270	-0.090
Invert Elevatio	175.091	174.948	174.830	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.178	0.353	0.496	0.760	0.875	1.022	1.067	1.104	1.672	1.672	1.826

MH

Figure 11 - 100-Year HGL Plot Through DI1

pipes

	Pipe - (609) (STM)	Pipe - (676) (STM)	534.1	534.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Conduit Slope	0.003	0.004	0.326	0.374	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.375	0.600	0.600	0.600	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.090	1.920	1.750	1.880	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.100	0.094	0.137	0.164	0.366	0.338	0.318	0.000	0.089	-0.189	-0.270
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



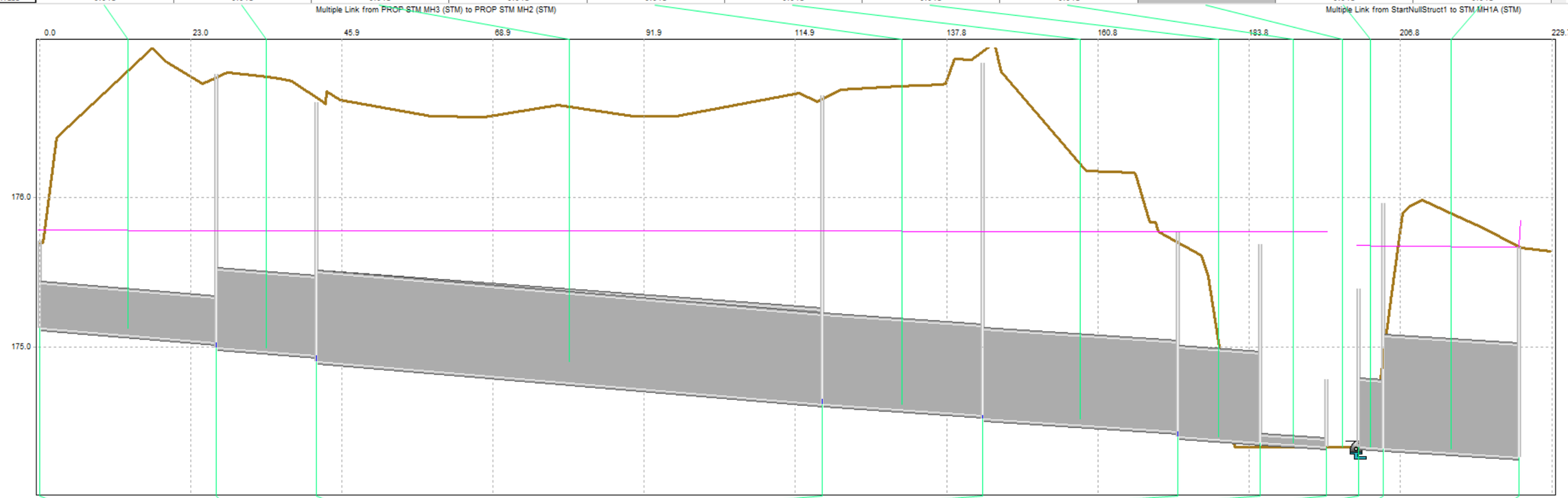
	DI1 (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Ground Elevati	175.538	176.840	176.634	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.782	175.778	175.778	175.777	175.772	175.772	175.774	175.774	175.678	175.676	175.855
Freeboard	-0.240	1.060	0.860	0.910	1.130	0.000	-0.090	-0.990	-0.290	0.280	-0.190
Invert Elevatio	175.063	174.997	174.900	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.877	0.952	1.071	1.420	1.529	1.676	1.726	1.762	1.649	1.655	1.946

MH

Figure 12 - 100-Year HGL Plot Through DI2

pipes

	Pipe - (607) (STM)	Pipe - (608) (STM)	534.1	534.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Conduit Slope	0.004	0.003	0.326	0.374	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.525	0.600	0.600	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.060	0.250	1.750	1.880	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.088	0.187	0.137	0.164	0.366	0.338	0.318	0.000	0.089	-0.189	-0.270
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



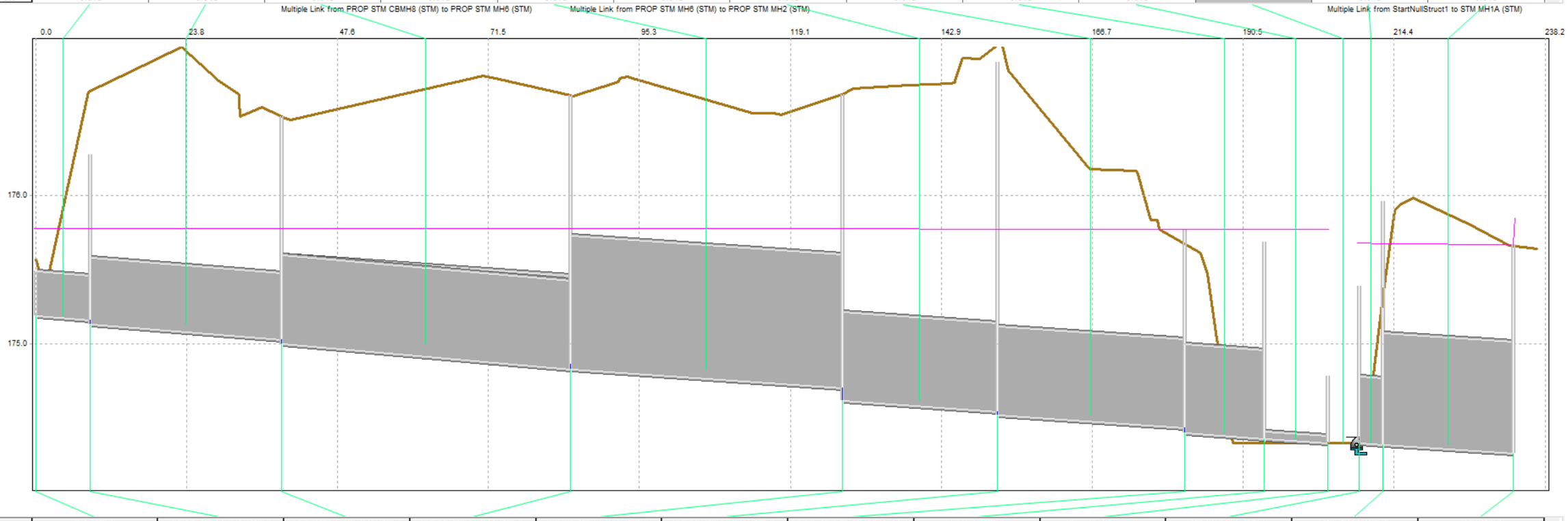
	DI2 (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Ground Elevat	175.710	176.823	176.634	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.781	175.778	175.778	175.777	175.772	175.772	175.774	175.774	175.678	175.676	175.855
Freeboard	-0.070	1.050	0.860	0.910	1.130	0.000	-0.090	-0.990	-0.290	0.280	-0.190
Invert Elevatio	175.127	174.993	174.900	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.798	0.958	1.071	1.420	1.529	1.676	1.726	1.762	1.649	1.655	1.946

MH

Figure 13 - 100-Year HGL Plot Through DI3

pipes

	Pipe - (611) (STM)	Pipe - (602) (STM)	537.1	537.2	535.1	535.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Conduit Slope	0.003	0.003	0.003	0.000	0.003	0.303	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.450	0.600	0.600	0.900	0.900	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.050	0.160	1.700	1.880	3.070	3.070	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.045	0.044	0.055	0.063	0.098	0.098	0.366	0.338	0.318	0.000	0.089	-0.189	-0.270
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



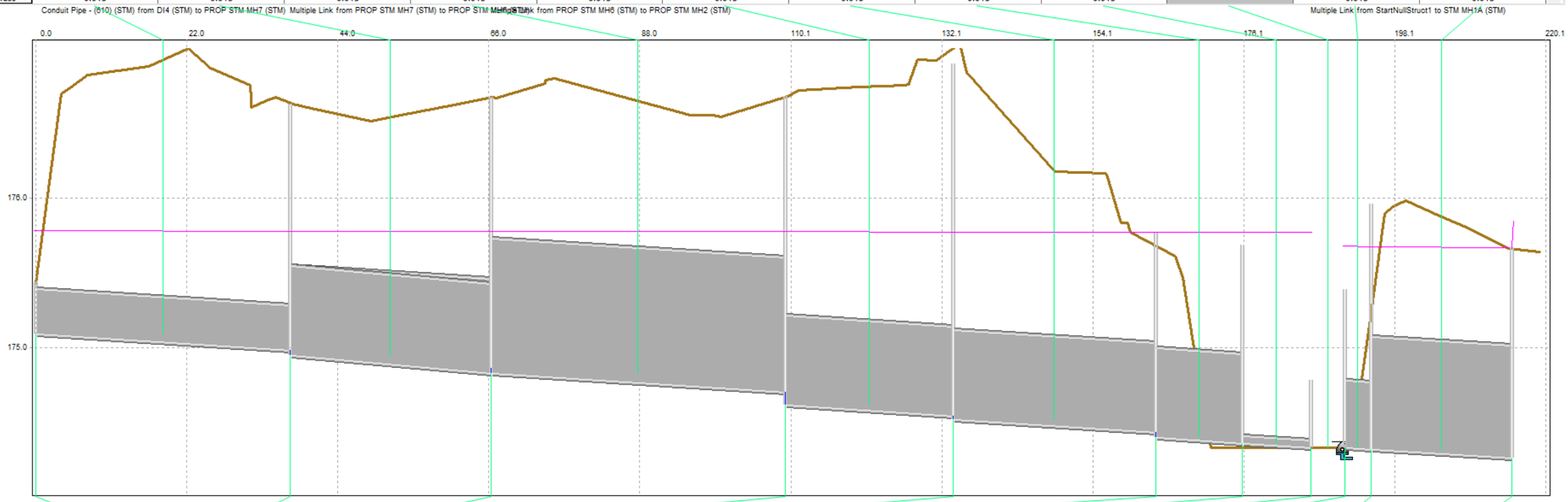
	DI3 (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (S	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Ground Elevati	175.492	176.278	176.533	176.677	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.779	175.778	175.777	175.777	175.777	175.772	175.772	175.774	175.774	175.678	175.676	175.855
Freeboard	-0.290	0.500	0.760	0.900	0.910	1.130	0.000	-0.090	-0.990	-0.290	0.280	-0.190
Invert Elevatio	175.185	175.128	175.000	174.830	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.724	0.793	0.949	1.156	1.420	1.529	1.676	1.726	1.762	1.649	1.655	1.946

MH

Figure 14 - 100-Year HGL Plot Through DI4

pipes

	Pipe - (610) (STM)	503.1	503.2	535.1	535.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Conduit Slope	0.003	0.300	0.000	0.003	0.303	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.600	0.600	0.900	0.900	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.050	1.680	1.950	3.070	3.070	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.042	0.047	0.066	0.098	0.098	0.366	0.338	0.318	0.000	0.089	-0.189	-0.270
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



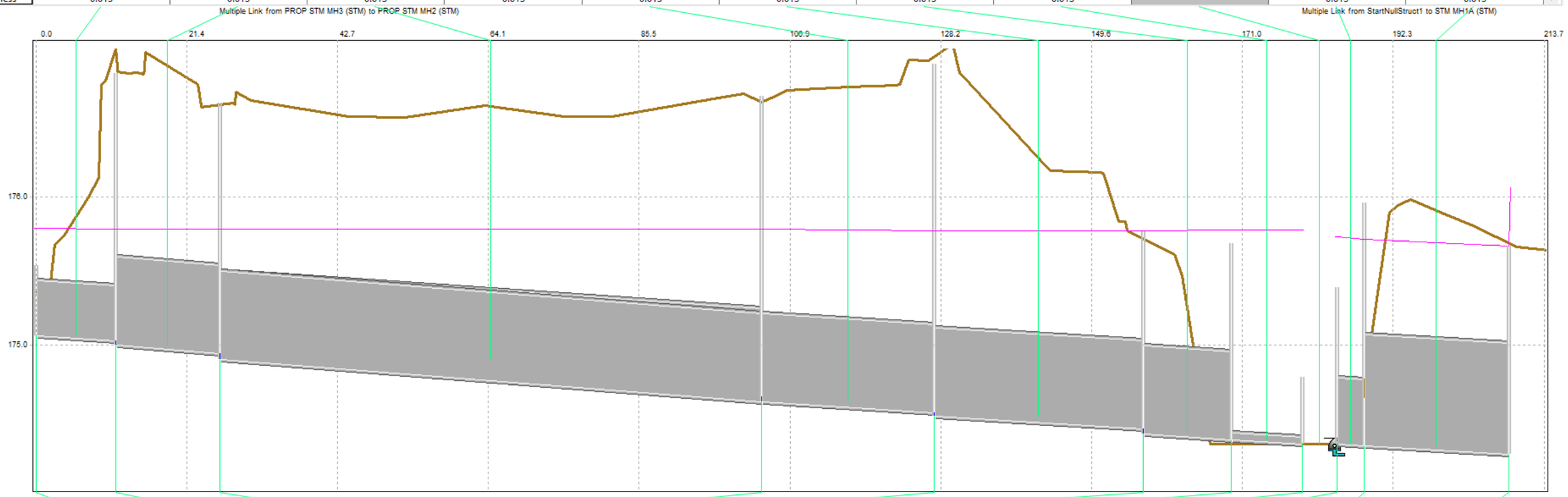
	DI4 (STM)	PROP STM MH7 (STM)	PROP STM MH6 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr	100yr-4hr
Ground Elevati	175.435	176.629	176.677	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.781	175.777	175.777	175.777	175.772	175.772	175.774	175.774	175.678	175.676	175.855
Freeboard	-0.350	0.850	0.900	0.910	1.130	0.000	-0.090	-0.990	-0.290	0.280	-0.190
Invert Elevatio	175.091	174.948	174.830	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.841	1.012	1.156	1.420	1.529	1.676	1.726	1.762	1.649	1.655	1.946

MH

Figure 15 - UST Storm HGL Plot Through DI1

pipes

	Pipe - (609) (STM)	Pipe - (676) (STM)	534.1	534.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Conduit Slope	0.003	0.004	0.326	0.374	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.375	0.600	0.600	0.600	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.090	1.920	1.750	1.880	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.102	0.096	0.124	0.150	0.354	0.330	0.308	0.000	0.090	0.090	0.107
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



	DI1 (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Ground Elevati	175.538	176.840	176.634	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.791	175.783	175.783	175.783	175.772	175.772	175.776	175.776	175.732	175.715	176.072
Freeboard	-0.250	1.060	0.850	0.900	1.130	0.000	-0.090	-1.000	-0.340	0.250	-0.400
Invert Elevatio	175.063	174.997	174.900	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.889	0.959	1.078	1.427	1.530	1.676	1.728	1.764	1.717	1.704	2.211

MH

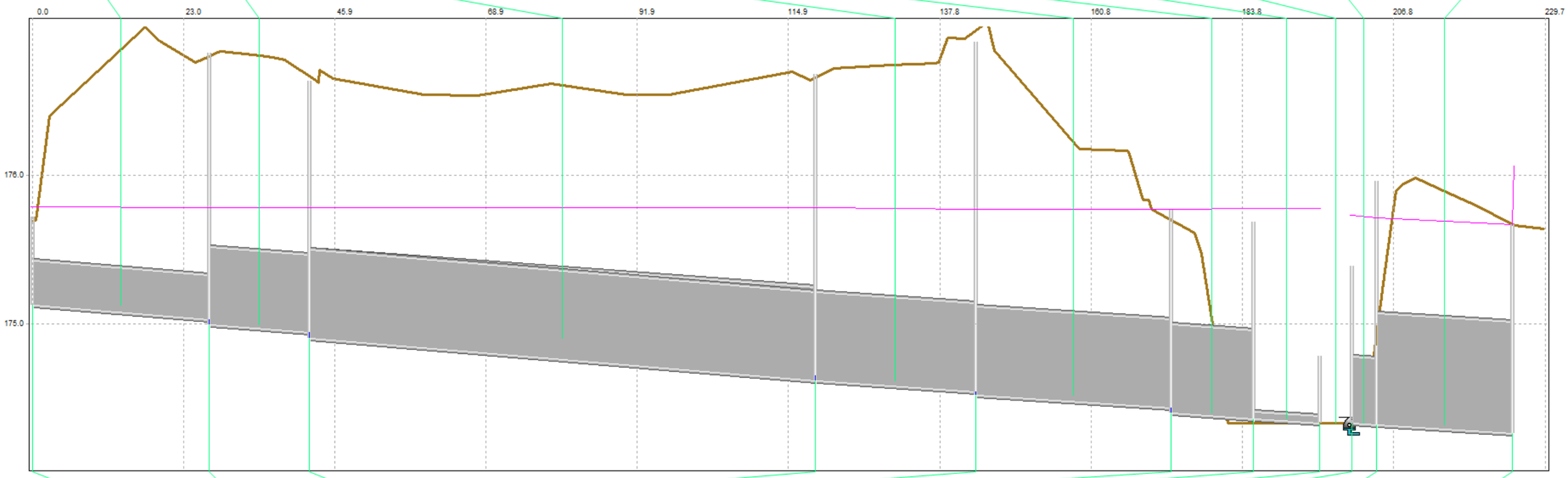
Figure 16 - UST Storm HGL Plot Through DI2

pipes

	Pipe - (607) (STM)	Pipe - (608) (STM)	534.1	534.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Conduit Slope	0.004	0.003	0.326	0.374	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.525	0.600	0.600	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.060	0.250	1.750	1.880	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.084	0.170	0.124	0.150	0.354	0.330	0.308	0.000	0.090	0.090	0.107
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013

Multiple Link from PROP STM MH3 (STM) to PROP STM MH2 (STM)

Multiple Link from StartNullStruct1 to STM MH1A (STM)



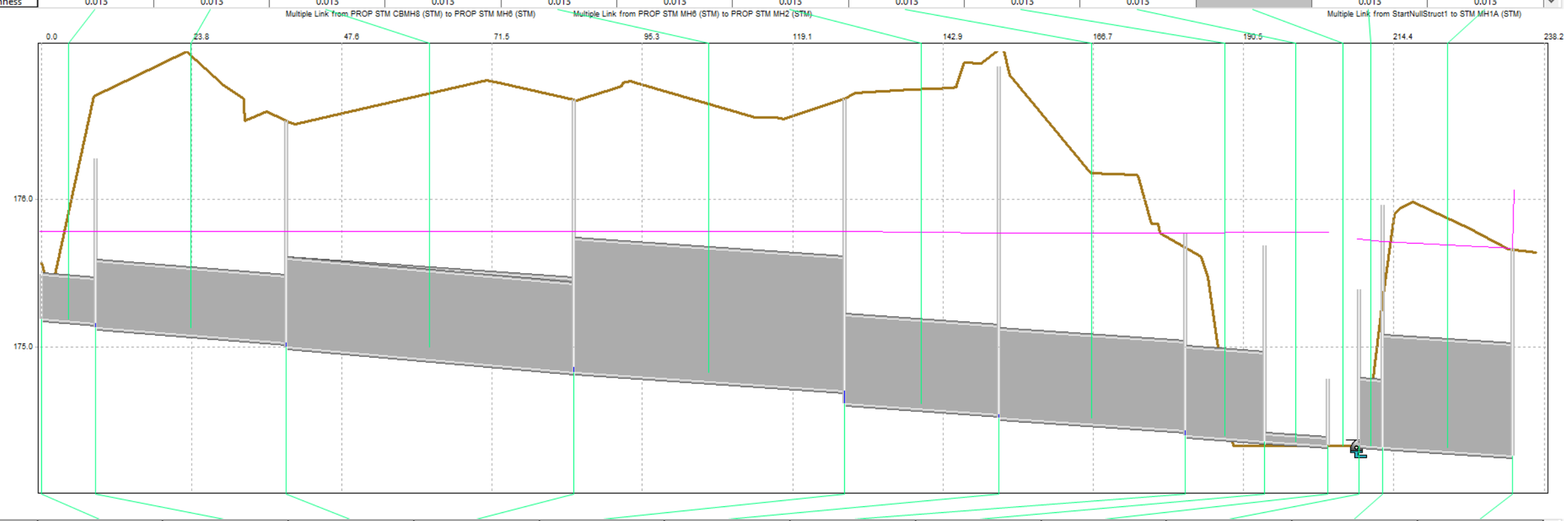
	DI2 (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Ground Elevati	175.720	176.823	176.634	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.788	175.783	175.782	175.782	175.772	175.772	175.776	175.776	175.732	175.715	176.072
Freeboard	-0.070	1.040	0.850	0.900	1.130	0.000	-0.090	-1.000	-0.340	0.250	-0.400
Invert Elevatio	175.127	174.993	174.900	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.807	0.964	1.076	1.425	1.530	1.676	1.727	1.764	1.717	1.704	2.211

MH

Figure 17 - UST Storm HGL Plot Through DI3

pipes

	Pipe - (611) (STM)	Pipe - (602) (STM)	537.1	537.2	535.1	535.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Conduit Slope	0.003	0.003	0.003	0.000	0.003	0.303	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.450	0.600	0.600	0.900	0.900	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.050	0.160	1.700	1.880	3.070	3.070	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.045	0.045	0.050	0.058	0.091	0.091	0.354	0.330	0.308	0.000	0.090	0.090	0.107
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



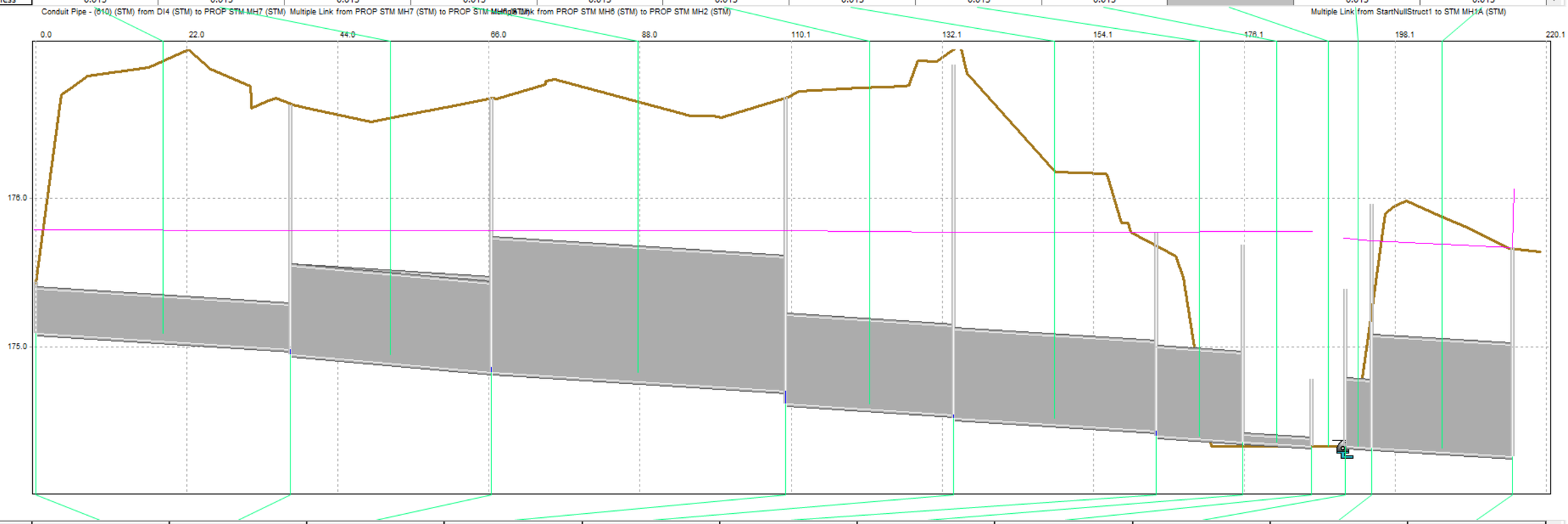
	DI3 (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (S	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Ground Elevat	175.492	176.278	176.533	176.677	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.785	175.784	175.783	175.783	175.783	175.772	175.772	175.776	175.776	175.732	175.715	176.072
Freeboard	-0.290	0.490	0.750	0.890	0.900	1.130	0.000	-0.090	-1.000	-0.340	0.250	-0.400
Invert Elevatio	175.185	175.128	175.000	174.830	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.732	0.800	0.955	1.163	1.427	1.530	1.676	1.728	1.764	1.717	1.704	2.211

MH

Figure 18 - UST Storm HGL Plot Through DI4

pipes

	Pipe - (610) (STM)	503.1	503.2	535.1	535.2	Pipe - (605) (STM)	Pipe - (600) (STM)	Pipe - (674) (STM)	Link181	205mm PLATE	Pipe - (612) (STM)	Pipe - (596) (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Conduit Slope	0.003	0.300	0.000	0.003	0.303	0.003	0.003	0.003	0.000		0.003	0.003
Diameter (Hei	0.300	0.600	0.600	0.900	0.900	0.600	0.600	0.600	0.050		0.450	0.750
Design Full Flo	0.050	1.680	1.950	3.070	3.070	0.340	1.690	0.340	0.000	0.040	0.160	0.600
Max Flow	0.043	0.040	0.060	0.091	0.091	0.354	0.330	0.308	0.000	0.090	0.090	0.107
Roughness	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013		0.013	0.013



	DI4 (STM)	PROP STM MH7 (STM)	PROP STM MH6 (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	PROP CDS PMSU5645-10 (ST	HW-1 (STM)	StartNullStruct1	STM MH1A (STM)	STM7080 (STM)	J27 (STM)
Storm	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST	UST
Ground Elevati	175.435	176.629	176.677	176.684	176.901	175.772	175.685	174.780	175.391	175.960	175.668
Max Water Ele	175.789	175.783	175.783	175.783	175.772	175.772	175.776	175.776	175.732	175.715	176.072
Freeboard	-0.350	0.850	0.890	0.900	1.130	0.000	-0.090	-1.000	-0.340	0.250	-0.400
Invert Elevatio	175.091	174.948	174.830	174.613	174.519	174.398	174.360	174.330	174.331	174.320	174.260
Max Volume	0.852	1.019	1.163	1.427	1.530	1.676	1.728	1.764	1.717	1.704	2.211

MH

Figure 19 - Hydrograph of outlet pipe (storm connection) from pond in 100-Y Storm

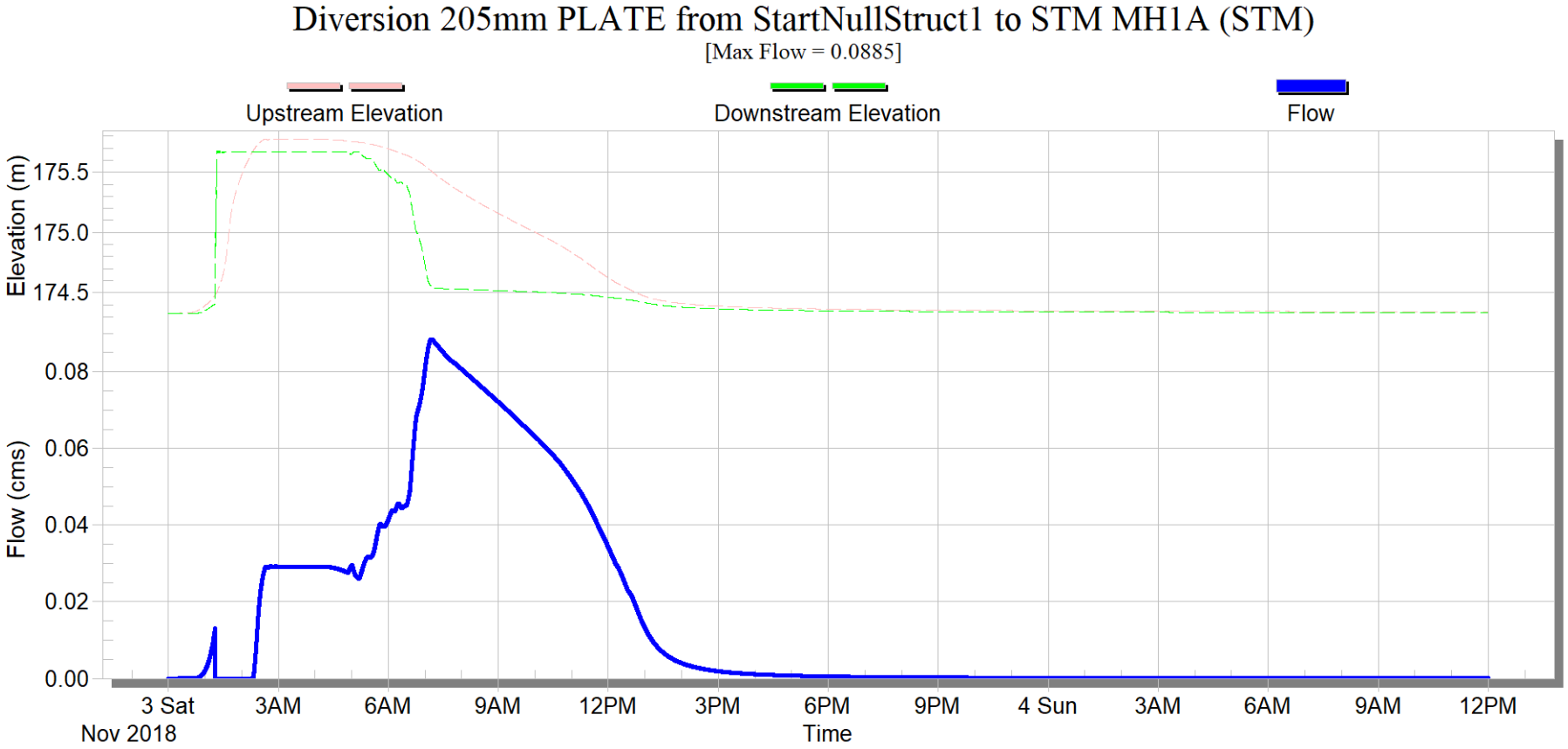
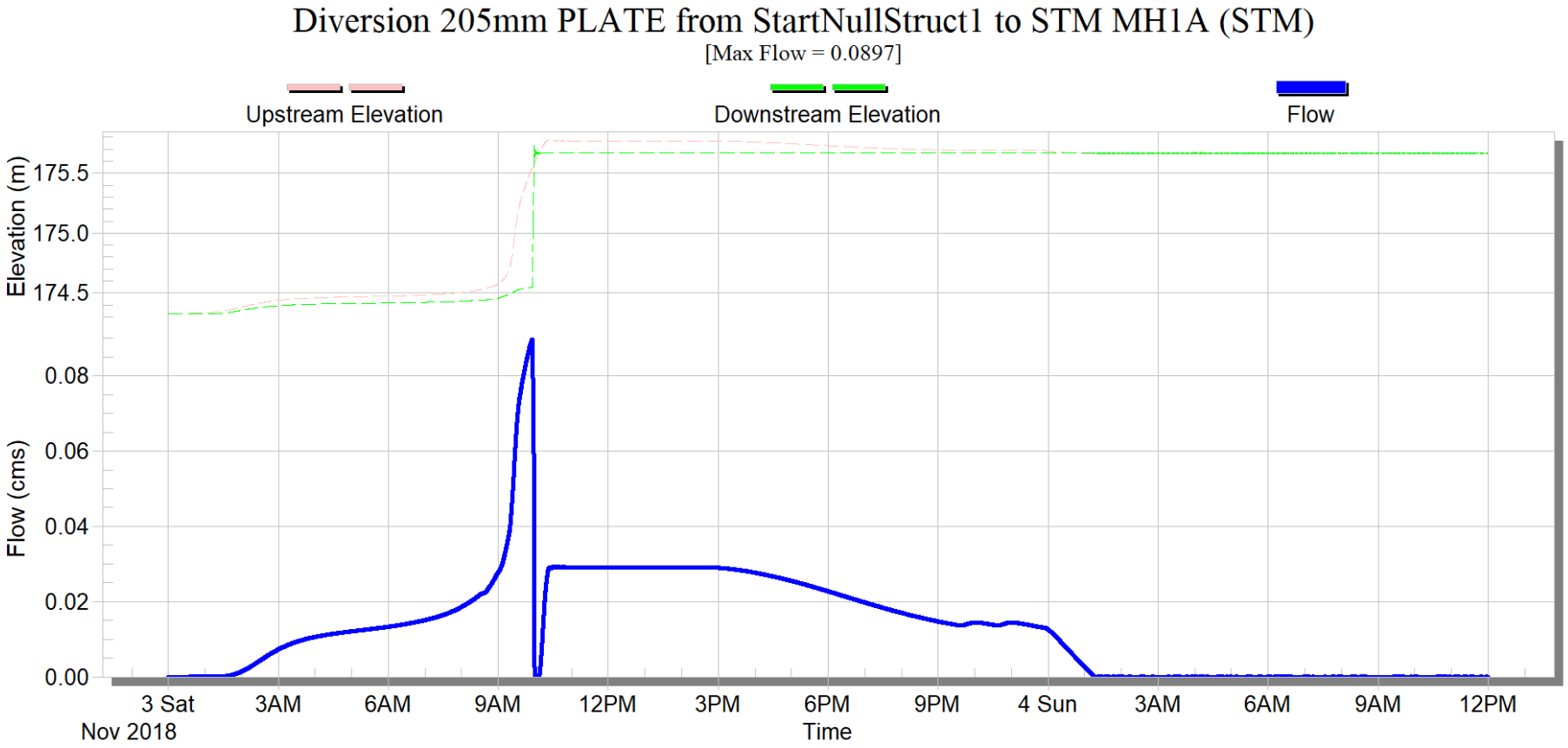


Figure 20 - Hydrograph of Pond Outlet flow in UST Storm



4. STORMWATER QUALITY CONTROL

An Oil-Grit Separator (OGS) is proposed to provide SWM quantity control. A Contech CDS Model No. PMSU 5645-10 is specified to provide net annual load removal efficiency of 80%. Refer to the Design Report by Contech in Appendix D. This OGS is CETV-certified – refer to the certification in Appendix D.

5. EROSION AND SEDIMENT CONTROL

Erosion and sediment controls for the site will be implemented according to The Erosion and Sedimentation Control Guidelines for Urban Construction prepared by the Greater Golden Horseshoe Area Conservation Authorities. A detailed erosion control plan will be prepared upon final design.

6. CONCLUSIONS

From our investigation the site is serviceable utilizing proposed sanitary and existing water main infrastructure adjacent to the site.

Storm water management for the site will be accommodated by a proposed SWM facility located as shown on the plans. The pond has been sized for quantity control to meet pre-development peak flow targets.

The site is favourable for the proposed residential use as shown on the Site Plan for the site and as detailed in this report.

7. REFERENCES

1. Boundary conditions at downstream MH J27 from Dillon Consulting.

2. Storm water Management Planning and Design Manual, Ontario Ministry of the Environment, March 2003.

3. The Erosion and Sedimentation Control Guidelines for Urban Construction prepared by the Greater Golden Horseshoe Area Conservation Authorities.

4. XPSWMM User's Manual, Innovyze, 2019

5. New Jersey Storm Water Best Management Practices Manual, April 2004.

6. Ministry of Transportation's *Road and Bridge Deck Drainage Systems* manual (November 1982)

7. Windsor Essex Region Region Stormwater Management Standards Manual (by Stantec Consulting Ltd., Rev. 1 Dec. 2018)

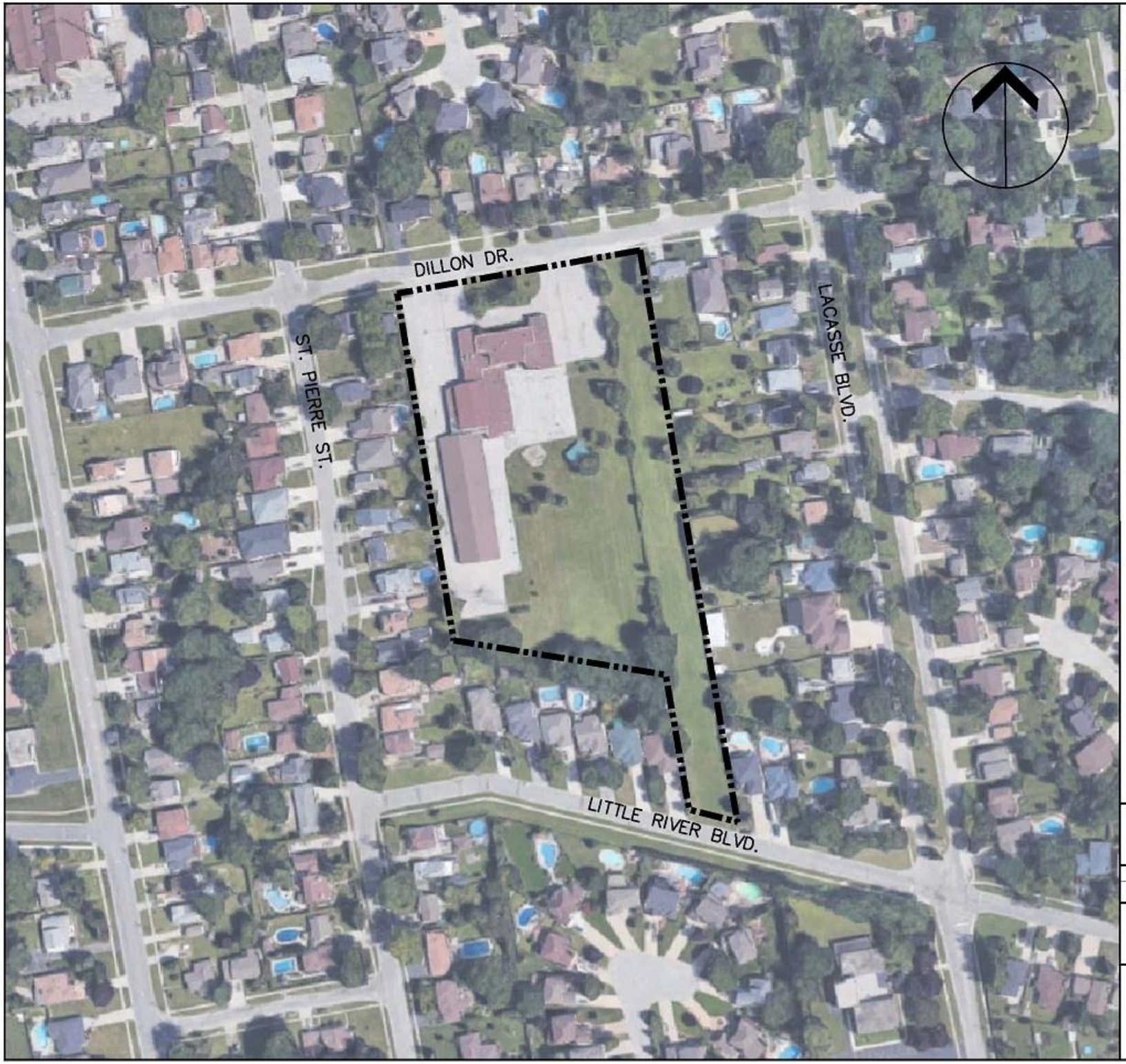
Respectfully Submitted;
The Odan Detech Group Inc.

John Krpan, M.S.C.E. P.Eng

Daniel Bancroft, P.Eng

APPENDIX A - CONTEXT

Existing Site, Aerial view of Site and surrounding Site



LEGEND

PROPERTY LINE

DRAWING :

AERIAL IMAGE OF EXISTING SITE

DATE:	PROJ. NO.:	SCALE:
MAR 2019	18249	N.T.S.

PROJECT :

PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT

DILLON DRIVE, TECUMSEH

ODAN·DETECH CONSULTING ENGINEERS

The Odan/Detech Group Inc. P: (905) 632-3611 F: (905) 632-3363
5236 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

APPENDIX B- WASTE WATER

Memorandum by Dillon Consulting: Victoria on the Lake Sanitary Assessment

MEMO

TO: John Henderson, P.Eng., Manager, Engineering Services
CC: Phil Bartnik, P.Eng, Director Public Works & Environmental Services
FROM: Flavio Forest, P.Eng.
DATE: November 26, 2018
SUBJECT: Victoria on the Lake Sanitary Assessment
OUR FILE: 15-2160

The former Victoria School site, located along Dillon Drive directly east of St. Pierre Street, is proposed to be redeveloped for residential use, including a mixture of 36 townhome units and a six storey apartment building. The total development will consist of 110 residential units.

The Town of Tecumseh requested that Dillon Consulting Limited (Dillon) assess the impact of changes to the sanitary sewage flow requirements on the existing sanitary sewer collection system. The latest update to the Town's XPSWMM sanitary sewer model will be used for this assessment based on calibrated wet weather flow conditions. The results of our assessment are summarized below.

XPSWMM Model Background

The Town's sanitary sewer model was developed in three areas; namely the Tecumseh Hamlet (TH) located south of County Road 22, Tecumseh Town (TE) located north of County Road 22 and west of Manning Road, and St. Clair Beach (SB) area located east of Manning Road. Due to widespread basement flooding arising from a storm event on June 5-6, 2010, the Tecumseh Town and St. Clair Beach components of the model were updated and calibrated by Dillon in 2011. A hydrologic model was developed based on a 1:5 year, 24-hour design storm to simulate Rainfall Derived Inflow and Infiltration (RDII) for Wet Weather Flow (WWF) to simulate existing conditions in the sanitary sewer system. Calibration of the model was completed based on the measured flows from six flow monitoring stations (three in Tecumseh Town and three in St. Clair Beach). Dry Weather Flow (DWF) was also established to represent diurnal Base Wastewater Flow (BWF) patterns. The WWF was then calibrated by subtracting out the DWF from the total monitored hydrograph over the runoff period. The resulting RDII was calibrated to water level readings for a large event that occurred on September 9, 2011, using three parameters for RDII estimation as follows:

- R: the fraction of rainfall volume that enters the sewer system;
- T: the time from the onset of rainfall to the peak of the hydrograph; and
- K: the ratio of the time to recession to the time to peak.

Since this model was developed, the Town has been undertaking an annual program to address extraneous flows in the sanitary sewer system, which has improved the wet weather flow conditions in the sanitary sewer system. Though the existing model has not been recalibrated to reflect these conditions, these measures will be qualitatively considered in interpreting the results of our evaluation.

XPSWMM Model Inputs

The existing conditions results of the XPSWMM sanitary sewer model are illustrated below in **Figure 1**, indicating the areas that under the previously calibrated wet weather conditions, experience surcharge conditions that are 1.5 m to 3 m below the ground surface (in yellow) and greater than 3 m below the ground surface (in green).

The proposed sanitary flows for the Victoria on the Lake development were introduced in the model at node **TE092,** as identified in **Figure 1**.

FIGURE 1: XPSWMM MODEL SCHEMATIC HIGHLIGHTING VICTORIA ON THE LAKE INPUT NODE

MH Colour Code	Description	Wet Weather Sanitary Surcharge Levels
🔴	High Water Levels	Less than 1.5 m from ground surface
🟡	Moderate Water Levels	1.5 m to 3.0 m from ground surface
🟢	Low Water Levels	Greater than 3.0 m from ground surface

For purposes of this analysis, the existing conditions sanitary demands from the Victoria school site were estimated based on guidelines for institutional uses, as outlined in **Table 1A** and as described in further detail below:

- The average daily sewage flow for institutional uses is 140 L/person-day.
- Since the Victoria school site was in operation for only a portion of the day (approx. 8 hours a day), this daily average rate was adjusted to an average flow over the expected hours of operation, since the sewage flow would drop to a residual amount during the remainder of the day:
    - 140 L/person-day x $\frac{24\ \text{hrs/day}}{8\ \text{hrs}}$ = 420 L/person over the 8 hour period of operations, as provided by MOE Sewer Design Guidelines (2008).
- Schools generally do not exhibit large maximum day to average day ratios, therefore, a peak flow factor of 1.5 was used, as outlined in the Ontario Design Guidelines for Drinking-Water Systems (October, 2016).
- Infiltration was applied to the entire 1.76 ha site in order to be conservative in the flow estimates.

TABLE 1A: EXISTING CONDITION SANITARY FLOW PARAMETERS

Parameter	Value
Zoning: Institutional – Population Density	165 persons/ ha
Domestic Sewage Flow Rate (8 hr. average)	420 L/person
Peak Flow Factor	1.5
Infiltration	13.48 m^3/day/ha

The estimated sanitary flows for the proposed Victoria on the Lake development are summarized in **Table 1B**.

TABLE 1B: PROPOSED CONDITION SANITARY FLOW PARAMETERS

Parameter	Value
High Density Residential – Population	2 persons/unit
Domestic Sewage Flow Rate	450 L/person-day
Peak Flow Factor	Harmon Formula
Infiltration	13.48 m^3/day/ha

The calculation of the total sewage flow for the existing and proposed site conditions is summarized in **Table 2**:

TABLE 2: SANITARY SEWER DESIGN CHART

Condition	Land Use	Basis for Determining Population	Population Density	Total Population	Peak Flow Factor	Peak Domestic Sanitary Flow (L/s)	Infiltration		Peak Sanitary Sewer Flow (L/s)
							(ha)	(m^3/day) (L/s)	
Existing	Institutional	1.76 ha	165 p/ha	290	1.5	2.1	1.76	(23.72) (0.275)	2.4
Proposed	High Density Residential	110 units	2 p/unit	220	4.1	4.7	1.76	(23.72) (0.275)	5.0

Existing Sanitary Sewer Dry-Weather Flow Capacity

From a dry-weather perspective, the existing sewage flow of 2.4 L/s represents approximately 7% of the existing full flow pipe capacity of the 250 mm diameter sanitary sewer on Dillon Drive. The proposed Victoria on the Lake development would essentially double the peak sewage flow rate from this site, resulting in sewage flows that would represent approximately 14% of the full flow pipe capacity.

Based on the assessment, the net increase in peak sewage flows can be accommodated within the available dry-weather flow capacity of the existing sanitary sewer on Dillon Drive.

Sanitary Sewer System Improvements

As identified previously, the Town's sanitary sewer collection system experiences excess inflow and infiltration during wet weather conditions, which has occasionally resulted in basement flooding. The Town has been addressing these basement flooding risks through various initiatives, including maintenance programs to reduce extraneous flows, subsidy programs to support measures to protect private properties, and infrastructure improvements.

Based on the Town's April 2013 Sanitary Sewage Collection System Improvements Class Environmental Assessment, underground sewage surcharge storage facilities were identified as another means of reducing the risk of basement flooding. One of these storage facilities was recently constructed in Lakewood Park South, east of Manning Road. The Lakewood Park South pump station and surcharge storage facility was also incorporated into the XPSWMM model. While this facility may provide some relief at the Victoria school site, there are expected to be more benefits realized from the Town's ongoing extraneous flow reduction program, though these have not yet been quantified and integrated into the sanitary sewer system model at this time. These improvements include sealing manhole covers and sewer pipe repairs. The impact of these improvements will be reflected in the future as the Town undertakes a recalibration of their sanitary sewer system model.

In addition, a 600 mm diameter sanitary diversion sewer was constructed on County Road 22 to intercept and redirect sanitary flows from the Tecumseh Hamlet system, thereby reducing flows in the sanitary sewer system north of County Road 22. This sanitary diversion sewer has been incorporated into the XPSWMM model.

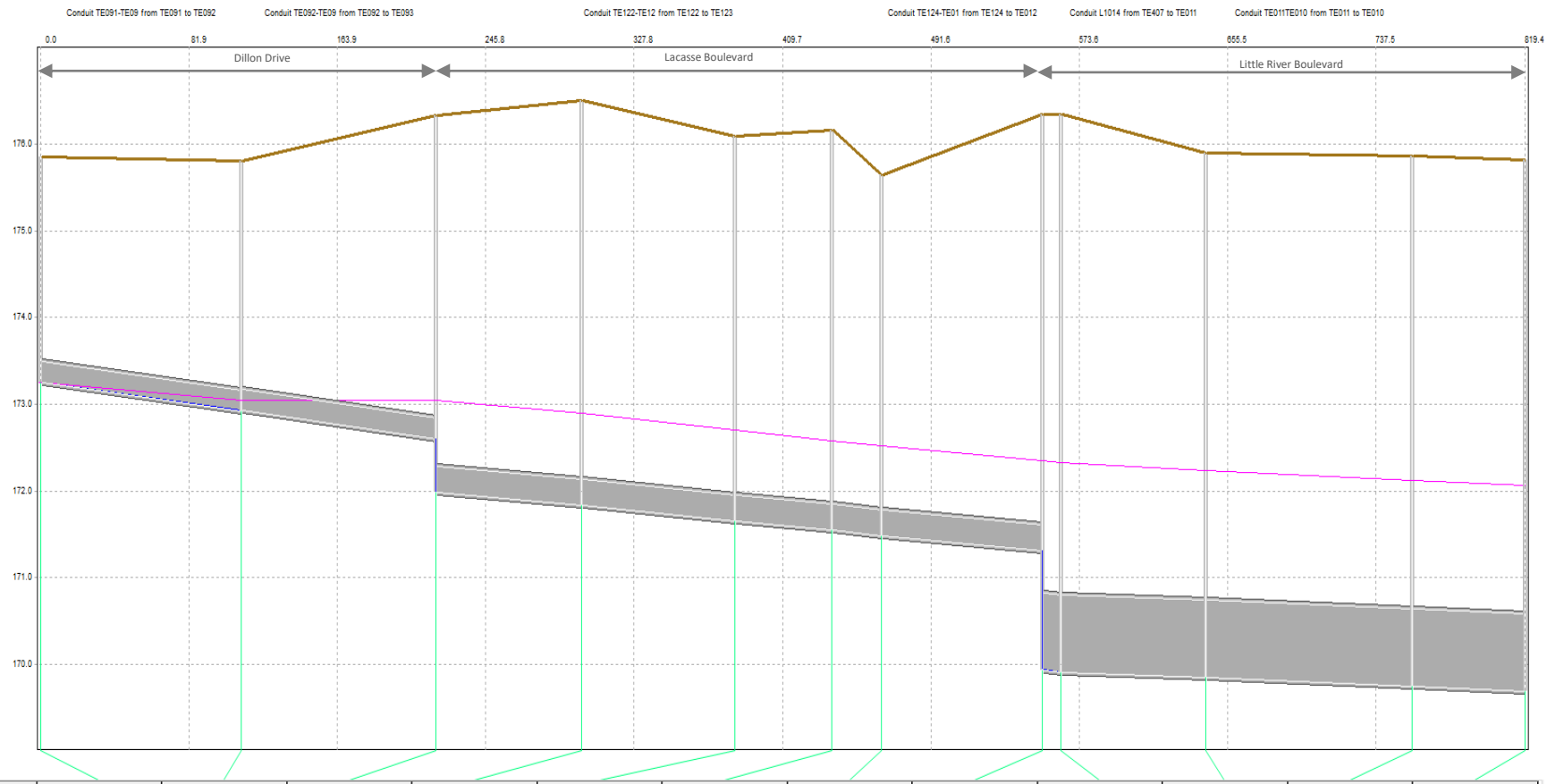
XPSWMM Model Results

The XPSWMM model was utilized to assess the sanitary sewer system under wet weather conditions for the existing and proposed Victoria on the Lake development based on a 1:5 year, 24-hour design storm event.

The existing wet weather conditions hydraulic grade line (HGL) along the Dillon Drive sanitary sewer is shown in **Figure 2**. The modelled wet weather conditions in this sanitary sewer shows the HGL maintained within the system upstream of the proposed development site at MH TE-092. Downstream of MH TE-093, the system becomes surcharged beyond the obvert of the existing pipes.

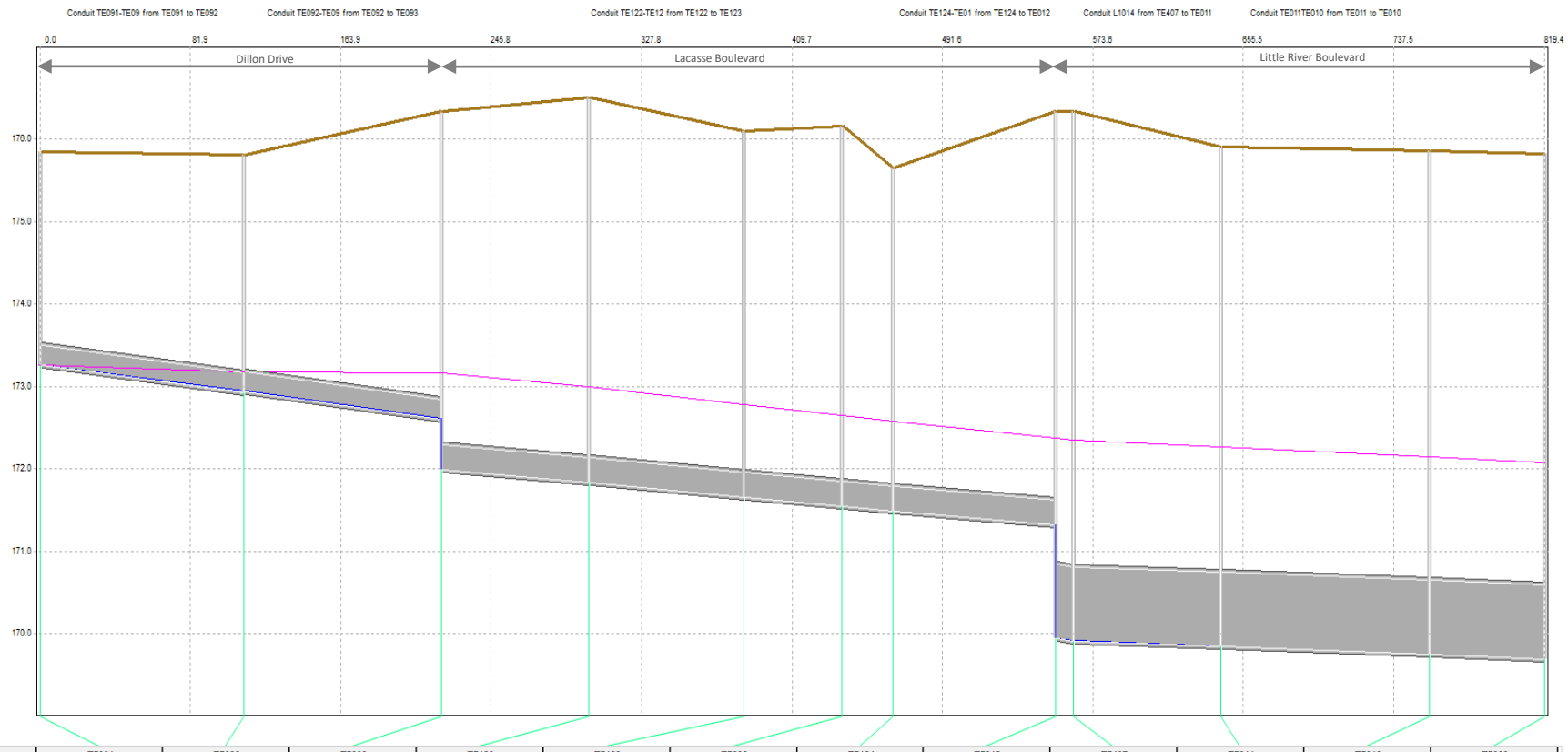
With the addition of the net increase in sanitary sewer flows from the Victoria on the Lake development, there is a varying increase in the wet weather HGL, as shown on **Figure 3** and documented in **Table 3**.

FIGURE 2: EXISTING CONDITIONS HGL ALONG DILLON DRIVE TO THE LITTLE RIVER SANITARY TRUNK SEWER



	TE091	TE092	TE093	TE122	TE123	TE698	TE124	TE012	TE407	TE011	TE010	TE009
Rainfall Referenc				5yr 24 hrs design				5yr 24 hrs design	5yr 24 hrs design		5yr 24 hrs design	
Ground Elevation	175.850	175.810	176.330	176.500	176.090	176.160	175.650	176.340	176.340	175.900	175.860	175.820
Max Water Elevati	173.254	173.049	173.045	172.898	172.701	172.583	172.523	172.349	172.330	172.238	172.123	172.061
Freeboard	2.60	2.76	3.29	3.60	3.39	3.58	3.13	3.99	4.01	3.66	3.74	3.76
Max Surface Area	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220
Total Iterations	460947.000	460947.000	460947.000	460947.000	460947.000	460947.000	460958.000	554796.000	492654.000	569315.000	530134.000	524426.000

FIGURE 3: PROPOSED CONDITIONS HGL ALONG DILLON DRIVE TO THE LITTLE RIVER SANITARY TRUNK SEWER WITH ADDITION OF VICTORIA ON THE LAKE SANITARY FLOWS



	TE091	TE092	TE093	TE122	TE123	TE698	TE124	TE012	TE407	TE011	TE010	TE009
Rainfall Referenc				5yr 24 hrs design				5yr 24 hrs design	5yr 24 hrs design		5yr 24 hrs design	
Ground Elevation	175.850	175.810	176.330	176.500	176.090	176.160	175.650	176.340	176.340	175.900	175.860	175.820
Max Water Elevati	173.254	173.176	173.165	172.996	172.774	172.642	172.573	172.373	172.353	172.260	172.140	172.077
Freeboard	2.60	2.63	3.17	3.50	3.32	3.52	3.08	3.97	3.99	3.64	3.72	3.74
Max Surface Area	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220	1.220
Total Iterations	460947.000	460947.000	460947.000	460947.000	460947.000	460947.000	460955.000	560111.000	494138.000	561449.000	529258.000	529238.000

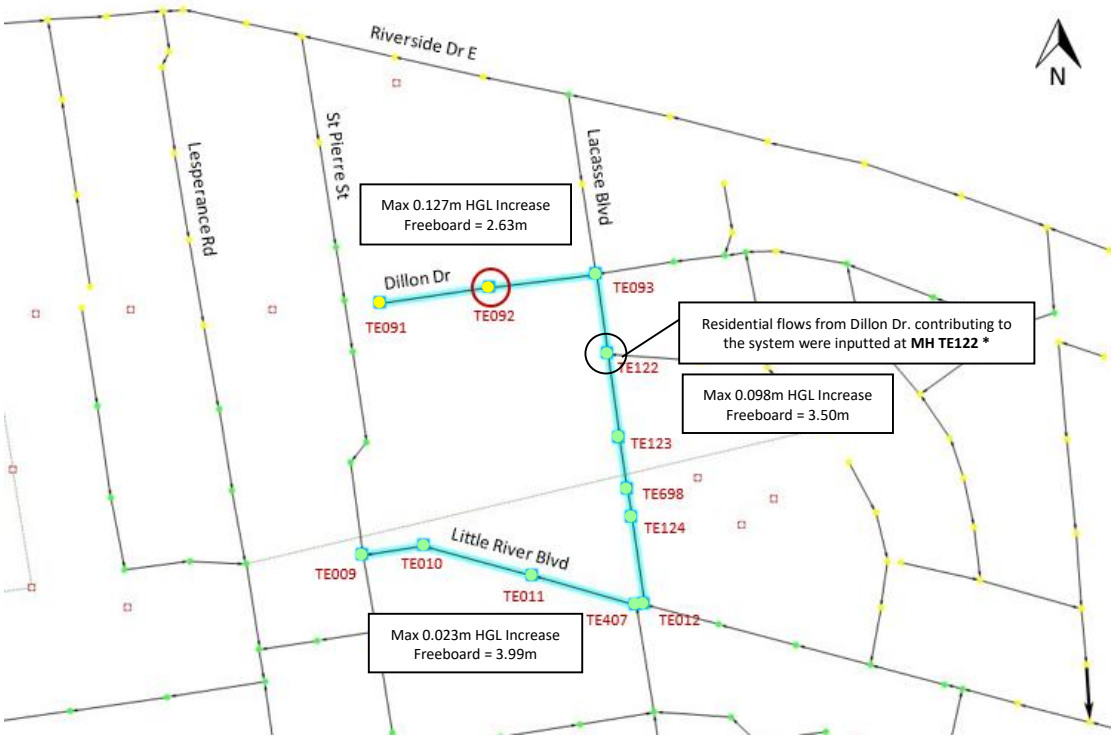
TABLE 2: COMPARISON OF HGL AND FREEBOARD FOR EXISTING AND PROPOSED CONDITIONS

Road Name	Dillon Drive			Lacasse Boulevard					Little River Boulevard			
Scenario	TE091	TE092[1]	TE093	TE122	TE123	TE698	TE124	TE012	TE407	TE011	TE010	TE009
Existing Conditions HGL (m)	173.254	173.049	173.045	172.898	172.701	172.583	172.523	172.349	172.330	172.238	172.123	172.061
HGL with Victoria on the Lake (m)	173.254	173.176	173.165	172.996	172.774	172.642	172.573	172.373	172.353	172.260	172.140	172.077
Difference in HGL (m)	0.000	0.127	0.120	0.098	0.073	0.059	0.050	0.024	0.023	0.022	0.017	0.016
Existing Conditions Freeboard (m)	2.60	2.76	3.29	3.60	3.39	3.58	3.13	3.99	4.01	3.66	3.74	3.76
Freeboard with Victoria on the Lake (m)	2.60	2.63	3.17	3.50	3.32	3.52	3.08	3.97	3.99	3.64	3.72	3.74

(1)Node at Victoria on the Lake outlet

With the addition of the Victoria on the Lake development, the increase in HGL ranges from 0.127 m at MH TE092 on Dillon Drive, to 0.016 m at the Little River trunk sanitary sewer outlet. Maximum HGL values for each street are provided in **Figure 4.**

FIGURE 4: PROPOSED CONDITIONS MAX HGL AND FREEBOARD FOR EACH STREET FROM DILLON DRIVE TO THE LITTLE RIVER SANITARY TRUNK SEWER



** Flows at node TE122 represent total upstream catchment area*

MH Colour Code	Description	Wet Weather Sanitary Surcharge Levels
🔴	High Water Levels	Less than 1.5 m from ground surface
🟡	Moderate Water Levels	1.5 m to 3.0 m from ground surface
🟢	Low Water Levels	Greater than 3.0 m from ground surface

Conclusions and Recommendations

The Victoria on the Lake development is estimated to result in an increased in the peak sanitary flow rate of approximately 2.6 L/s. This net increase in peak sewage flows can be accommodated within the available dry-weather flow capacity of the existing sanitary sewer on Dillon Drive.

The existing conditions wet weather sanitary sewer HGL along Dillon drive is at a minimum depth of 2.60 m below the existing ground surface under the design wet weather conditions. The Victoria on the Lake development is estimated to result in a maximum increase in HGL of approximately 0.13 m on Dillon Drive, reducing to 0.016 m at the Little River trunk sanitary sewer outlet. The increased wet weather HGL is not considered to be significant relative to the existing surcharge conditions, as well as the depth of the HGL being greater than 2.6 m below the existing ground surface (below typical basement floor elevations).

In addition, this evaluation does not account for the improvements in the wet weather flow conditions in the sanitary sewer system, which is expected to have improved as a result of the Town's ongoing efforts to reduce extraneous flows.

Accordingly, we are of the opinion that the increased sanitary sewer flows from the Victoria on the Lake development can be accommodated with nominal impacts to the existing sanitary sewer system and limited impact to an increased risk of basement flooding.

We trust that this evaluation provides the Town with the necessary information to consider the approval of the proposed Victoria on the Lake development from a sanitary system perspective. Should you have any further questions, we would be pleased to discuss the results of our evaluation in further detail.

Yours sincerely,

DILLON CONSULTING LIMITED

Flavio R. Forest, P. Eng.,
Project Manager

APPENDIX C - WATER DISTRIBUTION

Hydrant Flow Test Information supplied by Town of Tecumseh (2019)

TOWN OF Tecumseh
ONTARIO · CANADA

WATER DIVISION
GENERAL WORK ORDER

PLEASE PRINT ALL INFORMATON

Document Verified by (Initials Only)	

Date Received: MAY 3/2019	**Time Received:** 7:00 AM
Name of Customer: TOWN OF TECUMSEH	
Address/Location: F.H. IN FRONT OF 12450 LITTLE RIVER	**Telephone No.:**

INSTRUCTIONS

FLOW TEST FH OF 12" PVC WM

WORK PERFORMED AND COMMENTS

STATIC PRESSURE 68 PSI
DYNAMIC PRESSURE 64 PSI
1210 GPM
TEST DONE AT 9:30 AM
CHLORINE RESIDUAL 0.18 FREE

MATERIALS USED

Operator Name (print): VERN + JAMIE	
Operator Signature:	
Date Completed: MAY 3/2019	**Time Completed:** 10:00 AM

Page 1 of 1
Version 2

Email Confirmation from Town Staff regarding Dillon Drive 150mm Watermain Flow Test Results

From: Denis Berthiaume [mailto:dberthiaume@tecumseh.ca]
Sent: Wednesday, May 15, 2019 10:23 AM
To: daniel@odandetech.com
Cc: John Henderson <jhenderson@tecumseh.ca>; Brad Dupuis <bdupuis@tecumseh.ca>; jkrpan@odandetech.com
Subject: RE: Little River Blvd Water Flow Results

Good morning Daniel,

Last night a flow and pressure test was conducted on the fire hydrant in front of 12466 Dillon which is connected to the 150mm cast iron watermain. The results found were 530 GPM @ a pressure of 20psi.

Denis

From: Daniel Bancroft - Odan Detech Group [mailto:daniel@odandetech.com]
Sent: May-06-19 8:45 AM
To: Denis Berthiaume
Cc: John Henderson; Brad Dupuis; jkrpan@odandetech.com
Subject: RE: Little River Blvd Water Flow Results

Thanks Denis – please keep us posted re the 150mm WM test.

Regards
Daniel

ODAN·DETECH
CONSULTING ENGINEERS

Daniel Bancroft, P.Eng.
The Odan/Detech Group Inc.

P : (905) 632-3811 ext.133 | **F :** (905) 632-3363
5230, SOUTH SERVICE ROAD, UNIT 107 | BURLINGTON, ONTARIO | L7L 5K2
www.odandetech.com | daniel@odandetech.com

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WATER SUPPLY FOR PUBLIC FIRE PROTECTION , FIRE UNDERWRITERS SURVEY
GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOWS

F = 220 x C x √ A
Where:

F = required fire flow in liters per minute
C= Coefficient related to the type of construction
A = the total floor area in square meters (excluding basements) in the building considered

Coefficient related to type of construction	
1.5	Wood Frame
1	Ordinary
0.8	Non combustible
0.6	Fire Resistive

LOCATION: North Stacked TH Block

OBC OCCUPANCY: Residential

BUILDING FOOT PRINT (m2): 982

OF STOREYS: 3

PROJECT: Victoria by the Lake Townhouse Development

PROJECT No 18249

Contents	Charge
Non-Combustible	-25%
limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Buring	25%

CONSTRUCTION CLASS: Ordinary

AUTOMATED SPRINKLER PROTECTION

		Credit	Total
NFPA 13 sprinkler standard	no	0%	0%
Standard Water Supply	no	0%	
Fully Supervised System	no	0%	
		0%	

CONTENTS FACTOR: Non-Combustible CHARGE: -15%

EXPOSURE 1 (south) Townhouse Block	Distance to Exposure Building (m) / Length - Height	16.0	15%
EXPOSURE 2 (east) Ex Detached	Distance to Exposure Building (m) / Length - Height	>45	0%
EXPOSURE 3 (west) Townhouse Block	Distance to Exposure Building (m) / Length - Height	27.0	10%
EXPOSURE 4 (north) Townhouse Block	Distance to Exposure Building (m) / Length - Height	25.0	10%
		Total:	35%

no more than 75%

Separation	Charge
0-3 m	25%
3.1 -10 m	20%
10.1 - 20 m	15%
20.1 - 30 m	10%
30.1 - 45	5%
> 45 m	0%

ARE BUILDINGS CONTIGUOUS: Yes

FIRE RESISTANT BUILDING Are vertical openings and exterior vertical communications protected with a minimum one (1) h: No

CALCULATIONS

C =	1		Ordinary
A =	2946	m2	
F =	11941	L/min	
Round to Nearest 1000 L/min F =	12000	L/min	must be > 2000 L/min

STOREY AREAS m2	
982	L1
982	L2
982	L3

CORRECTION FACTORS:

OCCUPANCY	-1800	L/min
FIRE FLOW ADJUSTED FOR OCCUPANCY	10200	L/min
REDUCTION FOR SPRINKLER	0	L/min
EXPOSURE CHARGE	3570	L/min

REQUIRED FIRE FLOW

F =	13770	L/min		
Round to Nearest 1000 L/min **F =**	14000	L/min	3698	usgm
F =	233	L/sec		

WATER SUPPLY FOR PUBLIC FIRE PROTECTION , FIRE UNDERWRITERS SURVEY
GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOWS

F = 220 x C x √ A
Where:

F = required fire flow in liters per minute
C= Coefficient related to the type of construction
A = the total floor area in square meters (excluding basements) in the building considered

Coefficient related to type of construction	
1.5	Wood Frame
1	Ordinary
0.8	Non combustible
0.6	Fire Resistive

LOCATION: South Stacked TH Block

OBC OCCUPANCY: Residential

BUILDING FOOT PRINT (m2): 974

OF STOREYS 3

PROJECT: Victoria by the Lake Townhouse Development

PROJECT No 18249

Contents	Charge
Non-Combustible	-25%
limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Buring	25%

CONSTRUCTION CLASS: Ordinary

AUTOMATED SPRINKLER PROTECTION

		Credit	Total
NFPA 13 sprinkler standard	no	0%	
Standard Water Supply	no	0%	0%
Fully Supervised System	no	0%	
		0%	

CONTENTS FACTOR: Non-Combustible CHARGE: -15%

EXPOSURE 1 (south) Townhouse Block	Distance to Exposure Building (m) / Length - Height	25.0	10%
EXPOSURE 2 (east) Ex Detached	Distance to Exposure Building (m) / Length - Height	>45	0%
EXPOSURE 3 (west) Townhouse Block	Distance to Exposure Building (m) / Length - Height	24.0	10%
EXPOSURE 4 (north) Ex Detached	Distance to Exposure Building (m) / Length - Height	>45	0%
		Total:	20%

no more than 75%

Separation	Charge
0-3 m	25%
3.1 -10 m	20%
10.1 - 20 m	15%
20.1 - 30 m	10%
30.1 - 45	5%
> 45 m	0%

ARE BUILDINGS CONTIGUOUS: Yes

FIRE RESISTANT BUILDING Are vertical openings and exterior vertical communications protected with a minimum one (1) h No

CALCULATIONS

	C =	1		Ordinary
	A =	2922	m2	
	F =	11892	L/min	
Round to Nearest 1000 L/min	F =	12000	L/min	must be > 2000 L/min

STOREY AREAS m2	
974	L1
974	L2
974	L3

CORRECTION FACTORS:

OCCUPANCY	-1800	L/min
FIRE FLOW ADJUSTED FOR OCCUPANCY	10200	L/min
REDUCTION FOR SPRINKLER	0	L/min
EXPOSURE CHARGE	2040	L/min

REQUIRED FIRE FLOW F = 12240 L/min

Round to Nearest 1000 L/min **F =** 12000 L/min 3170 usgm

F = 200 L/sec

APPENDIX D - SWM

Screenshot of existing-system Storm Sewer Model showing outlets – provided by Dillon Consulting
Boundary Conditions at Downstream MH J27 – provided by Dillon Consulting
Email from Dillon Consulting regarding Allowable Release Rate Criteria
Design Storm Events – 5-year, 4-hour, 100-year, 4-hour, Urban Stress Test Design Storms
SWM Analysis – XPSWMM model Output Files (4hr-Chicago-100yr & 24hr-Stress Test)
Contech CDS OGS Design Report

900mm sewer outlet
750mm sewer cross-ing Dillon Drive
150mm Lead from Easement
150mm Lead from School Site
0.9 (m)
0.25 (m)
0.375 (m)
0.3 (m)
0.75 (m)
0.3 (m)
0.3 (m)
0.3 (m)
0.3 (m)
0.45 (m)
0.3 (m)
0.3 (m)

Chicago 1:100yr 4 hour Tailwater Condition

IDs:	J27	J27
Date/Time	Depth	Head
M/d/yyyy	m	m
8/1/2017 12:05:00 AM	0.0000	173.261
8/1/2017 12:10:00 AM	0.0000	173.261
8/1/2017 12:15:00 AM	0.0408	173.3018
8/1/2017 12:20:00 AM	0.2065	173.4675
8/1/2017 12:25:00 AM	0.5092	173.7702
8/1/2017 12:30:00 AM	0.5197	173.7807
8/1/2017 12:35:00 AM	0.5297	173.7907
8/1/2017 12:40:00 AM	0.5439	173.8049
8/1/2017 12:45:00 AM	0.5622	173.8232
8/1/2017 12:50:00 AM	0.5807	173.8417
8/1/2017 12:55:00 AM	0.5999	173.8609
8/1/2017 1:00:00 AM	0.6204	173.8814
8/1/2017 1:05:00 AM	0.6416	173.9026
8/1/2017 1:10:00 AM	0.6651	173.9261
8/1/2017 1:15:00 AM	0.7086	173.9697
8/1/2017 1:20:00 AM	0.7538	174.0148
8/1/2017 1:25:00 AM	0.8853	174.1463
8/1/2017 1:30:00 AM	2.4860	175.747
8/1/2017 1:35:00 AM	2.5598	175.8208
8/1/2017 1:40:00 AM	2.4956	175.7566
8/1/2017 1:45:00 AM	2.5629	175.8239
8/1/2017 1:50:00 AM	2.5946	175.8556
8/1/2017 1:55:00 AM	2.5580	175.819
8/1/2017 2:00:00 AM	2.5996	175.8606
8/1/2017 2:05:00 AM	2.5541	175.8151
8/1/2017 2:10:00 AM	2.5641	175.8251
8/1/2017 2:15:00 AM	2.5362	175.7972
8/1/2017 2:20:00 AM	2.6180	175.879
8/1/2017 2:25:00 AM	2.5648	175.8258
8/1/2017 2:30:00 AM	2.5637	175.8246
8/1/2017 2:35:00 AM	2.5519	175.8129
8/1/2017 2:40:00 AM	2.5267	175.7877
8/1/2017 2:45:00 AM	2.5504	175.8114
8/1/2017 2:50:00 AM	2.5126	175.7736
8/1/2017 2:55:00 AM	2.5898	175.8508
8/1/2017 3:00:00 AM	2.6037	175.8647
8/1/2017 3:05:00 AM	2.5184	175.7794
8/1/2017 3:10:00 AM	2.6115	175.8725
8/1/2017 3:15:00 AM	2.5434	175.8044
8/1/2017 3:20:00 AM	2.5480	175.809
8/1/2017 3:25:00 AM	2.5649	175.8259
8/1/2017 3:30:00 AM	2.5993	175.8603
8/1/2017 3:35:00 AM	2.5821	175.8431
8/1/2017 3:40:00 AM	2.5530	175.814
8/1/2017 3:45:00 AM	2.5484	175.8094
8/1/2017 3:50:00 AM	2.5220	175.783
8/1/2017 3:55:00 AM	2.5708	175.8318
8/1/2017 4:00:00 AM	2.5892	175.8502

Chicago 1:5yr 4 hour Tailwater Condition

IDs:	J27	J27
Date/Time	Depth	Head
M/d/yyyy	m	m
8/1/2017 12:05:00 AM	0.0000	173.261
8/1/2017 12:10:00 AM	0.0000	173.261
8/1/2017 12:15:00 AM	0.0200	173.281
8/1/2017 12:20:00 AM	0.1024	173.3634
8/1/2017 12:25:00 AM	0.2850	173.546
8/1/2017 12:30:00 AM	0.5107	173.7717
8/1/2017 12:35:00 AM	0.5183	173.7793
8/1/2017 12:40:00 AM	0.5252	173.7862
8/1/2017 12:45:00 AM	0.5329	173.7939
8/1/2017 12:50:00 AM	0.5440	173.8049
8/1/2017 12:55:00 AM	0.5583	173.8194
8/1/2017 1:00:00 AM	0.5740	173.8351
8/1/2017 1:05:00 AM	0.5907	173.8517
8/1/2017 1:10:00 AM	0.6113	173.8723
8/1/2017 1:15:00 AM	0.6426	173.9036
8/1/2017 1:20:00 AM	0.6841	173.9451
8/1/2017 1:25:00 AM	0.7601	174.0211
8/1/2017 1:30:00 AM	0.9991	174.2601
8/1/2017 1:35:00 AM	2.4847	175.7457
8/1/2017 1:40:00 AM	2.4763	175.7373
8/1/2017 1:45:00 AM	2.4958	175.7568
8/1/2017 1:50:00 AM	2.4447	175.7057
8/1/2017 1:55:00 AM	2.4163	175.6773
8/1/2017 2:00:00 AM	2.3692	175.6302
8/1/2017 2:05:00 AM	2.3416	175.6026
8/1/2017 2:10:00 AM	2.3499	175.6109
8/1/2017 2:15:00 AM	2.3649	175.6259
8/1/2017 2:20:00 AM	2.3171	175.5781
8/1/2017 2:25:00 AM	2.2339	175.4949
8/1/2017 2:30:00 AM	2.1560	175.417
8/1/2017 2:35:00 AM	2.1410	175.402
8/1/2017 2:40:00 AM	2.0662	175.3272
8/1/2017 2:45:00 AM	2.0205	175.2816
8/1/2017 2:50:00 AM	1.9344	175.1954
8/1/2017 2:55:00 AM	1.8727	175.1337
8/1/2017 3:00:00 AM	1.7971	175.0581
8/1/2017 3:05:00 AM	1.7383	174.9993
8/1/2017 3:10:00 AM	1.6687	174.9297
8/1/2017 3:15:00 AM	1.5859	174.8469
8/1/2017 3:20:00 AM	1.5043	174.7652
8/1/2017 3:25:00 AM	1.4270	174.688
8/1/2017 3:30:00 AM	1.3504	174.6114
8/1/2017 3:35:00 AM	1.3012	174.5622
8/1/2017 3:40:00 AM	1.2451	174.5061
8/1/2017 3:45:00 AM	1.1575	174.4185
8/1/2017 3:50:00 AM	1.0684	174.3294
8/1/2017 3:55:00 AM	1.0305	174.2915
8/1/2017 4:00:00 AM	1.0058	174.2668

8/1/2017 4:05:00 AM	2.5990	175.86	8/1/2017 4:05:00 AM	0.9401	174.2011
8/1/2017 4:10:00 AM	2.5244	175.7854	8/1/2017 4:10:00 AM	0.8699	174.1309
8/1/2017 4:15:00 AM	2.5096	175.7706	8/1/2017 4:15:00 AM	0.7908	174.0518
8/1/2017 4:20:00 AM	2.4697	175.7307	8/1/2017 4:20:00 AM	0.7152	173.9762
8/1/2017 4:25:00 AM	2.5374	175.7984	8/1/2017 4:25:00 AM	0.6498	173.9108
8/1/2017 4:30:00 AM	2.4445	175.7055	8/1/2017 4:30:00 AM	0.6087	173.8697
8/1/2017 4:35:00 AM	2.5313	175.7923	8/1/2017 4:35:00 AM	0.5962	173.8572
8/1/2017 4:40:00 AM	2.4638	175.7248	8/1/2017 4:40:00 AM	0.5911	173.8521
8/1/2017 4:45:00 AM	2.5220	175.783	8/1/2017 4:45:00 AM	0.5981	173.8591
8/1/2017 4:50:00 AM	2.4580	175.719	8/1/2017 4:50:00 AM	0.6024	173.8634
8/1/2017 4:55:00 AM	2.3860	175.647	8/1/2017 4:55:00 AM	0.6036	173.8646
8/1/2017 5:00:00 AM	2.4586	175.7196	8/1/2017 5:00:00 AM	0.6033	173.8643
8/1/2017 5:05:00 AM	2.4100	175.671	8/1/2017 5:05:00 AM	0.6023	173.8633
8/1/2017 5:10:00 AM	2.3858	175.6469	8/1/2017 5:10:00 AM	0.6010	173.862
8/1/2017 5:15:00 AM	2.4471	175.7081	8/1/2017 5:15:00 AM	0.5996	173.8606
8/1/2017 5:20:00 AM	2.4107	175.6717	8/1/2017 5:20:00 AM	0.5981	173.8591
8/1/2017 5:25:00 AM	2.4187	175.6797	8/1/2017 5:25:00 AM	0.5965	173.8575
8/1/2017 5:30:00 AM	2.3930	175.654	8/1/2017 5:30:00 AM	0.5950	173.856
8/1/2017 5:35:00 AM	2.3410	175.6021	8/1/2017 5:35:00 AM	0.5935	173.8545
8/1/2017 5:40:00 AM	2.3850	175.646	8/1/2017 5:40:00 AM	0.5920	173.853
8/1/2017 5:45:00 AM	2.2876	175.5486	8/1/2017 5:45:00 AM	0.5906	173.8516
8/1/2017 5:50:00 AM	2.2488	175.5098	8/1/2017 5:50:00 AM	0.5892	173.8502
8/1/2017 5:55:00 AM	2.2218	175.4828	8/1/2017 5:55:00 AM	0.5878	173.8488
8/1/2017 6:00:00 AM	2.2032	175.4642	8/1/2017 6:00:00 AM	0.5865	173.8475
8/1/2017 6:05:00 AM	2.2369	175.4979	8/1/2017 6:05:00 AM	0.5853	173.8463
8/1/2017 6:10:00 AM	2.2579	175.5189	8/1/2017 6:10:00 AM	0.5841	173.8451
8/1/2017 6:15:00 AM	2.1858	175.4468	8/1/2017 6:15:00 AM	0.5829	173.8439
8/1/2017 6:20:00 AM	2.1867	175.4477	8/1/2017 6:20:00 AM	0.5817	173.8427
8/1/2017 6:25:00 AM	2.1786	175.4396	8/1/2017 6:25:00 AM	0.5806	173.8416
8/1/2017 6:30:00 AM	2.1131	175.3741	8/1/2017 6:30:00 AM	0.5795	173.8405
8/1/2017 6:35:00 AM	2.1212	175.3822	8/1/2017 6:35:00 AM	0.5784	173.8394
8/1/2017 6:40:00 AM	2.0769	175.3379	8/1/2017 6:40:00 AM	0.5774	173.8384
8/1/2017 6:45:00 AM	2.1145	175.3755	8/1/2017 6:45:00 AM	0.5763	173.8374
8/1/2017 6:50:00 AM	1.9332	175.1942	8/1/2017 6:50:00 AM	0.5753	173.8363
8/1/2017 6:55:00 AM	1.7746	175.0356	8/1/2017 6:55:00 AM	0.5744	173.8354
8/1/2017 7:00:00 AM	1.7274	174.9884	8/1/2017 7:00:00 AM	0.5734	173.8344
8/1/2017 7:05:00 AM	1.6606	174.9216	8/1/2017 7:05:00 AM	0.5724	173.8334
8/1/2017 7:10:00 AM	1.5347	174.7957	8/1/2017 7:10:00 AM	0.5716	173.8326
8/1/2017 7:15:00 AM	1.3823	174.6433	8/1/2017 7:15:00 AM	0.5710	173.832
8/1/2017 7:20:00 AM	1.3039	174.5649	8/1/2017 7:20:00 AM	0.5705	173.8315
8/1/2017 7:25:00 AM	1.2272	174.4883	8/1/2017 7:25:00 AM	0.5699	173.8309
8/1/2017 7:30:00 AM	1.1520	174.413	8/1/2017 7:30:00 AM	0.5694	173.8304
8/1/2017 7:35:00 AM	1.1097	174.3707	8/1/2017 7:35:00 AM	0.5689	173.8299
8/1/2017 7:40:00 AM	0.9818	174.2428	8/1/2017 7:40:00 AM	0.5685	173.8295
8/1/2017 7:45:00 AM	0.8869	174.1479	8/1/2017 7:45:00 AM	0.5680	173.829
8/1/2017 7:50:00 AM	0.7912	174.0522	8/1/2017 7:50:00 AM	0.5675	173.8285
8/1/2017 7:55:00 AM	0.7145	173.9755	8/1/2017 7:55:00 AM	0.5670	173.828
8/1/2017 8:00:00 AM	0.7060	173.967	8/1/2017 8:00:00 AM	0.5666	173.8276
8/1/2017 8:05:00 AM	0.7169	173.9779	8/1/2017 8:05:00 AM	0.5661	173.8271
8/1/2017 8:10:00 AM	0.7195	173.9805	8/1/2017 8:10:00 AM	0.5657	173.8267
8/1/2017 8:15:00 AM	0.7201	173.9811	8/1/2017 8:15:00 AM	0.5652	173.8262
8/1/2017 8:20:00 AM	0.7201	173.9811	8/1/2017 8:20:00 AM	0.5647	173.8257
8/1/2017 8:25:00 AM	0.7201	173.9811	8/1/2017 8:25:00 AM	0.5643	173.8253

8/1/2017 8:30:00 AM	0.7200	173.981	8/1/2017 8:30:00 AM	0.5639	173.8248
8/1/2017 8:35:00 AM	0.7200	173.981	8/1/2017 8:35:00 AM	0.5634	173.8244
8/1/2017 8:40:00 AM	0.7199	173.9809	8/1/2017 8:40:00 AM	0.5630	173.824
8/1/2017 8:45:00 AM	0.7198	173.9808	8/1/2017 8:45:00 AM	0.5625	173.8235
8/1/2017 8:50:00 AM	0.7197	173.9807	8/1/2017 8:50:00 AM	0.5621	173.8231
8/1/2017 8:55:00 AM	0.7196	173.9807	8/1/2017 8:55:00 AM	0.5617	173.8227
8/1/2017 9:00:00 AM	0.7195	173.9805	8/1/2017 9:00:00 AM	0.5613	173.8223
8/1/2017 9:05:00 AM	0.7194	173.9803	8/1/2017 9:05:00 AM	0.5608	173.8218
8/1/2017 9:10:00 AM	0.7191	173.9801	8/1/2017 9:10:00 AM	0.5604	173.8214
8/1/2017 9:15:00 AM	0.7188	173.9798	8/1/2017 9:15:00 AM	0.5600	173.821
8/1/2017 9:20:00 AM	0.7185	173.9795	8/1/2017 9:20:00 AM	0.5596	173.8206
8/1/2017 9:25:00 AM	0.7181	173.9791	8/1/2017 9:25:00 AM	0.5592	173.8202
8/1/2017 9:30:00 AM	0.7177	173.9787	8/1/2017 9:30:00 AM	0.5588	173.8198
8/1/2017 9:35:00 AM	0.7173	173.9783	8/1/2017 9:35:00 AM	0.5584	173.8194
8/1/2017 9:40:00 AM	0.7168	173.9778	8/1/2017 9:40:00 AM	0.5579	173.8189
8/1/2017 9:45:00 AM	0.7163	173.9773	8/1/2017 9:45:00 AM	0.5575	173.8185
8/1/2017 9:50:00 AM	0.7158	173.9768	8/1/2017 9:50:00 AM	0.5570	173.818
8/1/2017 9:55:00 AM	0.7153	173.9763	8/1/2017 9:55:00 AM	0.5566	173.8176
8/1/2017 10:00:00 AM	0.7147	173.9757	8/1/2017 10:00:00 AM	0.5561	173.8171
8/1/2017 10:05:00 AM	0.7142	173.9752	8/1/2017 10:05:00 AM	0.5557	173.8167
8/1/2017 10:10:00 AM	0.7136	173.9746	8/1/2017 10:10:00 AM	0.5552	173.8162
8/1/2017 10:15:00 AM	0.7128	173.9738	8/1/2017 10:15:00 AM	0.5547	173.8158
8/1/2017 10:20:00 AM	0.7117	173.9727	8/1/2017 10:20:00 AM	0.5543	173.8153
8/1/2017 10:25:00 AM	0.7105	173.9715	8/1/2017 10:25:00 AM	0.5538	173.8148
8/1/2017 10:30:00 AM	0.7093	173.9703	8/1/2017 10:30:00 AM	0.5534	173.8144
8/1/2017 10:35:00 AM	0.7081	173.9691	8/1/2017 10:35:00 AM	0.5529	173.8139
8/1/2017 10:40:00 AM	0.7068	173.9678	8/1/2017 10:40:00 AM	0.5524	173.8134
8/1/2017 10:45:00 AM	0.7056	173.9666	8/1/2017 10:45:00 AM	0.5520	173.813
8/1/2017 10:50:00 AM	0.7043	173.9653	8/1/2017 10:50:00 AM	0.5515	173.8125
8/1/2017 10:55:00 AM	0.7030	173.9641	8/1/2017 10:55:00 AM	0.5511	173.8121
8/1/2017 11:00:00 AM	0.6974	173.9585	8/1/2017 11:00:00 AM	0.5506	173.8116
8/1/2017 11:05:00 AM	0.6413	173.9023	8/1/2017 11:05:00 AM	0.5501	173.8111
8/1/2017 11:10:00 AM	0.6089	173.8699	8/1/2017 11:10:00 AM	0.5497	173.8107
8/1/2017 11:15:00 AM	0.5921	173.8531	8/1/2017 11:15:00 AM	0.5492	173.8102
8/1/2017 11:20:00 AM	0.5817	173.8427	8/1/2017 11:20:00 AM	0.5488	173.8098
8/1/2017 11:25:00 AM	0.5746	173.8356	8/1/2017 11:25:00 AM	0.5483	173.8093
8/1/2017 11:30:00 AM	0.5697	173.8307	8/1/2017 11:30:00 AM	0.5478	173.8088
8/1/2017 11:35:00 AM	0.5669	173.8279	8/1/2017 11:35:00 AM	0.5474	173.8084
8/1/2017 11:40:00 AM	0.5652	173.8262	8/1/2017 11:40:00 AM	0.5469	173.8079
8/1/2017 11:45:00 AM	0.5640	173.825	8/1/2017 11:45:00 AM	0.5465	173.8075
8/1/2017 11:50:00 AM	0.5632	173.8242	8/1/2017 11:50:00 AM	0.5460	173.807
8/1/2017 11:55:00 AM	0.5624	173.8234	8/1/2017 11:55:00 AM	0.5456	173.8066
8/1/2017 12:00:00 PM	0.5618	173.8228	8/1/2017 12:00:00 PM	0.5451	173.8061
8/1/2017 12:05:00 PM	0.5613	173.8223	8/1/2017 12:05:00 PM	0.5447	173.8057
8/1/2017 12:10:00 PM	0.5608	173.8218	8/1/2017 12:10:00 PM	0.5442	173.8052
8/1/2017 12:15:00 PM	0.5603	173.8213	8/1/2017 12:15:00 PM	0.5438	173.8048
8/1/2017 12:20:00 PM	0.5598	173.8208	8/1/2017 12:20:00 PM	0.5433	173.8043
8/1/2017 12:25:00 PM	0.5593	173.8203	8/1/2017 12:25:00 PM	0.5429	173.8039
8/1/2017 12:30:00 PM	0.5589	173.8199	8/1/2017 12:30:00 PM	0.5424	173.8034
8/1/2017 12:35:00 PM	0.5584	173.8194	8/1/2017 12:35:00 PM	0.5420	173.803
8/1/2017 12:40:00 PM	0.5580	173.819	8/1/2017 12:40:00 PM	0.5415	173.8025
8/1/2017 12:45:00 PM	0.5575	173.8185	8/1/2017 12:45:00 PM	0.5411	173.8021
8/1/2017 12:50:00 PM	0.5570	173.818	8/1/2017 12:50:00 PM	0.5406	173.8016

8/1/2017 12:55:00 PM	0.5566	173.8176	8/1/2017 12:55:00 PM	0.5402	173.8012
8/1/2017 1:00:00 PM	0.5561	173.8171	8/1/2017 1:00:00 PM	0.5397	173.8007
8/1/2017 1:05:00 PM	0.5556	173.8166	8/1/2017 1:05:00 PM	0.5393	173.8003
8/1/2017 1:10:00 PM	0.5551	173.8161	8/1/2017 1:10:00 PM	0.5388	173.7998
8/1/2017 1:15:00 PM	0.5547	173.8157	8/1/2017 1:15:00 PM	0.5384	173.7994
8/1/2017 1:20:00 PM	0.5542	173.8152	8/1/2017 1:20:00 PM	0.5379	173.7989
8/1/2017 1:25:00 PM	0.5537	173.8147	8/1/2017 1:25:00 PM	0.5375	173.7985
8/1/2017 1:30:00 PM	0.5533	173.8143	8/1/2017 1:30:00 PM	0.5370	173.798
8/1/2017 1:35:00 PM	0.5528	173.8138	8/1/2017 1:35:00 PM	0.5366	173.7976
8/1/2017 1:40:00 PM	0.5524	173.8134	8/1/2017 1:40:00 PM	0.5361	173.7971
8/1/2017 1:45:00 PM	0.5519	173.8129	8/1/2017 1:45:00 PM	0.5357	173.7967
8/1/2017 1:50:00 PM	0.5514	173.8124	8/1/2017 1:50:00 PM	0.5353	173.7962
8/1/2017 1:55:00 PM	0.5510	173.812	8/1/2017 1:55:00 PM	0.5348	173.7958
8/1/2017 2:00:00 PM	0.5505	173.8115	8/1/2017 2:00:00 PM	0.5343	173.7953
8/1/2017 2:05:00 PM	0.5501	173.8111	8/1/2017 2:05:00 PM	0.5339	173.7949
8/1/2017 2:10:00 PM	0.5496	173.8106	8/1/2017 2:10:00 PM	0.5334	173.7944
8/1/2017 2:15:00 PM	0.5492	173.8102	8/1/2017 2:15:00 PM	0.5329	173.7939
8/1/2017 2:20:00 PM	0.5488	173.8098	8/1/2017 2:20:00 PM	0.5324	173.7934
8/1/2017 2:25:00 PM	0.5483	173.8093	8/1/2017 2:25:00 PM	0.5319	173.7929
8/1/2017 2:30:00 PM	0.5479	173.8089	8/1/2017 2:30:00 PM	0.5314	173.7924
8/1/2017 2:35:00 PM	0.5474	173.8084	8/1/2017 2:35:00 PM	0.5309	173.7919
8/1/2017 2:40:00 PM	0.5470	173.808	8/1/2017 2:40:00 PM	0.5304	173.7914
8/1/2017 2:45:00 PM	0.5466	173.8076	8/1/2017 2:45:00 PM	0.5299	173.7909
8/1/2017 2:50:00 PM	0.5462	173.8072	8/1/2017 2:50:00 PM	0.5294	173.7904
8/1/2017 2:55:00 PM	0.5457	173.8067	8/1/2017 2:55:00 PM	0.5289	173.7899
8/1/2017 3:00:00 PM	0.5453	173.8063	8/1/2017 3:00:00 PM	0.5284	173.7894
8/1/2017 3:05:00 PM	0.5449	173.8059	8/1/2017 3:05:00 PM	0.5279	173.7888
8/1/2017 3:10:00 PM	0.5445	173.8055	8/1/2017 3:10:00 PM	0.5273	173.7883
8/1/2017 3:15:00 PM	0.5440	173.805	8/1/2017 3:15:00 PM	0.5268	173.7878
8/1/2017 3:20:00 PM	0.5436	173.8046	8/1/2017 3:20:00 PM	0.5263	173.7873
8/1/2017 3:25:00 PM	0.5432	173.8042	8/1/2017 3:25:00 PM	0.5257	173.7867
8/1/2017 3:30:00 PM	0.5428	173.8038	8/1/2017 3:30:00 PM	0.5252	173.7862
8/1/2017 3:35:00 PM	0.5423	173.8033	8/1/2017 3:35:00 PM	0.5247	173.7857
8/1/2017 3:40:00 PM	0.5419	173.8029	8/1/2017 3:40:00 PM	0.5241	173.7851
8/1/2017 3:45:00 PM	0.5415	173.8025	8/1/2017 3:45:00 PM	0.5236	173.7846
8/1/2017 3:50:00 PM	0.5411	173.8021	8/1/2017 3:50:00 PM	0.5231	173.7841
8/1/2017 3:55:00 PM	0.5407	173.8017	8/1/2017 3:55:00 PM	0.5226	173.7836
8/1/2017 4:00:00 PM	0.5325	172.7285	8/1/2017 4:00:00 PM	0.5221	173.7831
8/1/2017 4:05:00 PM	0.5313	172.7297	8/1/2017 4:05:00 PM	0.5215	173.7826
8/1/2017 4:10:00 PM	0.5266	172.7344	8/1/2017 4:10:00 PM	0.5210	173.7821
8/1/2017 4:15:00 PM	0.5227	172.7383	8/1/2017 4:15:00 PM	0.5205	173.7816
8/1/2017 4:20:00 PM	0.5211	172.7399	8/1/2017 4:20:00 PM	0.5200	173.7811
8/1/2017 4:25:00 PM	0.5201	172.7409	8/1/2017 4:25:00 PM	0.5199	173.7809
8/1/2017 4:30:00 PM	0.4986	172.7624	8/1/2017 4:30:00 PM	0.4854	173.7464
8/1/2017 4:35:00 PM	0.4754	172.7856	8/1/2017 4:35:00 PM	0.4257	173.6867
8/1/2017 4:40:00 PM	0.3955	172.8655	8/1/2017 4:40:00 PM	0.3541	173.6151
8/1/2017 4:45:00 PM	0.2855	172.9755	8/1/2017 4:45:00 PM	0.2157	173.4767
8/1/2017 4:50:00 PM	0.2155	173.0455	8/1/2017 4:50:00 PM	0.1855	173.4465
8/1/2017 4:55:00 PM	0.1549	173.1061	8/1/2017 4:55:00 PM	0.0985	173.3595
8/1/2017 5:00:00 PM	0.1155	173.1455	8/1/2017 5:00:00 PM	0.0522	173.3132

Urban Stress-Test Boundary Condition

IDs:	STM7080
Date/Time	Head
M/d/yyyy	m
8/1/2017 12:05:00 AM	173.485
8/1/2017 12:10:00 AM	173.485
8/1/2017 12:15:00 AM	173.485
8/1/2017 12:20:00 AM	173.485
8/1/2017 12:25:00 AM	173.485
8/1/2017 12:30:00 AM	173.485
8/1/2017 12:35:00 AM	173.485
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8/1/2017 1:15:00 AM	173.6201
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8/1/2017 1:30:00 AM	174.3216
8/1/2017 1:35:00 AM	174.3327
8/1/2017 1:40:00 AM	174.3335
8/1/2017 1:45:00 AM	174.3343
8/1/2017 1:50:00 AM	174.335
8/1/2017 1:55:00 AM	174.3356
8/1/2017 2:00:00 AM	174.3362
8/1/2017 2:05:00 AM	174.3368
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8/1/2017 2:15:00 AM	174.3378
8/1/2017 2:20:00 AM	174.3383
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8/1/2017 2:30:00 AM	174.339
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8/1/2017 2:40:00 AM	174.3403
8/1/2017 2:45:00 AM	174.3418
8/1/2017 2:50:00 AM	174.3434
8/1/2017 2:55:00 AM	174.3448
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8/1/2017 3:05:00 AM	174.3478
8/1/2017 3:10:00 AM	174.3496
8/1/2017 3:15:00 AM	174.3511
8/1/2017 3:20:00 AM	174.3524
8/1/2017 3:25:00 AM	174.3536
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8/1/2017 4:05:00 AM	174.359
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8/1/2017 4:25:00 AM	174.3616
8/1/2017 4:30:00 AM	174.362
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8/1/2017 4:40:00 AM	174.3627
8/1/2017 4:45:00 AM	174.363
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8/1/2017 6:45:00 AM	174.3728
8/1/2017 6:50:00 AM	174.373

8/1/2017 6:55:00 AM	174.3732
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8/1/2017 7:05:00 AM	174.3746
8/1/2017 7:10:00 AM	174.3762
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8/1/2017 8:55:00 AM	174.3981
8/1/2017 9:00:00 AM	174.3984
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8/2/2017 7:00:00 AM	174.3505	8/2/2017 10:35:00 AM	174.3434
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8/2/2017 3:50:00 PM	174.3374
8/2/2017 3:55:00 PM	174.3373

From: Langlois, Ryan [mailto:rlanglois@dillon.ca]
Sent: Tuesday, November 20, 2018 3:23 PM
To: jkrpan@odandetech.com
Cc: John Henderson <jhenderson@tecumseh.ca>; Phil Bartnik <pbartnik@tecumseh.ca>; Flavio Forest <fforest@dillon.ca>
Subject: Re: Victoria -on the Lake - Tecumseh - SWMM model

Good afternoon John,

I received your voicemail and my apologies for not getting back to you earlier. I reviewed your model and based on my review felt it is more efficient for the design to send you the tailwater conditions and the allowable release rate from the site based on the master existing condition model for your team to revise the required stormwater management for the site based on these conditions. The site under existing conditions is being controlled into the existing 750mm diameter storm sewer crossing Dillon drive through a 150mm diameter storm sewer. There is a second connection to the 750mm diameter sewer which is located within the easement to the east. Below are the allowable release rates:

- Total 1:100yr 24 hour max. allowable release rate into the 750mm diameter sewer = 102 L/s (includes both 150mm connections from the site and the easement); and
- Victoria Site 1:100yr 24 hour max. allowable release rate into the 750mm diameter sewer = 58 L/s.

Attached I have provided the 1:2-4hr, 1:5-4hr and 1:100yr-24 hour tailwater conditions for the site. Note that we ran the model simulations for 16 hours for the 4-hour events and 30 hours for the 24-hour event. The peak within the system was reached for each event and the hydrographs begin to draw down, but as you can see in the excel sheet not completely down to the bottom of the pipe. We did not run the models any further for complete drawdown due to the length of time it takes to run each simulation. Using the simulation times outlined above, we were able to reach the maximum ponding within the municipality.

Once your team has revised the stormwater design, please forward the model over and I will incorporate it into our master model.

Please do not hesitate to contact me if you have any questions.

Thanks

Ryan Langlois, P.Eng.
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Windsor, Ontario, N8W 5K8
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Please consider the environment before printing this email

5-YEAR DESIGN STORMS

CHICAGO 4-HOUR
Depth = 49.5 mm

Time h:mm	5min Rain mm/hr
0:00	2.44
0:05	2.58
0:10	2.73
0:15	2.91
0:20	3.12
0:25	3.36
0:30	3.65
0:35	3.99
0:40	4.41
0:45	4.92
0:50	5.59
0:55	6.46
1:00	7.66
1:05	9.42
1:10	12.20
1:15	17.18
1:20	28.20
1:25	64.52
1:30	139.58
1:35	60.83
1:40	35.06
1:45	23.95
1:50	17.96
1:55	14.28
2:00	11.81
2:05	10.06
2:10	8.75
2:15	7.74
2:20	6.94
2:25	6.29
2:30	5.76
2:35	5.30
2:40	4.92
2:45	4.59
2:50	4.30
2:55	4.05
3:00	3.83
3:05	3.63
3:10	3.45
3:15	3.29
3:20	3.14
3:25	3.01
3:30	2.89
3:35	2.78
3:40	2.67
3:45	2.58
3:50	2.49
3:55	2.41
4:00	0.00

Time h:mm	10min Rain mm/hr
0:00	2.51
0:10	2.82
0:20	3.24
0:30	3.82
0:40	4.67
0:50	6.02
1:00	8.54
1:10	14.69
1:20	38.85
1:30	107.72
1:40	29.51
1:50	16.12
2:00	10.93
2:10	8.25
2:20	6.62
2:30	5.53
2:40	4.76
2:50	4.18
3:00	3.73
3:10	3.37
3:20	3.08
3:30	2.83
3:40	2.63
3:50	2.45
4:00	0.00

Time h:mm	15min Rain mm/hr
0:00	2.58
0:15	3.13
0:30	4.02
0:45	5.66
1:00	9.76
1:15	26.72
1:30	88.40
1:45	18.73
2:00	10.21
2:15	6.99
2:30	5.33
2:45	4.31
3:00	3.64
3:15	3.15
3:30	2.78
3:45	2.49
4:00	0.00

Time h:mm	20min Rain mm/hr
0:00	2.66
0:20	3.53
0:40	5.34
1:00	11.61
1:20	75.35
1:40	20.75
2:00	9.59
2:20	6.07
2:40	4.47
3:00	3.55
3:20	2.95
3:40	2.54
4:00	0.00

Time h:mm	30min Rain mm/hr
0:00	2.86
0:30	4.84
1:00	13.11
1:30	58.69
2:00	8.60
2:30	4.82
3:00	3.39
3:30	2.64
4:00	0.00

100-YEAR DESIGN STORMS

CHICAGO 4-HOUR
Depth = 81.6 mm

Time h:mm	5min Rain mm/hr
0:00	3.71
0:05	3.94
0:10	4.20
0:15	4.50
0:20	4.85
0:25	5.25
0:30	5.73
0:35	6.31
0:40	7.03
0:45	7.92
0:50	9.07
0:55	10.59
1:00	12.72
1:05	15.84
1:10	20.81
1:15	29.71
1:20	49.12
1:25	108.91
1:30	218.23
1:35	103.42
1:40	60.97
1:45	41.72
1:50	31.11
1:55	24.53
2:00	20.12
2:05	16.98
2:10	14.65
2:15	12.86
2:20	11.44
2:25	10.30
2:30	9.36
2:35	8.58
2:40	7.91
2:45	7.34
2:50	6.85
2:55	6.42
3:00	6.04
3:05	5.70
3:10	5.40
3:15	5.13
3:20	4.88
3:25	4.66
3:30	4.46
3:35	4.27
3:40	4.10
3:45	3.95
3:50	3.80
3:55	3.67
4:00	0.00

Time h:mm	10min Rain mm/hr
0:00	3.83
0:10	4.35
0:20	5.05
0:30	6.02
0:40	7.47
0:50	9.83
1:00	14.28
1:10	25.26
1:20	67.16
1:30	172.68
1:40	51.34
1:50	27.82
2:00	18.55
2:10	13.75
2:20	10.87
2:30	8.97
2:40	7.63
2:50	6.63
3:00	5.87
3:10	5.26
3:20	4.77
3:30	4.37
3:40	4.03
3:50	3.74
4:00	0.00

Time h:mm	15min Rain mm/hr
0:00	3.95
0:15	4.87
0:30	6.36
0:45	9.19
1:00	16.45
1:15	46.45
1:30	143.67
1:45	32.45
2:00	17.25
2:15	11.53
2:30	8.62
2:45	6.87
3:00	5.71
3:15	4.89
3:30	4.28
3:45	3.81
4:00	0.00

Time h:mm	20min Rain mm/hr
0:00	4.09
0:20	5.54
0:40	8.65
1:00	19.77
1:20	123.48
1:40	36.02
2:00	16.15
2:20	9.92
2:40	7.13
3:00	5.56
3:20	4.57
3:40	3.88
4:00	0.00

Time h:mm	30min Rain mm/hr
0:00	4.41
0:30	7.78
1:00	22.45
1:30	97.06
2:00	14.39
2:30	7.74
3:00	5.30
3:30	4.04
4:00	0.00

URBAN STRESS TEST STORM

CHICAGO 100-YEAR 24-HOUR (108 mm) + UNIFORM DISTRIBUTION OF ADDITIONAL 42 mm Depth = 108 mm + 42 mm = 150 mm			
Time h:mm	15min Rain mm/hr	Time h:mm	15min Rain mm/hr
0:00	2.41	12:15	4.49
0:15	2.43	12:30	4.29
0:30	2.45	12:45	4.12
0:45	2.46	13:00	3.98
1:00	2.48	13:15	3.85
1:15	2.51	13:30	3.74
1:30	2.53	13:45	3.63
1:45	2.55	14:00	3.54
2:00	2.58	14:15	3.46
2:15	2.61	14:30	3.39
2:30	2.64	14:45	3.32
2:45	2.67	15:00	3.26
3:00	2.71	15:15	3.20
3:15	2.74	15:30	3.15
3:30	2.79	15:45	3.10
3:45	2.83	16:00	3.05
4:00	2.88	16:15	3.01
4:15	2.94	16:30	2.97
4:30	3.00	16:45	2.93
4:45	3.07	17:00	2.90
5:00	3.15	17:15	2.87
5:15	3.23	17:30	2.84
5:30	3.33	17:45	2.81
5:45	3.45	18:00	2.78
6:00	3.59	18:15	2.76
6:15	3.75	18:30	2.73
6:30	3.94	18:45	2.71
6:45	4.18	19:00	2.69
7:00	4.49	19:15	2.67
7:15	4.89	19:30	2.65
7:30	5.43	19:45	2.63
7:45	6.20	20:00	2.61
8:00	7.41	20:15	2.59
8:15	9.56	20:30	2.57
8:30	14.29	20:45	2.56
8:45	32.01	21:00	2.54
9:00	145.13	21:15	2.53
9:15	48.51	21:30	2.51
9:30	23.13	21:45	2.50
9:45	15.08	22:00	2.49
10:00	11.35	22:15	2.47
10:15	9.23	22:30	2.46
10:30	7.88	22:45	2.45
10:45	6.94	23:00	2.44
11:00	6.25	23:15	2.43
11:15	5.73	23:30	2.42
11:30	5.32	23:45	2.41
11:45	4.99	0:00	0.00
12:00	4.72		

XPSWMM Output File – 100-Year, 4-Hour Event

```
 Current Directory:   C:\PROGRA~1\Innovyze\XPSWMM~1.1_X
 Engine Name: C:\PROGRA~1\Innovyze\XPSWMM~1.1_X\engine\SWMMEN~2.EXE
 Input File: P:\2018\18249\SWMM and REPORT\XPSWMM-REV7\XPSWMM - 100Y\1D\18249 xpswmm-rev-0-100yr_100yr-4hr\18249 xpswmm-rev-0-100yr_100yr-4hr.XP

          *==============================================*
          |                    xpswmm                    |
          |     Storm and Wastewater Management Model    |
          |            Developed by Innovyze.            |
          |==============================================|
          |                                              |
          | Last Update      : May 21 2019               |
          | Interface Version: 2019.1                    |
          | Engine Version   : 12.0                      |
          | Data File Version: 12.62                     |
          |                                              |
          |                                              |
          *==============================================*
```

Software Info

```
Engine Name: C:\PROGRA~1\Innovyze\XPSWMM~1.1_X\engine\SWMMEN~2.EXE


*=====================================================*
|       Input and Output file names by Layer          |
*=====================================================*

 Input File  to Layer #     1 JOT.US
 Output File to Layer #     1 JOT.US
 Input File  to Layer #     2 JOT.US
 Output File to Layer #     2 JOT.US

*==============================================================*
|              Configuration Parameters                        |
|  Configuration Parameters, both those that are hardwired     |
|  and those added to the simulation are listed below.         |
|  Configuration Parameters that start with a $ are set in     |
|  the engine as defaults.  The remaining in UPPERCASE         |
|  have been added to the simulation in the Configuration->    |
|  Configuration Parameters dialog or as Engine Defaults in    |
|  the SWMXP.INI file.                                         |
|                                                              |
|  Consult the Help File for the specific meaning/purpose      |
|  of any particular parameter.                                |
|                                                              |
|  Note:                                                       |
|  The second column denotes the value of the parameter.       |
*==============================================================*

 $powerstation                          0.0000         1         2
 $perv                                  0.0000         0         4
 $oldegg                                0.0000         0         7
 $as                                    0.0000         0        11
 $noflat                                0.0000         0        21
 $oldomega                              0.0000         0        24
 $oldvol                                0.0000         1        28
 $implicit                              0.0000         1        29
 $oldhot                                0.0000         1        31
 $oldscs                                0.0000         0        33
 $flood                                 0.0000         1        40
 $nokeys                                0.0000         0        42
 $pzero                                 0.0000         0        55
 $oldvol2                               0.0000         2        59
 $storage2                              0.0000         3        62
 $oldhot1                               0.0000         1        63
 $pumpwt                                0.0000         1        70
 $ecloss                                0.0000         1        77
 $exout                                 0.0000         0        97
 $spatial = 0.90                        0.9000         5       124
 $djref = -1.0                         -0.1000         3       143
 $weirlen = 50                         50.0000         1       153
 $oldbnd                                0.0000         1       154
 $nogrelev                              0.0000         1       161
 $ncmid                                 0.0000         0       164
 $new_nl_97                             0.0000         2       290
 SCSIADEPTH=ON                          0.0000         1       293
 $best97                                0.0000         1       294
 $newbound                              0.0000         1       295
 $q_tol = 0.01                          0.0001         1       316
 $new_storage                           0.0000         1       322
 $old_iteration                         0.0000         1       333
 MINLEN=2                               2.0000         1       346
 $review_elevation                      0.0000         1       383
 $use_half_volume                       0.0000         1       385
 VERT_WALLS=ON                          0.0000         1       389
 $min_ts = 1.0                          1.0000         1       407
 $design_restart = on                   0.0000         1       412
 $zero_value=1.e-05                     0.0000         1       415
 SUBCATCHMENT_RES=ON                    0.0000         1       419
 $relax_depth = on                      0.0000         1       427
 $saveallpts = on                       0.0000         1       434
 PUMP_NEGHD=ON                          0.0000         1       437
 $channel_geometry=1                    0.0000         1       456
 PROJUNITS == METRIC                    0.0000         0       462

 *==============================================================*
 |   The XPSWMM/XPSTORM engine internally uses object IDs       |
 |      instead of full object names to represent objects.      |
 |   Included below is a table of these IDs along with the      |
 |        name of the object that ID corresponds to.            |
 *==============================================================*
        Object ID          Object
           Number           Name
 ================  ====================
              441  StartNullStruct1
              451  PROP STM MH1 (STM)
              452  PROP STM CBMH4 (STM)
              453  PROP STM MH5 (STM)
              458  PROP STM MH2 (STM)
              459  PROP STM MH6 (STM)
              461  PROP STM MH3 (STM)
              462  PROP STM MH7 (STM)
              464  PROP STM CBMH8 (STM)
              471  PROP STM MH9 (STM)
              474  STM7080 (STM)
              475  DI2 (STM)
              477  PROP CDS PMSU5645-10 (STM)
              482  HW-1 (STM)
              484  J27 (STM)
              490  DI1 (STM)
              491  DI3 (STM)
              494  DI4 (STM)
              495  STM MH1A (STM)
              498  Pipe - (596) (STM)
              500  Pipe - (600) (STM)
              501  Pipe - (602) (STM)
              502  Pipe - (605) (STM)
              504  Pipe - (607) (STM)
              505  Pipe - (608) (STM)
              506  Pipe - (609) (STM)
              507  Pipe - (610) (STM)
              508  Pipe - (611) (STM)
              509  Pipe - (612) (STM)
              524  Pipe - (674) (STM)
              526  Pipe - (676) (STM)
              538  Link181
         C(503.1)  503.1
         C(503.2)  503.2
         C(534.1)  534.1
         C(534.2)  534.2
         C(535.1)  535.1
         C(535.2)  535.2
         C(537.1)  537.1
         C(537.2)  537.2
         O(510.1)  205mm PLATE
```

Summary of pipes and MHs

```
*==========================================================*
| Parameter Values on the Tapes Common Block.These are the |
| values read from the data file and dynamically allocated |
| by the model for this simulation.                        |
*==========================================================*

 Number of Subcatchments in the Runoff Block (NW)....    11
 Number of Channel/Pipes in the Runoff Block (NG)....     0
 Runoff Water quality constituents (NRQ).............     0
 Runoff Land Uses per Subcatchment (NLU).............     0
 Number of Elements in the Transport Block (NET).....     0
 Number of Storage Junctions in Transport (NTSE).....     0
 Number of Input Hydrographs in Transport (NTH)......     0
 Number of Elements in the Extran Block (NEE)........    23
 Number of Groundwater Subcatchments in Runoff (NGW).     0
 Number of Interface locations for all Blocks (NIE)..    23
 Number of Pumps in Extran (NEP).....................     0
 Number of Orifices in Extran (NEO)..................     1
 Number of Tide Gates/Free Outfalls in Extran (NTG)..     1
 Number of Extran Weirs (NEW)........................     0
 Number of scs hydrograph points.....................   433
 Number of Extran printout locations (NPO)...........     0
 Number of Tide elements in Extran (NTE).............     1
 Number of Natural channels (NNC)....................     0
 Number of Storage junctions in Extran (NVSE)........     0
 Number of Time history data points in Extran(NTVAL).   190
 Number of Variable storage elements in Extran (NVST)     0
 Number of Input Hydrographs in Extran (NEH).........     0
 Number of Particle sizes in Transport Block (NPS)...     0
 Number of User defined conduits (NHW)...............    11
 Number of Connecting conduits in Extran (NECC)......    20
 Number of Upstream elements in Transport (NTCC)....     10
 Number of Storage/treatment plants (NSTU)...........     1
 Number of Values for R1 lines in Transport (NR1)....     0
 Number of Nodes to be allowed for (NNOD)............    23
 Number of Plugs in a Storage Treatment Unit.........     1


 ######################################################
 #    Entry made to the Runoff Layer(Block) of SWMM    #
 #    Last Updated June, 2014 by Innovyze              #
 ######################################################

 *==========================================================*
 |          RUNOFF TABLES IN THE OUTPUT FILE.               |
 |  These are the more important tables in the output file. |
 |  You can use your editor to find the table numbers,      |
 |  for example: search for Table R3 to check continuity.   |
 |  This output file can be imported into a Word Processor  |
 |  and printed on US letter or A4 paper using portrait     |
 |  mode, courier font, a size of 8 pt. and margins of 0.75 |
 |                                                          |
 | Table R1  - Physical Hydrology Data                      |
 | Table R2  - Infiltration data                            |
 | Table R3  - Raingage and Infiltration Database Names     |
 | Table R4  - Groundwater Data                             |
 | Table R5  - Continuity Check for Surface Water           |
 | Table R6  - Continuity Check for Channels/Pipes          |
 | Table R7  - Continuity Check for Subsurface Water        |
 | Table R8  - Infiltration/Inflow Continuity Check         |
 | Table R9  - Summary Statistics for Subcatchments         |
 | Table R10 - Sensitivity anlysis for Subcatchments        |
 *==========================================================*

                    A1

##########################################
#            RUNOFF JOB CONTROL          #
##########################################

 Snowmelt parameter - ISNOW.......................           0
 Number of rain gages - NRGAG.....................           1
 Quality is not simulated - KWALTY................           0
 Read evaporation data on line(s) F1 (F2) - IVAP..           1
 Hour of day at start of storm - NHR..............           0
 Minute of hour at start of storm - NMN...........           0
 Time TZERO at start of storm (hours).............       0.000
 Use Metric units for I/O - METRIC................           1
  ===> Ft-sec units used in all internal computations
 Runoff input print control...                               0
 Runoff graph plot control....                               0
 Runoff output print control..                               0
 Limit number of groundwater convergence messages to      10000

 Print headers every 50 lines - NOHEAD (0=yes, 1=no)         0

 Print land use load percentages -LANDUPR (0=no, 1=yes)      0
 Month, day, year of start of storm is:             11/ 3/2018
 Wet time step length (seconds)......                     300.0
 Dry time step length (seconds)......                    3600.0
 Wet/Dry time step length (seconds)...                    300.0
 Simulation length is......                                24.0 Hours

 If Horton infiltration model is being used
 A mixture of infiltration options may be used in
 XP-SWMM as a watershed specific option.
 Rate for regeneration of infiltration = REGEN * DECAY
 Decay is read in for each subcatchment
 REGEN = ............................................  0.01000


 Raingage #...............................          1
 KTYPE  - Rainfall input type.............          0
 NHISTO - Total number of rainfall values..      25
 KINC   - Rainfall values(pairs) per line..      10
 KPRINT - Print rainfall(0-Yes,1-No).......          0
 KTIME  - Precipitation time units
 0 --> Minutes  1 --> Hours...............          0
 KPREP  - Precipitation unit type
 0 --> Intensity  1 --> Volume............          0
 KTHIS - Variable rainfall intervals
 0 --> No, >= 1 --> Yes...................          0
 THISTO - Rainfall time interval...........      10.00
 TZRAIN - Starting time(KTIME units).......       0.00


#####################################
# Rainfall input summary from Runoff #
#####################################

 Total rainfall for gage #     1 is   81.5883 mm

   ############################
   #        Data Group F1     #
   # Evaporation Rate (mm/day) #
   ############################

  JAN.  FEB.  MAR.  APR.  MAY   JUN.  JUL.  AUG.  SEP.  OCT.  NOV  DEC.
  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ---- ----
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000


  ##################################################
  #  Table R1.  S U B C A T C H M E N T  D A T A   #
  #             Physical Hydrology Data            #
  ##################################################

                                                                                                  Deprs   Deprs   Prcnt
                                                                   Per-                           -sion   -sion    Zero
      Subcatchment              Channel                Width      Area      cent    Slope    "n"     "n"    Storge  Storge   Deten
 Number         Name          or inlet                 (m)       (Ha)     Imperv    m/m   Imprv    Perv   Imprv    Perv   -tion
 ------ -------------------- -------------------- ---------- ----------  ------ ------- ------- ------- ------- ------- -------
```

Table of contents

Input hydrology data

```
      1          DI2 (STM)#1            DI2 (STM)   22.000     0.42000     33.00   0.010   0.014   0.300   2.000   5.000  25.000
      2   PROP STM MH5 (ST#1   PROP STM MH5 (STM)   16.000     0.22000     90.00   0.010   0.014   0.300   2.000   5.000  25.000
      3          DI1 (STM)#1            DI1 (STM)   35.000     1.0900      12.00   0.010   0.014   0.300   2.000   5.000  25.000
      4   PROP STM MH3 (ST#1   PROP STM MH3 (STM)   15.000     0.21000     95.00   0.010   0.014   0.300   2.000   5.000  25.000
      5          DI4 (STM)#1            DI4 (STM)   18.000     0.28000     18.00   0.010   0.014   0.300   2.000   5.000  25.000
      6   PROP STM MH7 (ST#1   PROP STM MH7 (STM)   15.000     0.21000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
      7          DI3 (STM)#1            DI3 (STM)   18.000     0.28000     20.00   0.010   0.014   0.300   2.000   5.000  25.000
      8   PROP STM CBMH8 (#1 PROP STM CBMH8 (STM)   17.000     0.25000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
      9   PROP STM MH6 (ST#1   PROP STM MH6 (STM)   14.000     0.17000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
     10         HW-1 (STM)#1           HW-1 (STM)   19.000     0.74000     15.00   0.010   0.014   0.300   2.000   5.000  25.000
     11         HW-1 (STM)#2           HW-1 (STM)   34.000     0.31000     50.00   0.010   0.014   0.300   2.000   5.000  25.000


##############################################################################################
#          Table R2.  SUBCATCHMENT  DATA                                                     #
#                     Infiltration or Time of Concentration Data                             #
#                                                                                            #
# Infiltration Type      Infl #1(#5)       Infl #2(#6)          Infl #3(#7)             Infl #4(#8)  #
# SCS                 ->   Comp CN          Time Conc         Shape Factor        Depth or Fraction  #
# SBUH                ->   Comp CN          Time Conc                 N/A                     N/A  #
# Green Ampt          ->   Suction          Hydr Cond           Initial MD                    N/A  #
# Horton              ->  Max Rate           Min Rate   Decay Rate (1/sec)      Max. Infilt. Volume  #
# Proportional        ->  Constant                N/A                 N/A                     N/A  #
# Initial/Cont Loss   ->   Initial          Continuing                 N/A                     N/A  #
# Initial/Proportional ->  Initial           Constant                 N/A                     N/A  #
# Laurenson Parameters ->  B Value        Pervious "n"      Impervious Cont                Exponent  #
# Rational Formula    -> Tc Method   Flow Path Length      Flow Path Slope  Roughness or Retardance  #
#                                (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)             #
#                     Rational Formula Tc Method: 1 = Constant                                     #
#                                                 2 = Friend's Equation                            #
#                                                 3 = Kinematic Wave                               #
#                                                 4 = Alameda Method                               #
#                                                 5 = Izzard's Formula                             #
#                                                 6 = Kerby's Equation                             #
#                                                 7 = Kirpich's Equation                           #
#                                                 8 = Bransby Williams Equation                    #
#                                                 9 = Federal Aviation Authority Equation          #
##############################################################################################

        Subcatchment            Infl      Infl      Infl      Infl      Infl      Infl      Infl      Infl
  Number             Name       # 1       # 2       # 3       # 4       # 5       # 6       # 7       # 8
  ------------------------    --------- --------- --------- --------- --------- --------- --------- ---------
    1          DI2 (STM)#1     250.000     1.800     0.260
    2   PROP STM MH5 (ST#1     250.000     1.800     0.260
    3          DI1 (STM)#1     250.000     1.800     0.260
    4   PROP STM MH3 (ST#1     250.000     1.800     0.260
    5          DI4 (STM)#1     250.000     1.800     0.260
    6   PROP STM MH7 (ST#1     250.000     1.800     0.260
    7          DI3 (STM)#1     250.000     1.800     0.260
    8   PROP STM CBMH8 (#1     250.000     1.800     0.260
    9   PROP STM MH6 (ST#1     250.000     1.800     0.260
   10         HW-1 (STM)#1     250.000     1.800     0.260
   11         HW-1 (STM)#2     250.000     1.800     0.260


#########################################################
#     Table R3.  SUBCATCHMENT  DATA                     #
#                Rainfall and Infiltration Database Names  #
#########################################################

        Subcatchment             Gage  Infiltration       Routing
  Number             Name         No      Type             Type
  ------ -------------------- ------- ------------ --------------------
       1          DI2 (STM)#1      1   Green Ampt  Non-linear reservoir
       2   PROP STM MH5 (ST#1      1   Green Ampt  Non-linear reservoir
       3          DI1 (STM)#1      1   Green Ampt  Non-linear reservoir
       4   PROP STM MH3 (ST#1      1   Green Ampt  Non-linear reservoir
       5          DI4 (STM)#1      1   Green Ampt  Non-linear reservoir
       6   PROP STM MH7 (ST#1      1   Green Ampt  Non-linear reservoir
       7          DI3 (STM)#1      1   Green Ampt  Non-linear reservoir
       8   PROP STM CBMH8 (#1      1   Green Ampt  Non-linear reservoir
       9   PROP STM MH6 (ST#1      1   Green Ampt  Non-linear reservoir
      10         HW-1 (STM)#1      1   Green Ampt  Non-linear reservoir
      11         HW-1 (STM)#2      1   Green Ampt  Non-linear reservoir

 Total Number of Subcatchments...              11
 Total Tributary Area (hectares).           4.18
 Impervious Area (hectares)......           1.57
 Pervious Area (hectares)........           2.61
 Total Width (metres)............         223.00
 Impervious Area (%)............          37.67


  ##################################################
  #          S U B C A T C H M E N T  D A T A      #
  #   Default, Ratio values for subcatchment data  #
  #   Used with the calibrate node in the runoff.  #
  # 1 - width     2 - area       3 - impervious %  #
  # 4 - slope     5 - imp "n"    6 - perv "n"      #
  # 7 - imp ds    8 - perv ds    9 - 1st infil     #
  #10 - 2nd infil              11 - 3rd infil     #
  ##################################################

 Column           1         2         3         4         5         6         7         8         9        10        11
 Default     0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
 Ratio       1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000

 ***********************************************************
 *     Arrangement of Subcatchments and Channel/Pipes      *
 ***********************************************************


     Inlet
 DI2 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI2 (STM)#1
 PROP STM MH5 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH5 (ST#1
 DI1 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI1 (STM)#1
 PROP STM MH3 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH3 (ST#1
 DI4 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI4 (STM)#1
 PROP STM MH7 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH7 (ST#1
 DI3 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI3 (STM)#1
 PROP STM CBMH8 (STM)      No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM CBMH8 (#1
 PROP STM MH6 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH6 (ST#1
 HW-1 (STM)                No Tributary Channel/Pipes
               Tributary Subareas........ HW-1 (STM)#1 HW-1 (STM)#2


 ***********************************************************
 * Hydrographs will be stored for the following  10 INLETS *
 ***********************************************************
  DI2 (STM)           PROP STM MH5 (STM)  DI1 (STM)
  PROP STM MH3 (STM)  DI4 (STM)           PROP STM MH7 (STM)
  DI3 (STM)           PROP STM CBMH8 (STM)PROP STM MH6 (STM)
  HW-1 (STM)


 ************************************************
 *  Quality Simulation not included in this run *
 ************************************************



 ****************************************************
 *  Precipitation Interface File Summary            *
```

Input infiltration data for Green-Ampt Method

```
*  Number of precipitation station....        1   *
**************************************************

Location Station Number
-------- --------------
       1.            1

XXX End of Header Section XXX

#####################################################
#    Entry made to the HYDRAULIC Layer of XP-SWMM     #
#    Last Updated in June, 2014 by Innovyze           #
#####################################################

#####################################################
#    Entry made to the Runoff Layer(Block) of SWMM    #
#    Last Updated June, 2014 by Innovyze              #
#####################################################

*==========================================================*
|         RUNOFF TABLES IN THE OUTPUT FILE.                |
|  These are the more important tables in the output file. |
|  You can use your editor to find the table numbers,      |
|  for example: search for Table R3 to check continuity.   |
|  This output file can be imported into a Word Processor  |
|  and printed on US letter or A4 paper using portrait     |
|  mode, courier font, a size of 8 pt. and margins of 0.75 |
|                                                          |
| Table R1  - Physical Hydrology Data                      |
| Table R2  - Infiltration data                            |
| Table R3  - Raingage and Infiltration Database Names     |
| Table R4  - Groundwater Data                             |
| Table R5  - Continuity Check for Surface Water           |
| Table R6  - Continuity Check for Channels/Pipes          |
| Table R7  - Continuity Check for Subsurface Water        |
| Table R8  - Infiltration/Inflow Continuity Check         |
| Table R9  - Summary Statistics for Subcatchments         |
| Table R10 - Sensitivity anlysis for Subcatchments        |
*==========================================================*

                    A1

##########################################
#             RUNOFF JOB CONTROL         #
##########################################

Snowmelt parameter - ISNOW.......................          0
Number of rain gages - NRGAG.....................          1
Quality is not simulated - KWALTY................          0
Read evaporation data on line(s) F1 (F2) - IVAP..          1
Hour of day at start of storm - NHR..............          0
Minute of hour at start of storm - NMN...........          0
Time TZERO at start of storm (hours).............      0.000
Use Metric units for I/O - METRIC................          1
 ===> Ft-sec units used in all internal computations
Runoff input print control...                              0
Runoff graph plot control....                              0
Runoff output print control..                              0
Limit number of groundwater convergence messages to      10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no)        0

Print land use load percentages -LANDUPR (0=no, 1=yes)     0
Month, day, year of start of storm is:            11/ 3/2018
Wet time step length (seconds)......                   300.0
Dry time step length (seconds)......                  3600.0
Wet/Dry time step length (seconds)...                  300.0
Simulation length is......                              24.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = ..........................................  0.01000


Raingage #...............................          1
KTYPE  - Rainfall input type.............          0
NHISTO - Total number of rainfall values..        25
KINC   - Rainfall values(pairs) per line..        10
KPRINT - Print rainfall(0-Yes,1-No)......          0
KTIME  - Precipitation time units
0 --> Minutes  1 --> Hours...............          0
KPREP  - Precipitation unit type
0 --> Intensity  1 --> Volume............          0
KTHIS - Variable rainfall intervals
0 --> No, >= 1 --> Yes...................          0
THISTO - Rainfall time interval..........      10.00
TZRAIN - Starting time(KTIME units)......       0.00


#####################################
# Rainfall input summary from Runoff #
#####################################

Total rainfall for gage #     1 is   81.5883 mm

  ############################
  #        Data Group F1     #
  # Evaporation Rate (mm/day) #
  ############################

 JAN.  FEB.  MAR.  APR.  MAY   JUN.  JUL.  AUG.  SEP.  OCT.  NOV  DEC.
 ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ---- ----
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000


 ##################################################
 #  Table R1.  S U B C A T C H M E N T  D A T A    #
 #             Physical Hydrology Data             #
 ##################################################

                                                                                                                  Deprs   Deprs   Prcnt
                                                                                  Per-                            -sion   -sion    Zero
      Subcatchment              Channel              Width      Area       Slope    cent    "n"     "n"   Storge  Storge   Deten
 Number           Name         or inlet               (m)       (Ha)       m/m    Imperv  Imprv   Perv  Imprv   Perv    -tion
 ====== ==================== ==================== ========== ========== ======= ====== ======= ====== ====== ====== ======
      1          DI2 (STM)#1          DI2 (STM)   22.000     0.42000    0.010   33.00  0.014   0.300  2.000  5.000 25.000
      2   PROP STM MH5 (ST#1   PROP STM MH5 (STM)   16.000     0.22000    0.010   90.00  0.014   0.300  2.000  5.000 25.000
      3          DI1 (STM)#1          DI1 (STM)   35.000     1.0900     0.010   12.00  0.014   0.300  2.000  5.000 25.000
      4   PROP STM MH3 (ST#1   PROP STM MH3 (STM)   15.000     0.21000    0.010   95.00  0.014   0.300  2.000  5.000 25.000
      5          DI4 (STM)#1          DI4 (STM)   18.000     0.28000    0.010   18.00  0.014   0.300  2.000  5.000 25.000
      6   PROP STM MH7 (ST#1   PROP STM MH7 (STM)   15.000     0.21000    0.010   85.00  0.014   0.300  2.000  5.000 25.000
      7          DI3 (STM)#1          DI3 (STM)   18.000     0.28000    0.010   20.00  0.014   0.300  2.000  5.000 25.000
      8   PROP STM CBMH8 (#1 PROP STM CBMH8 (STM)   17.000     0.25000    0.010   85.00  0.014   0.300  2.000  5.000 25.000
      9   PROP STM MH6 (ST#1   PROP STM MH6 (STM)   14.000     0.17000    0.010   85.00  0.014   0.300  2.000  5.000 25.000
     10         HW-1 (STM)#1         HW-1 (STM)   19.000     0.74000    0.010   15.00  0.014   0.300  2.000  5.000 25.000
     11         HW-1 (STM)#2         HW-1 (STM)   34.000     0.31000    0.010   50.00  0.014   0.300  2.000  5.000 25.000


##############################################################################################
#          Table R2.  SUBCATCHMENT  DATA                                                     #
#                     Infiltration or Time of Concentration Data                             #
#                                                                                            #
# Infiltration Type      Infl #1(#5)       Infl #2(#6)          Infl #3(#7)          Infl #4(#8)  #
# SCS                 ->   Comp CN          Time Conc         Shape Factor        Depth or Fraction  #
# SBUH                ->   Comp CN          Time Conc                 N/A                     N/A  #
# Green Ampt          ->   Suction          Hydr Cond           Initial MD                    N/A  #
# Horton              ->  Max Rate           Min Rate   Decay Rate (1/sec)      Max. Infilt. Volume  #
# Proportional        ->  Constant                N/A                 N/A                     N/A  #
# Initial/Cont Loss   ->   Initial          Continuing                 N/A                     N/A  #
# Initial/Proportional ->  Initial           Constant                  N/A                     N/A  #
```

```
# Laurenson Parameters ->   B Value       Pervious "n"      Impervious Cont                 Exponent  #
# Rational Formula     -> Tc Method   Flow Path Length     Flow Path Slope  Roughness or Retardance  #
#                              (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)               #
#                       Rational Formula Tc Method: 1 = Constant                                     #
#                                                   2 = Friend's Equation                            #
#                                                   3 = Kinematic Wave                               #
#                                                   4 = Alameda Method                               #
#                                                   5 = Izzard's Formula                             #
#                                                   6 = Kerby's Equation                             #
#                                                   7 = Kirpich's Equation                           #
#                                                   8 = Bransby Williams Equation                    #
#                                                   9 = Federal Aviation Authority Equation          #
#######################################################################################################
```

Number	Subcatchment Name	Infl # 1	Infl # 2	Infl # 3	Infl # 4	Infl # 5	Infl # 6	Infl # 7	Infl # 8
1	DI2 (STM)#1	250.000	1.800	0.260					
2	PROP STM MH5 (ST#1	250.000	1.800	0.260					
3	DI1 (STM)#1	250.000	1.800	0.260					
4	PROP STM MH3 (ST#1	250.000	1.800	0.260					
5	DI4 (STM)#1	250.000	1.800	0.260					
6	PROP STM MH7 (ST#1	250.000	1.800	0.260					
7	DI3 (STM)#1	250.000	1.800	0.260					
8	PROP STM CBMH8 (#1	250.000	1.800	0.260					
9	PROP STM MH6 (ST#1	250.000	1.800	0.260					
10	HW-1 (STM)#1	250.000	1.800	0.260					
11	HW-1 (STM)#2	250.000	1.800	0.260					

```
#########################################################
#     Table R3.  SUBCATCHMENT  DATA                     #
#                Rainfall and Infiltration Database Names  #
#########################################################
```

Number	Subcatchment Name	Gage No	Infiltration Type	Routing Type
1	DI2 (STM)#1	1	Green Ampt	Non-linear reservoir
2	PROP STM MH5 (ST#1	1	Green Ampt	Non-linear reservoir
3	DI1 (STM)#1	1	Green Ampt	Non-linear reservoir
4	PROP STM MH3 (ST#1	1	Green Ampt	Non-linear reservoir
5	DI4 (STM)#1	1	Green Ampt	Non-linear reservoir
6	PROP STM MH7 (ST#1	1	Green Ampt	Non-linear reservoir
7	DI3 (STM)#1	1	Green Ampt	Non-linear reservoir
8	PROP STM CBMH8 (#1	1	Green Ampt	Non-linear reservoir
9	PROP STM MH6 (ST#1	1	Green Ampt	Non-linear reservoir
10	HW-1 (STM)#1	1	Green Ampt	Non-linear reservoir
11	HW-1 (STM)#2	1	Green Ampt	Non-linear reservoir

```
Total Number of Subcatchments...              11
Total Tributary Area (hectares).            4.18
Impervious Area (hectares).......           1.57
Pervious Area (hectares)........            2.61
Total Width (metres)............          223.00
Impervious Area (%).............           37.67


 ##################################################
 #          S U B C A T C H M E N T  D A T A      #
 #   Default, Ratio values for subcatchment data  #
 #   Used with the calibrate node in the runoff.  #
 # 1 - width     2 - area      3 - impervious %   #
 # 4 - slope     5 - imp "n"   6 - perv "n"       #
 # 7 - imp ds    8 - perv ds   9 - 1st infil      #
 #10 - 2nd infil              11 - 3rd infil      #
 ##################################################

Column           1         2         3         4         5         6         7         8         9        10        11
Default     0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
Ratio       1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000

*************************************************************
*     Arrangement of Subcatchments and Channel/Pipes        *
*************************************************************


    Inlet
DI2 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI2 (STM)#1
PROP STM MH5 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH5 (ST#1
DI1 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI1 (STM)#1
PROP STM MH3 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH3 (ST#1
DI4 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI4 (STM)#1
PROP STM MH7 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH7 (ST#1
DI3 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI3 (STM)#1
PROP STM CBMH8 (STM)      No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM CBMH8 (#1
PROP STM MH6 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH6 (ST#1
HW-1 (STM)                No Tributary Channel/Pipes
               Tributary Subareas........ HW-1 (STM)#1 HW-1 (STM)#2


*************************************************************
* Hydrographs will be stored for the following  10 INLETS *
*************************************************************
 DI2 (STM)              PROP STM MH5 (STM)  DI1 (STM)
 PROP STM MH3 (STM)  DI4 (STM)          PROP STM MH7 (STM)
 DI3 (STM)              PROP STM CBMH8 (STM)PROP STM MH6 (STM)
 HW-1 (STM)


 ************************************************
 *  Quality Simulation not included in this run *
 ************************************************




 ****************************************************
 *  Precipitation Interface File Summary            *
 *  Number of precipitation station....          1  *
 ****************************************************

 Location Station Number
 -------- --------------
        1.             1


     A1


 *==============================================================*
 |        HYDRAULICS TABLES IN THE OUTPUT FILE                  |
 |  These are the more important tables in the output file.     |
 |  You can use your editor to find the table numbers,          |
 |  for example: search for Table E20 to check continuity.      |
 |  This output file can be imported into a Word Processor      |
 |  and printed on US letter or A4 paper using portrait         |
 |  mode, courier font, a size of 8 pt. and margins of 0.75     |
 |                                                              |
 | Table E1   - Basic Conduit Data                              |
 | Table E2   - Conduit Factor Data                             |
 | Table E3a  - Junction Data                                   |
 | Table E3b  - Junction Data                                   |
```

```
| Table E4   - Conduit Connectivity Data                    |
| Table E4a  - Dry Weather Flow Data                        |
| Table E4b  - Real Time Control Data                       |
| Table E5   - Junction Time Step Limitation Summary        |
| Table E5a  - Conduit Explicit Condition Summary           |
| Table E6   - Final Model Condition                        |
| Table E7   - Iteration Summary                            |
| Table E8   - Junction Time Step Limitation Summary        |
| Table E9   - Junction  Summary  Statistics                |
| Table E10  - Conduit   Summary  Statistics                |
| Table E11  - Area assumptions used in the analysis        |
| Table E12  - Mean conduit information                     |
| Table E13  - Channel losses(H) and culvert info           |
| Table E13a - Culvert Analysis Classification              |
| Table E14  - Natural Channel Overbank Flow Information    |
| Table E14a - Natural Channel Encroachment Information     |
| Table E14b - Floodplain Mapping                           |
| Table E15  - Spreadsheet Info List                        |
| Table E15a - Spreadsheet Reach List                       |
| Table E16  - New Conduit Output Section                   |
| Table E17  - Pump Operation                               |
| Table E18  - Junction Continuity Error                    |
| Table E19  - Junction Inflow & Outflow Listing            |
| Table E20  - Junction Flooding and Volume List            |
| Table E21  - Continuity balance at simulation end         |
| Table E22  - Model Judgement Section                      |
*==========================================================*

Time Control from Hydraulics Job Control
Year.........    2018 Month.......      11
Day..........       3 Hour........       0
Minute.......       0 Second......       0


Control information for simulation
----------------------------------

Integration cycles.................     25920
Length of integration step is......      5.00 seconds
Simulation length..................     36.00 hours
Do not create equiv. pipes(NEQUAL).         0
Use metric units for I/O...........         1
Printing starts in cycle...........         1
Intermediate printout intervals of.       500 cycles
Intermediate printout intervals of.     41.67 minutes
Summary printout intervals of......       500 cycles
Summary printout time interval of..     41.67 minutes
Hot start file parameter (REDO)....         0
Initial time.......................      0.00 hours

Iteration variables: Flow Tolerance.   0.00010
                     Head Tolerance.   0.00005
    Minimum depth (m or ft)........   0.00001
    Underrelaxation parameter......   0.85000
    Time weighting parameter.......   0.85000
    Conduit roughness factor.......   1.00000
    Flow adjustment factor.........   1.00000
    Initial Condition Smoothing....         0
    Courant Time Step Factor.......   1.00000
    Default Expansion/Contraction K.  0.00000
    Default Entrance/Exit K........   0.00000
    Routing Method.................   Dynamic Wave
Default surface area of junctions...      1.22 square meters.
Minimum Junction/Conduit Depth......   0.00001 meter.
Ponding Area Coefficient............   5000.00
Ponding Area Exponent...............    1.0000
Minimum Orifice Length..............      1.00 meters.
NJSW input hydrograph junctions.....     0
     or user defined hydrographs....

*====================================================*
|          Table E1 - Conduit Data                   |
*====================================================*

                                                                                  Trapezoid  Hazen
 Inp              Conduit      Length    Conduit      Area    Manning  Max Width      Depth      Side  Williams
 Num                Name         (m)      Class    ( m^2)     Coef.     (m)         (m)      Slopes  c-factor
---- -------------------- ---------- ----------  -------  -------  ---------      -----    -------  -------
   1   Pipe - (596) (STM)    20.5450   Circular    0.4418    0.0130    0.7500     0.7500
   2   Pipe - (600) (STM)    29.6119  Rectangle    1.0800    0.0130    1.8000     0.6000
   3   Pipe - (602) (STM)    30.2024   Circular    0.1590    0.0130    0.4500     0.4500
   4   Pipe - (605) (STM)    24.4022   Circular    0.2827    0.0130    0.6000     0.6000
   5   Pipe - (607) (STM)    26.8475   Circular    0.0707    0.0130    0.3000     0.3000
   6   Pipe - (608) (STM)    15.2695   Circular    0.2165    0.0130    0.5250     0.5250
   7   Pipe - (609) (STM)    11.3637   Circular    0.1104    0.0130    0.3750     0.3750
   8   Pipe - (610) (STM)    37.1498   Circular    0.0707    0.0130    0.3000     0.3000
   9   Pipe - (611) (STM)     8.6495   Circular    0.0707    0.0130    0.3000     0.3000
  10   Pipe - (612) (STM)     3.7348   Circular    0.1590    0.0130    0.4500     0.4500
  11   Pipe - (674) (STM)    12.5501   Circular    0.2827    0.0130    0.6000     0.6000
  12   Pipe - (676) (STM)    14.7281  Rectangle    1.0800    0.0130    1.8000     0.6000
  13              Link181    10.0000   Circular    0.0020    0.0130    0.0500     0.0500
  14                503.1    29.2192  Rectangle    1.0800    0.0130    1.8000     0.6000
  15                503.2    29.2100  Rectangle    1.0800    0.0130    1.8000     0.6000
  16                534.1    76.7816  Rectangle    1.0800    0.0130    1.8000     0.6000
  17                534.2    76.7800  Rectangle    1.0800    0.0130    1.8000     0.6000
  18                535.1    42.8888  Rectangle    1.6200    0.0130    1.8000     0.9000
  19                535.2    42.8888  Rectangle    1.6200    0.0130    1.8000     0.9000
  20                537.1    45.5948  Rectangle    1.0800    0.0130    1.8000     0.6000
  21                537.2    45.5900  Rectangle    1.0800    0.0130    1.8000     0.6000
Total length of all conduits ....        634.0078 meters

*====================================================*
| If there are messages about (sqrt(g*d)*dt/dx), or |
| the sqrt(wave celerity)*time step/conduit length  |
| in the output file all it means is that the       |
| program will lower the internal time step to      |
| satisfy this condition (explicit condition).      |
| You control the actual internal time step by      |
| using the minimum courant time step factor in the |
| HYDRAULICS job control.  The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection.    |
| You have further control by using the modify      |
| conduit option in the HYDRAULICS Job Control.     |
*====================================================*


             Conduit     Courant
               Name       Ratio
--------------------   ---------
 Pipe - (596) (STM)        0.66
 Pipe - (600) (STM)        0.41
 Pipe - (602) (STM)        0.35
 Pipe - (605) (STM)        0.50
 Pipe - (607) (STM)        0.32
 Pipe - (608) (STM)        0.74
 Pipe - (609) (STM)        0.84
 Pipe - (610) (STM)        0.23
 Pipe - (611) (STM)        0.99
 Pipe - (612) (STM)        2.81  ===> Warning ! (sqrt(wave celerity)*time step/conduit length)
 Pipe - (674) (STM)        0.97
 Pipe - (676) (STM)        0.82
            Link181        0.35
              503.1        0.42
              503.2        0.42
              534.1        0.16
              534.2        0.16
              535.1        0.35
              535.2        0.35
              537.1        0.27
              537.2        0.27

*==================*
```

Input hydraulics data

| Conduit Volume |

Full pipe or full open conduit volume
Input full depth volume........... 5.4891E+02 cubic meters

Table E3a - Junction Data

Inp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst cms	Initial Depth-m	Interface Flow (%)
1	StartNullStruct1	174.7800	174.3800	174.3300	0.0000	0.0000	100.0000
2	PROP STM MH1 (STM)	176.9015	175.1398	174.5188	0.0000	0.0000	100.0000
3	PROP STM CBMH4 (STM)	176.8396	175.5974	174.9974	0.0000	0.0000	100.0000
4	PROP STM MH5 (STM)	176.8235	175.5176	174.9926	0.0000	0.0000	100.0000
5	PROP STM MH2 (STM)	176.6840	175.6002	174.6132	0.0000	0.0000	100.0000
6	PROP STM MH6 (STM)	176.6773	175.7300	174.8300	0.0000	0.0000	100.0000
7	PROP STM MH3 (STM)	176.6339	175.5400	174.9000	0.0000	0.0000	100.0000
8	PROP STM MH7 (STM)	176.6287	175.5478	174.9478	0.0000	0.0000	100.0000
9	PROP STM CBMH8 (STM)	176.5327	175.6000	175.0000	0.0000	0.0000	100.0000
10	PROP STM MH9 (STM)	176.2783	175.5783	175.1283	0.0000	0.0000	100.0000
11	STM7080 (STM)	175.9600	175.0700	174.3200	0.0000	0.0000	100.0000
12	DI2 (STM)	175.9318	175.4270	175.1270	0.0000	0.0000	100.0000
13	ID*477	175.7715	175.0296	174.3976	0.0000	0.0000	100.0000
14	HW-1 (STM)	175.6850	174.9600	174.3600	0.0000	0.0000	100.0000
15	J27 (STM)	175.6681	175.0100	174.2600	0.0000	0.0000	100.0000
16	DI1 (STM)	175.5379	175.4379	175.0629	0.0000	0.0000	100.0000
17	DI3 (STM)	175.4923	175.4853	175.1853	0.0000	0.0000	100.0000
18	DI4 (STM)	175.4347	175.3914	175.0914	0.0000	0.0000	100.0000
19	STM MH1A (STM)	175.3912	174.7812	174.3312	0.0000	0.0000	100.0000

Table E3b - Junction Data

Inp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Capacity	Pavement Shape	Pavement Slope
1	StartNullStruct1	0.0000	0.0000	2D Invert	Normal		0	0.00
2	PROP STM MH1 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
3	PROP STM CBMH4 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
4	PROP STM MH5 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
5	PROP STM MH2 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
6	PROP STM MH6 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
7	PROP STM MH3 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
8	PROP STM MH7 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
9	PROP STM CBMH8 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
10	PROP STM MH9 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
11	STM7080 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
12	DI2 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
13	ID*477	0.0000	0.0000	No Ponding	Normal		0	0.00
14	HW-1 (STM)	0.0000	0.0000	2D Invert	Normal		0	0.00
15	J27 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
16	DI1 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
17	DI3 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
18	DI4 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
19	STM MH1A (STM)	0.0000	0.0000	Sealed	Normal		0	0.00

Table E4 - Conduit Connectivity

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation	
1	Pipe - (596) (STM)	STM7080 (STM)	J27 (STM)	174.3200	174.2600	No Design
2	Pipe - (600) (STM)	PROP STM MH1 (STM)	ID*477	174.5188	174.4296	No Design
3	Pipe - (602) (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	175.1283	175.0300	No Design
4	Pipe - (605) (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	174.6132	174.5398	No Design
5	Pipe - (607) (STM)	DI2 (STM)	PROP STM MH5 (STM)	175.1270	175.0296	No Design
6	Pipe - (608) (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	174.9926	174.9400	No Design
7	Pipe - (609) (STM)	DI1 (STM)	PROP STM CBMH4 (STM)	175.0629	175.0304	No Design
8	Pipe - (610) (STM)	DI4 (STM)	PROP STM MH7 (STM)	175.0914	174.9798	No Design
9	Pipe - (611) (STM)	DI3 (STM)	PROP STM MH9 (STM)	175.1853	175.1603	No Design
10	Pipe - (612) (STM)	STM MH1A (STM)	STM7080 (STM)	174.3312	174.3200	No Design
11	Pipe - (674) (STM)	ID*477	HW-1 (STM)	174.3976	174.3600	No Design
12	Pipe - (676) (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	174.9974	174.9400	No Design
13	Link181	HW-1 (STM)	StartNullStruct1	174.3600	174.3300	No Design
14	503.1	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9478	174.8600	No Design
15	503.2	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9478	174.8300	No Design
16	534.1	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9000	174.6502	No Design
17	534.2	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9000	174.6132	No Design
18	535.1	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8300	174.7002	No Design
19	535.2	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8300	174.7002	No Design
20	537.1	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0000	174.8600	No Design
21	537.2	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0000	174.8300	No Design

Orifice Data

Conduit Name	From Junction	To Junction	Type	Area (m2)	Depth (m)	Discharge Coefficient	Height Above Junction (m)
205mm PLATE	StartNullStruct1	STM MH1A (STM)	Circ Side	0.03	0.00	0.600	0.000

```
====> EQUIVALENT PIPE INFORMATION FOR ORIFICE             1
      CONDUIT NAME...........................        205mm PLATE
      Upstream node..........................     StartNullStruct1
      Downstream node........................       STM MH1A (STM)
      PIPE DIAMETER.......................              0.20
      PIPE LENGTH.........................            300.00
      MANNINGS ROUGHNESS..................            0.0030
      INVERT ELEVATION AT UPSTREAM END.....         174.3300
      INVERT ELEVATION AT DOWNSTREAM END...         174.3270
```

Note: For a Bottom-outlet orifice the invert elevation of the downstream node will be adjusted to accomodate the equivalent conduit. Conduit grades are not affected.

FREE OUTFALL DATA (DATA GROUP I1)
BOUNDARY CONDITION ON DATA GROUP J1

Outfall at Junction....J27 (STM) has boundary condition number... 1

INTERNAL CONNECTIVITY INFORMATION

CONDUIT	JUNCTION	JUNCTION
205mm PLATE	StartNullStruct1	STM MH1A (STM)
FREE# 1	J27 (STM)	BOUNDARY

Boundary Condition Information
Data Groups J1-J4

XP Note Field Summary

```
 XP-2D single precision engine engaged.

 +==================================+
 |   Conduit Convergence Criteria   |
 +==================================+

              Conduit        Full      Conduit
                Name         Flow       Slope
--------------------  ----------  ----------
  Pipe - (596) (STM)       0.6016      0.0029
  Pipe - (600) (STM)       1.6868      0.0030
  Pipe - (602) (STM)       0.1627      0.0033
  Pipe - (605) (STM)       0.3368      0.0030
  Pipe - (607) (STM)       0.0582      0.0036
  Pipe - (608) (STM)       0.2524      0.0034
  Pipe - (609) (STM)       0.0938      0.0029
  Pipe - (610) (STM)       0.0530      0.0030
  Pipe - (611) (STM)       0.0520      0.0029
  Pipe - (612) (STM)       0.1561      0.0030
  Pipe - (674) (STM)       0.3361      0.0030
  Pipe - (676) (STM)       1.9186      0.0039
            Link181        0.0004      0.0030
              503.1        1.6847      0.0030
              503.2        1.9517      0.0040
              534.1        1.7530      0.0033
              534.2        1.8783      0.0037
              535.1        3.0722      0.0030
              535.2        3.0722      0.0030
              537.1        1.7030      0.0031
              537.2        1.8767      0.0037
        205mm PLATE        0.0397      0.0000

 +==================================+
 |    Initial Model Condition       |
 | Initial Time =       0.00 hours  |
 +==================================+

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.00 /   174.33   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.00 /   174.33

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00               FREE# 1/       0.00

           Conduit/   Velocity
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00

           Conduit/ Cross Sectional Area
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00

           Conduit/ Hydraulic Radius
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00

           Conduit/ Upstream/ Downstream Elevation
 Pipe - (596) (STM)/   174.26/   174.26  Pipe - (600) (STM)/   174.40/   174.40  Pipe - (602) (STM)/   175.00/   175.00
 Pipe - (605) (STM)/   174.52/   174.52  Pipe - (607) (STM)/   174.99/   174.99  Pipe - (608) (STM)/   174.90/   174.90
 Pipe - (609) (STM)/   175.00/   175.00  Pipe - (610) (STM)/   174.95/   174.95  Pipe - (611) (STM)/   175.13/   175.13
 Pipe - (612) (STM)/   174.32/   174.32  Pipe - (674) (STM)/   174.36/   174.36  Pipe - (676) (STM)/   174.90/   174.90
            Link181/   174.33/   174.33                503.1/   174.83/   174.83                503.2/   174.83/   174.83
              534.1/   174.61/   174.61                534.2/   174.61/   174.61                535.1/   174.61/   174.61
              535.2/   174.61/   174.61                537.1/   174.83/   174.83                537.2/   174.83/   174.83
        205mm PLATE/   174.33/   174.33

Cycle        500      Time          0 Hrs - 41.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.01 /   174.53 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.04   PROP STM MH2 (STM)/   0.06 /   174.68   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.01 /   174.91   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.02 /   175.15        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.04 /   175.16
            ID*477/   0.06 /   174.46           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.04 /   175.10            DI3 (STM)/   0.03 /   175.21            DI4 (STM)/   0.03 /   175.12
     STM MH1A (STM)/   0.00 /   174.33

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00         205mm PLATE/       0.00             FREE# 1/       0.00

Cycle       1000      Time          1 Hrs - 23.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.22 /   174.55   PROP STM MH1 (STM)/   0.09 /   174.61 PROP STM CBMH4 (STM)/   0.02 /   175.02
 PROP STM MH5 (STM)/   0.14 /   175.13   PROP STM MH2 (STM)/   0.20 /   174.81   PROP STM MH6 (STM)/   0.04 /   174.87
 PROP STM MH3 (STM)/   0.04 /   174.94   PROP STM MH7 (STM)/   0.02 /   174.97 PROP STM CBMH8 (STM)/   0.02 /   175.02
 PROP STM MH9 (STM)/   0.06 /   175.19        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.11 /   175.24
            ID*477/   0.19 /   174.59           HW-1 (STM)/   0.19 /   174.55            J27 (STM)/   1.52 /   175.78
          DI1 (STM)/   0.11 /   175.17            DI3 (STM)/   0.08 /   175.26            DI4 (STM)/   0.07 /   175.16
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.08   Pipe - (602) (STM)/       0.01   Pipe - (605) (STM)/       0.08
 Pipe - (607) (STM)/       0.02   Pipe - (608) (STM)/       0.04   Pipe - (609) (STM)/       0.02   Pipe - (610) (STM)/       0.01
 Pipe - (611) (STM)/       0.01   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.07   Pipe - (676) (STM)/       0.02
            Link181/       0.00                503.1/       0.01                503.2/       0.01*                534.1/       0.03*
              534.2/       0.03*               535.1/       0.03                535.2/       0.03                 537.1/       0.01
              537.2/       0.01*        205mm PLATE/       0.00             FREE# 1/       0.00

Cycle       1500      Time          2 Hrs -  5.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.21 /   175.54   PROP STM MH1 (STM)/   1.03*/   175.55 PROP STM CBMH4 (STM)/   0.55 /   175.54
 PROP STM MH5 (STM)/   0.55*/   175.55   PROP STM MH2 (STM)/   0.94 /   175.55   PROP STM MH6 (STM)/   0.72 /   175.55
 PROP STM MH3 (STM)/   0.65*/   175.55   PROP STM MH7 (STM)/   0.60*/   175.55 PROP STM CBMH8 (STM)/   0.55 /   175.55
```

Hydraulic output results at different time steps

```
 PROP STM MH9 (STM)/   0.43 /   175.55        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.44 /   175.57
            ID*477/   1.15*/   175.55           HW-1 (STM)/   1.18 /   175.54            J27 (STM)/   1.55 /   175.81
          DI1 (STM)/   0.47*/   175.54            DI3 (STM)/   0.37 /   175.56            DI4 (STM)/   0.47 /   175.56
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.11   Pipe - (602) (STM)/       0.02   Pipe - (605) (STM)/       0.11
 Pipe - (607) (STM)/       0.03   Pipe - (608) (STM)/       0.04   Pipe - (609) (STM)/      -0.02   Pipe - (610) (STM)/       0.02
 Pipe - (611) (STM)/       0.02   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.11   Pipe - (676) (STM)/      -0.03
            Link181/       0.00                503.1/      -0.01                503.2/       0.04                534.1/       0.01
              534.2/       0.03                535.1/       0.04                535.2/       0.04                537.1/       0.00
              537.2/       0.03          205mm PLATE/       0.00             FREE# 1/       0.00

Cycle       2000      Time          2 Hrs - 46.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.78*/   175.78
 PROP STM MH5 (STM)/   0.78*/   175.78   PROP STM MH2 (STM)/   1.16*/   175.78   PROP STM MH6 (STM)/   0.95*/   175.78
 PROP STM MH3 (STM)/   0.88*/   175.78   PROP STM MH7 (STM)/   0.83*/   175.78 PROP STM CBMH8 (STM)/   0.78*/   175.78
 PROP STM MH9 (STM)/   0.65*/   175.78        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.65 /   175.78
            ID*477/   1.37*/   175.77           HW-1 (STM)/   1.41 /   175.77            J27 (STM)/   1.59 /   175.85
          DI1 (STM)/   0.72 /   175.78            DI3 (STM)/   0.59 /   175.78            DI4 (STM)/   0.69 /   175.78
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.09   Pipe - (602) (STM)/       0.01   Pipe - (605) (STM)/       0.09
 Pipe - (607) (STM)/       0.01   Pipe - (608) (STM)/       0.02   Pipe - (609) (STM)/       0.03   Pipe - (610) (STM)/       0.01
 Pipe - (611) (STM)/       0.01   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/      -0.01   Pipe - (676) (STM)/       0.03
            Link181/       0.00                503.1/      -0.01                503.2/       0.02                534.1/       0.03
              534.2/       0.03                535.1/       0.02                535.2/       0.02                537.1/      -0.00
              537.2/       0.02          205mm PLATE/       0.03             FREE# 1/       0.03

Cycle       2500      Time          3 Hrs - 28.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.78*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.83*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.65 /   175.77
            ID*477/   1.37*/   175.77           HW-1 (STM)/   1.41 /   175.77            J27 (STM)/   1.59 /   175.85
          DI1 (STM)/   0.71 /   175.77            DI3 (STM)/   0.59 /   175.77            DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.05   Pipe - (602) (STM)/       0.01   Pipe - (605) (STM)/       0.05
 Pipe - (607) (STM)/       0.01   Pipe - (608) (STM)/       0.01   Pipe - (609) (STM)/       0.02   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.01   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.02
            Link181/       0.00                503.1/      -0.01                503.2/       0.01                534.1/       0.02
              534.2/       0.02                535.1/       0.01                535.2/       0.01                537.1/      -0.00
              537.2/       0.01          205mm PLATE/       0.03             FREE# 1/       0.03

Cycle       3000      Time          4 Hrs - 10.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.77*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.82*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.64 /   175.77
            ID*477/   1.37*/   175.77           HW-1 (STM)/   1.41 /   175.77            J27 (STM)/   1.52 /   175.78
          DI1 (STM)/   0.71 /   175.77            DI3 (STM)/   0.59 /   175.77            DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.01                503.2/       0.01                534.1/       0.01
              534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.01          205mm PLATE/       0.03             FREE# 1/       0.03

Cycle       3500      Time          4 Hrs - 51.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.43 /   175.76   PROP STM MH1 (STM)/   1.24*/   175.76 PROP STM CBMH4 (STM)/   0.76*/   175.76
 PROP STM MH5 (STM)/   0.77*/   175.76   PROP STM MH2 (STM)/   1.15*/   175.76   PROP STM MH6 (STM)/   0.93*/   175.76
 PROP STM MH3 (STM)/   0.86*/   175.76   PROP STM MH7 (STM)/   0.81*/   175.76 PROP STM CBMH8 (STM)/   0.76*/   175.76
 PROP STM MH9 (STM)/   0.63*/   175.76        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.63 /   175.76
            ID*477/   1.36*/   175.76           HW-1 (STM)/   1.40 /   175.76            J27 (STM)/   1.43 /   175.69
          DI1 (STM)/   0.70 /   175.76            DI3 (STM)/   0.58 /   175.76            DI4 (STM)/   0.67 /   175.76
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.01                503.2/       0.01                534.1/       0.00
              534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.01          205mm PLATE/       0.03             FREE# 1/       0.03

Cycle       4000      Time          5 Hrs - 33.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.40 /   175.73   PROP STM MH1 (STM)/   1.21*/   175.73 PROP STM CBMH4 (STM)/   0.73*/   175.73
 PROP STM MH5 (STM)/   0.74*/   175.73   PROP STM MH2 (STM)/   1.12*/   175.73   PROP STM MH6 (STM)/   0.90*/   175.73
 PROP STM MH3 (STM)/   0.83*/   175.73   PROP STM MH7 (STM)/   0.78*/   175.73 PROP STM CBMH8 (STM)/   0.73*/   175.73
 PROP STM MH9 (STM)/   0.60*/   175.73        STM7080 (STM)/   1.28*/   175.60            DI2 (STM)/   0.60 /   175.73
            ID*477/   1.33*/   175.73           HW-1 (STM)/   1.37 /   175.73            J27 (STM)/   1.34 /   175.60
          DI1 (STM)/   0.67 /   175.73            DI3 (STM)/   0.55 /   175.73            DI4 (STM)/   0.64 /   175.73
     STM MH1A (STM)/   1.28*/   175.60

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.01          205mm PLATE/       0.03             FREE# 1/       0.03

Cycle       4500      Time          6 Hrs - 15.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.67
 PROP STM MH5 (STM)/   0.68*/   175.67   PROP STM MH2 (STM)/   1.06*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.77*/   175.67   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.09*/   175.41            DI2 (STM)/   0.54 /   175.67
            ID*477/   1.27*/   175.67           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.15 /   175.41
          DI1 (STM)/   0.61 /   175.67            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.58 /   175.67
     STM MH1A (STM)/   1.08*/   175.41

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.05   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.05   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.01          205mm PLATE/       0.05             FREE# 1/       0.05

Cycle       5000      Time          6 Hrs - 56.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.23 /   175.56   PROP STM MH1 (STM)/   1.05*/   175.57 PROP STM CBMH4 (STM)/   0.57 /   175.57
 PROP STM MH5 (STM)/   0.57*/   175.57   PROP STM MH2 (STM)/   0.95*/   175.57   PROP STM MH6 (STM)/   0.74 /   175.57
 PROP STM MH3 (STM)/   0.67*/   175.57   PROP STM MH7 (STM)/   0.62*/   175.57 PROP STM CBMH8 (STM)/   0.57 /   175.57
 PROP STM MH9 (STM)/   0.44*/   175.57        STM7080 (STM)/   0.50 /   174.82            DI2 (STM)/   0.44 /   175.57
            ID*477/   1.17*/   175.57           HW-1 (STM)/   1.21 /   175.57            J27 (STM)/   0.56 /   174.82
          DI1 (STM)/   0.50 /   175.57            DI3 (STM)/   0.38 /   175.57            DI4 (STM)/   0.47 /   175.57
     STM MH1A (STM)/   0.49*/   174.82

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.08   Pipe - (600) (STM)/       0.03   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.03
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.08   Pipe - (674) (STM)/       0.03   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.00
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            534.2/       0.00                535.1/       0.01                535.2/       0.01                537.1/      -0.00
            537.2/       0.01          205mm PLATE/       0.08              FREE# 1/       0.08

Cycle       5500      Time          7 Hrs - 38.33 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.07 /   175.40   PROP STM MH1 (STM)/   0.89*/   175.40 PROP STM CBMH4 (STM)/   0.41 /   175.41
 PROP STM MH5 (STM)/   0.41 /   175.41   PROP STM MH2 (STM)/   0.79 /   175.41   PROP STM MH6 (STM)/   0.57 /   175.40
 PROP STM MH3 (STM)/   0.51 /   175.41   PROP STM MH7 (STM)/   0.46 /   175.41 PROP STM CBMH8 (STM)/   0.40 /   175.40
 PROP STM MH9 (STM)/   0.28 /   175.40        STM7080 (STM)/   0.19 /   174.51            DI2 (STM)/   0.28 /   175.40
            ID*477/   1.01*/   175.40           HW-1 (STM)/   1.04 /   175.40            J27 (STM)/   0.17 /   174.43
          DI1 (STM)/   0.34 /   175.41            DI3 (STM)/   0.22 /   175.40            DI4 (STM)/   0.32 /   175.41
     STM MH1A (STM)/   0.21 /   174.53

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.08   Pipe - (600) (STM)/       0.04   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.04
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.08   Pipe - (674) (STM)/       0.04   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
            534.2/       0.00                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.01          205mm PLATE/       0.08              FREE# 1/       0.08

Cycle       6000      Time          8 Hrs - 20.00 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.94 /   175.27   PROP STM MH1 (STM)/   0.75*/   175.27 PROP STM CBMH4 (STM)/   0.27 /   175.27
 PROP STM MH5 (STM)/   0.28 /   175.27   PROP STM MH2 (STM)/   0.66 /   175.27   PROP STM MH6 (STM)/   0.44 /   175.27
 PROP STM MH3 (STM)/   0.37 /   175.27   PROP STM MH7 (STM)/   0.32 /   175.27 PROP STM CBMH8 (STM)/   0.27 /   175.27
 PROP STM MH9 (STM)/   0.15 /   175.27        STM7080 (STM)/   0.18 /   174.50            DI2 (STM)/   0.14 /   175.27
            ID*477/   0.87*/   175.27           HW-1 (STM)/   0.91 /   175.27            J27 (STM)/   0.17 /   174.43
          DI1 (STM)/   0.21 /   175.27            DI3 (STM)/   0.09 /   175.27            DI4 (STM)/   0.18 /   175.27
     STM MH1A (STM)/   0.20 /   174.53

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.08   Pipe - (600) (STM)/       0.04   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.04
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.08   Pipe - (674) (STM)/       0.04   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.01
            534.2/       0.01                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.01          205mm PLATE/       0.08              FREE# 1/       0.08

Cycle       6500      Time          9 Hrs -  1.67 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.83 /   175.16   PROP STM MH1 (STM)/   0.64*/   175.16 PROP STM CBMH4 (STM)/   0.16 /   175.16
 PROP STM MH5 (STM)/   0.16 /   175.16   PROP STM MH2 (STM)/   0.54 /   175.16   PROP STM MH6 (STM)/   0.33 /   175.16
 PROP STM MH3 (STM)/   0.26 /   175.16   PROP STM MH7 (STM)/   0.21 /   175.16 PROP STM CBMH8 (STM)/   0.16 /   175.16
 PROP STM MH9 (STM)/   0.03 /   175.16        STM7080 (STM)/   0.17 /   174.49            DI2 (STM)/   0.03 /   175.16
            ID*477/   0.76*/   175.16           HW-1 (STM)/   0.80 /   175.16            J27 (STM)/   0.16 /   174.42
          DI1 (STM)/   0.09 /   175.16            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.07 /   175.16
     STM MH1A (STM)/   0.19 /   174.52

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.07   Pipe - (600) (STM)/       0.04   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.04
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.07   Pipe - (674) (STM)/       0.04   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
            534.2/       0.00                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.07              FREE# 1/       0.07

Cycle       7000      Time          9 Hrs - 43.33 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.71 /   175.04   PROP STM MH1 (STM)/   0.53 /   175.05 PROP STM CBMH4 (STM)/   0.05 /   175.05
 PROP STM MH5 (STM)/   0.05 /   175.05   PROP STM MH2 (STM)/   0.43 /   175.05   PROP STM MH6 (STM)/   0.22 /   175.05
 PROP STM MH3 (STM)/   0.15 /   175.05   PROP STM MH7 (STM)/   0.10 /   175.05 PROP STM CBMH8 (STM)/   0.05 /   175.05
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.17 /   174.49            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.65*/   175.05           HW-1 (STM)/   0.68 /   175.05            J27 (STM)/   0.15 /   174.41
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.18 /   174.51

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.07   Pipe - (600) (STM)/       0.04   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.04
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.07   Pipe - (674) (STM)/       0.04   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
            534.2/       0.00                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.07              FREE# 1/       0.07

Cycle       7500      Time         10 Hrs - 25.00 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.61 /   174.94   PROP STM MH1 (STM)/   0.42 /   174.94 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.33 /   174.94   PROP STM MH6 (STM)/   0.11 /   174.94
 PROP STM MH3 (STM)/   0.04 /   174.94   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.16 /   174.48            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.54 /   174.94           HW-1 (STM)/   0.58 /   174.94            J27 (STM)/   0.14 /   174.40
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.17 /   174.50

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.06   Pipe - (600) (STM)/       0.03   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.03
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.06   Pipe - (674) (STM)/       0.03   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00*               503.2/       0.00*               534.1/       0.00
            534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00*
            537.2/       0.00*         205mm PLATE/       0.06              FREE# 1/       0.06

Cycle       8000      Time         11 Hrs -  6.67 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.48 /   174.81   PROP STM MH1 (STM)/   0.29 /   174.81 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.20 /   174.81   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.15 /   174.47            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.41 /   174.81           HW-1 (STM)/   0.45 /   174.81            J27 (STM)/   0.13 /   174.39
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.16 /   174.49

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.05   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.05   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00*
            534.2/       0.00*               535.1/       0.00                535.2/       0.00                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.05              FREE# 1/       0.05

Cycle       8500      Time         11 Hrs - 48.33 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.33 /   174.66   PROP STM MH1 (STM)/   0.14 /   174.66 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.05 /   174.66   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.13 /   174.45            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.27 /   174.66           HW-1 (STM)/   0.30 /   174.66            J27 (STM)/   0.12 /   174.38
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.14 /   174.47

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.04   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.04   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00*
            534.2/       0.00*               535.1/       0.00                535.2/       0.00                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.04              FREE# 1/       0.04

Cycle       9000      Time         12 Hrs - 30.00 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.21 /   174.54   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.10 /   174.42            DI2 (STM)/   0.00 /   175.13
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            ID*477/   0.14 /   174.54          HW-1 (STM)/   0.18 /   174.54           J27 (STM)/   0.09 /   174.35
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.12 /   174.44

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.02              FREE# 1/       0.02

Cycle       9500      Time         13 Hrs - 11.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.12 /   174.45   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.07 /   174.39           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.06 /   174.45          HW-1 (STM)/   0.09 /   174.45           J27 (STM)/   0.06 /   174.32
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.08 /   174.41

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.00*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.01              FREE# 1/       0.01

Cycle      10000      Time         13 Hrs - 53.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.09 /   174.42   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.05 /   174.37           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.02 /   174.42          HW-1 (STM)/   0.06 /   174.42           J27 (STM)/   0.04 /   174.30
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.06 /   174.38

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      10500      Time         14 Hrs - 35.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.07 /   174.40   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.04 /   174.36           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40          HW-1 (STM)/   0.04 /   174.40           J27 (STM)/   0.03 /   174.29
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.04 /   174.37

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      11000      Time         15 Hrs - 16.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.05 /   174.38   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.03 /   174.35           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40          HW-1 (STM)/   0.03 /   174.39           J27 (STM)/   0.02 /   174.28
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.04 /   174.36

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

WARNING !! SIMULATION CONTINUES AFTER THE TIME
HISTORY STAGE ENDS FOR TIDAL BOUNDARY CONDITION      1
PROGRAM DEFAULTS TO THE LAST STAGE VALUE.

Cycle      11500      Time         15 Hrs - 58.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.05 /   174.38   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.03 /   174.35           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40          HW-1 (STM)/   0.02 /   174.38           J27 (STM)/   0.01 /   174.27
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.03 /   174.36

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      12000      Time         16 Hrs - 40.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.04 /   174.37   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.02 /   174.34           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40          HW-1 (STM)/   0.01 /   174.37           J27 (STM)/   0.01 /   174.27
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.03 /   174.35

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      12500      Time         17 Hrs - 21.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.04 /   174.37   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13         STM7080 (STM)/   0.02 /   174.34           DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40          HW-1 (STM)/   0.01 /   174.37           J27 (STM)/   0.01 /   174.27
          DI1 (STM)/   0.00 /   175.06           DI3 (STM)/   0.00 /   175.19           DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.03 /   174.35

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
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 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      13000      Time         18 Hrs -  3.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.03 /   174.36   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.02 /   174.34            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.01 /   174.27
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.35

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      13500      Time         18 Hrs - 45.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.03 /   174.36   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.01 /   174.27
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.35

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      14000      Time         19 Hrs - 26.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.03 /   174.36   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.35

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      14500      Time         20 Hrs -  8.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.03 /   174.36   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.35

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      15000      Time         20 Hrs - 50.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.03 /   174.36   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      15500      Time         21 Hrs - 31.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      16000      Time         22 Hrs - 13.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.02 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      16500      Time         22 Hrs - 55.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
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 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      17000      Time         23 Hrs - 36.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      17500      Time         24 Hrs - 18.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      18000      Time         25 Hrs -  0.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      18500      Time         25 Hrs - 41.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      19000      Time         26 Hrs - 23.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      19500      Time         27 Hrs -  5.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      20000      Time         27 Hrs - 46.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

             Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
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 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      20500      Time         28 Hrs - 28.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.01 /   174.33            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      21000      Time         29 Hrs - 10.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      21500      Time         29 Hrs - 51.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      22000      Time         30 Hrs - 33.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.02 /   174.35   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      22500      Time         31 Hrs - 15.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      23000      Time         31 Hrs - 56.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      23500      Time         32 Hrs - 38.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
             ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      24000      Time         33 Hrs - 20.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
```

```
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
    ID*477/   0.00 /   174.40            HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06             DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      24500      Time         34 Hrs -  1.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
    ID*477/   0.00 /   174.40            HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06             DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      25000      Time         34 Hrs - 43.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
    ID*477/   0.00 /   174.40            HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06             DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      25500      Time         35 Hrs - 25.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
    ID*477/   0.00 /   174.40            HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06             DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.01 /   174.34

            Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00


 +=====================================================*
 | Table E5 - Junction Time Limitation Summary         |
 |              (0.10 or 0.25)* Depth * Area           |
 | Time step = ------------------------------          |
 |                  Sum of Flow                        |
 +=====================================================*
 |  The time this junction was the limiting junction |
 |                is listed in the third column.     |
 +=====================================================*

            Junction     Time(.10)  Time(.25)  Time(sec)
---------------------  ---------  --------  ---------
    StartNullStruct1         0.87      2.18    91730.0
  PROP STM MH1 (STM)         7.13     17.83        0.0
PROP STM CBMH4 (STM)        42.78     50.00        0.0
  PROP STM MH5 (STM)        28.00     50.00        0.0
  PROP STM MH2 (STM)        50.00     50.00        0.0
  PROP STM MH6 (STM)        50.00     50.00        0.0
  PROP STM MH3 (STM)        39.52     50.00        0.0
  PROP STM MH7 (STM)         5.06     12.65        0.0
PROP STM CBMH8 (STM)        10.28     25.69        0.0
  PROP STM MH9 (STM)        23.81     50.00        0.0
       STM7080 (STM)         0.86      2.14       30.0
           DI2 (STM)        24.86     50.00        0.0
              ID*477         0.30      0.76    12555.0
          HW-1 (STM)         0.09      0.22    25225.0
           J27 (STM)        50.00     50.00        0.0
           DI1 (STM)         0.40      1.01        0.0
           DI3 (STM)        46.58     50.00        0.0
           DI4 (STM)        35.52     50.00        0.0
      STM MH1A (STM)         0.32      0.80       60.0
The junction requiring the smallest time step was...StartNullStruct1


 +==============================================================*
 |       Table E5a - Conduit Explicit Condition Summary         |
 |       Courant   =         Conduit Length                     |
 |       Time step = --------------------------------           |
 |                     Velocity + sqrt(g*depth)                 |
 |                                                              |
 |                  Conduit Implicit Condition Summary          |
 |       Courant   =         Conduit Length                     |
 |       Time step = --------------------------------           |
 |                               Velocity                       |
 +==============================================================*
 |  The 3rd column is the Explicit time step times the          |
 |      minimum courant time step factor                        |
 |                                                              |
 |  Minimum Conduit Time Step in seconds in the 4th column      |
 |  in the list. Maximum possible is 10 * maximum time step     |
 |                                                              |
 |  The 5th column is the maximum change at any time step       |
 |  during the simulation. The 6th column is the wobble         |
 |  value which is an indicator of the flow stability.          |
 |                                                              |
 |  You should use this section to find those conduits that     |
 |  are slowing your model down.  Use modify conduits to        |
 |  alter the length of the slow conduits to make your          |
 |  simulation faster, or change the conduit name to            |
 |  "CHME?????" where ????? are any characters, this will       |
 |  lengthen the conduit based on the model time step,          |
 |  not the value listed in modify conduits.                    |
 +==============================================================*

             Conduit  Time(exp)  Expl*Cmin  Time(imp) Time(min)  Max Qchange   Wobble  Type of Soln
       --------------  ---------  ---------  --------- ---------  -----------  -------  ------------
  Pipe - (596) (STM)      5.43       5.43      20.59      61.1          0.044    5.344   Normal Soln
  Pipe - (600) (STM)      7.97       7.97      50.00       0.0         -0.003    1.202   Normal Soln
  Pipe - (602) (STM)     10.91      10.91      34.49       0.0         -0.001    4.370   Normal Soln
  Pipe - (605) (STM)      6.40       6.40      15.42       0.0         -0.002    4.031   Normal Soln
  Pipe - (607) (STM)      8.37       8.37      21.55       0.0         -0.000    7.761   Normal Soln
```

```
  Pipe - (608) (STM)      4.85      4.85     10.96       0.0          0.001     5.120   Normal Soln
  Pipe - (609) (STM)      3.75      3.75      9.39       0.0         -0.001    11.518   Normal Soln
  Pipe - (610) (STM)     12.64     12.64     43.51       0.0         -0.000     5.591   Normal Soln
  Pipe - (611) (STM)      3.33      3.33      8.82       0.0          0.001    12.303   Normal Soln
  Pipe - (612) (STM)      0.98      0.98      2.68    2078.2          0.100    17.569   Normal Soln
  Pipe - (674) (STM)      3.19      3.19     11.03      19.7          0.002     5.989   Normal Soln
  Pipe - (676) (STM)      5.08      5.08     23.48       0.0          0.002     1.132   Normal Soln
             Link181      3.31      3.31     50.00       1.1          0.000     9.639   Normal Soln
               503.1      9.71      9.71     50.00       0.0          0.004     0.844   Normal Soln
               503.2      9.52      9.52     50.00       0.0          0.004     0.715   Normal Soln
               534.1     22.91     22.91     50.00       0.0          0.001     0.635   Normal Soln
               534.2     22.51     22.51     50.00       0.0          0.001     0.610   Normal Soln
               535.1     13.15     13.15     50.00       0.0         -0.001     0.438   Normal Soln
               535.2     13.15     13.15     50.00       0.0         -0.001     0.438   Normal Soln
               537.1     15.16     15.16     50.00       0.0          0.003     1.098   Normal Soln
               537.2     14.87     14.87     50.00       0.0          0.003     1.013   Normal Soln
        205mm PLATE     49.98     49.98     50.00       0.0         -0.000     5.543   Normal Soln
The conduit with the smallest time step limitation was..Pipe - (612) (STM)
The conduit with the largest wobble was.................Pipe - (612) (STM)
The conduit with the largest flow change in any
consecutive time step...................................Pipe - (612) (STM)

 ************************************************
 *      End of time step DO-loop in Runoff      *
 ************************************************

 Final Date (Mo/Day/Year)   =            11/ 4/2018
 Total number of time steps =                   288
 Final Julian Date          =               2018308
 Final time of day          =                    0. seconds.
 Final time of day          =                  0.00   hours.
 Final running time         =               24.0000   hours.
 Final running time         =                1.0000    days.

 ****************************************************
 *     Extrapolation Summary for Watersheds         *
 * Explains the number of time steps and iterations *
 * used in the solution of the subcatchments.       *
 * # Steps ==> Total Number of Extrapolated Steps   *
 * # Calls ==> Total Number of OVERLND Calls        *
 ****************************************************

         Subcatchment   # Steps  # Calls              Subcatchment   # Steps  # Calls              Subcatchment   # Steps  # Calls
---------------------  -------  --------     ---------------------  -------  --------     ---------------------  -------  --------
         DI2 (STM)#1      2409       619       PROP STM MH5 (ST#1      2363       601             DI1 (STM)#1      2497       635
   PROP STM MH3 (ST#1     2358       598            DI4 (STM)#1      2505       619       PROP STM MH7 (ST#1      2369       603
            DI3 (STM)#1   2489       619       PROP STM CBMH8 (#1      2369       603       PROP STM MH6 (ST#1      2377       603
         HW-1 (STM)#1     2436       640             HW-1 (STM)#2      2457       607


#######################################################
# Rainfall input summary from Runoff Continuity Check   #
#######################################################

 Total rainfall read for gage #         1 is        81.59 mm
 Total rainfall duration for gage #     1 is       240.00 minutes

 ************************************************************
 * Table R5. CONTINUITY CHECK FOR SURFACE WATER             *
 *       Any continuity error can be fixed by lowering the  *
 *       wet and transition time step. The transition time  *
 *       should not be much greater than the wet time step. *
 ************************************************************
                                                                    Millimeters over
                                                     cubic meters      Total Basin
 Total Precipitation (Rain plus Snow)               3.410392E+03        81.588
 Total Infiltration                                 1.214451E+03        29.054
 Total Evaporation                                  0.000000E+00         0.000
 Surface Runoff from Watersheds                     2.181892E+03        52.198
 Total Water remaining in Surface Storage           2.369257E+01         0.567
 Infiltration over the Pervious Area...             1.214451E+03        46.616
                         --------
 Infiltration + Evaporation +
 Surface Runoff + Snow removal +
 Water remaining in Surface Storage +
 Water remaining in Snow Cover.........             3.420036E+03        81.819
 Total Precipitation + Initial Storage.             3.410392E+03        81.588


 The error in continuity is calculated as
 ****************************************
 * Precipitation + Initial Snow Cover  *
 *     - Infiltration -                 *
 *Evaporation - Snow removal -          *
 *Surface Runoff from Watersheds -      *
 *Water in Surface Storage -            *
 *Water remaining in Snow Cover         *
 *--------------------------------------*
 * Precipitation + Initial Snow Cover  *
 ****************************************
 Percent Continuity Error...............                          -0.2828


 ****************************************************
 * Table R6. Continuity Check for Channel/Pipes     *
 *           You should have zero continuity error  *
 *           if you are not using runoff hydraulics *
 ****************************************************
                                                                    Millimeters over
                                                     cubic meters      Total Basin
 Initial Channel/Pipe Storage................       0.000000E+00          0.000
 Final Channel/Pipe Storage..................       0.000000E+00          0.000
 Surface Runoff from Watersheds..............       2.181892E+03         52.198
 Groundwater Subsurface Inflow or Diversion..       0.000000E+00          0.000
 Evaporation Loss from Channels..............       0.000000E+00          0.000
 Groundwater Flow Diverted Out of Network....       0.000000E+00          0.000
 Channel/Pipe/Inlet Outflow..................       2.181892E+03         52.198
 Initial Storage + Inflow....................       2.181892E+03         52.198
 Final Storage + Outflow + Diverted GW.......       2.181892E+03         52.198
 *******************************************
 * Final Storage + Outflow + Evaporation  - *
 * Watershed Runoff - Groundwater Inflow  - *
 *     Initial Channel/Pipe Storage         *
 *     ----------------------------------   *
 *  Final Storage + Outflow  + Evaporation  *
 *******************************************
 Percent Continuity Error....................                     0.0000

        ##############################################
        # Table R9. Summary Statistics for Subcatchments #
        ##############################################

 Note: Total Runoff Depth includes pervious & impervious areas.
       Pervious and Impervious Runoff Depth is only the runoff from those two areas.
       For catchments receiving redirected flow, this flow will only be shown if the flow is not
       directed directly to the outlet. Flow that is getting redirected is also listed with
       the original subcatchment.


 Subcatchment...........          DI2 (STM)#1   PROP STM MH5 (ST#1          DI1 (STM)#1   PROP STM MH3 (ST#1          DI4 (STM)#1
 Area (hectares)........              0.42001             0.22000             1.09002             0.21000             0.28001
 Percent Impervious.....             33.00000            90.00000            12.00000            95.00000            18.00000
 Total Rainfall (mm)....             81.58833            81.58833            81.58833            81.58833            81.58833
 Max Intensity (mm/hr)..            172.68000           172.68000           172.68000           172.68000           172.68000

 Pervious Area
 -------------
 Total Runoff Depth (mm)             38.49822            46.47233            32.41579            47.14324            38.51715
 Peak Runoff Rate (cms).              0.02466             0.00772             0.04712             0.00438             0.02016

 Total Impervious Area
 ---------------------
 Total Runoff Depth (mm)              3.17125             3.17090             3.16878             3.17064             3.16638
```

```
Peak Runoff Rate (cms).              0.06612              0.09204              0.06269              0.09226              0.02417

Impervious Area with depression storage
---------------------------------------
Total Runoff Depth (mm)             60.03831             60.03170             59.99122             60.02670             59.94539
Peak Runoff Rate (cms).              0.04959              0.06903              0.04702              0.06919              0.01813

Impervious Area without depression storage
------------------------------------------
Total Runoff Depth (mm)             20.51152             20.50923             20.49590             20.50754             20.48072
Peak Runoff Rate (cms).              0.01653              0.02301              0.01567              0.02306              0.00604

Total Area
----------
Total Runoff Depth (mm)             52.37525             77.13407             38.18435             78.86469             46.06076
Peak Runoff Rate (cms).              0.08836              0.09975              0.10039              0.09663              0.04236

Rational Formula
----------------
Pervious Tc. (mins)....              0.00000              0.00000              0.00000              0.00000              0.00000
Perv. Intensity (mm/hr)              0.00000              0.00000              0.00000              0.00000              0.00000
Pervious C ............              0.00000              0.00000              0.00000              0.00000              0.00000
Impervious Tc. (mins)..              0.00000              0.00000              0.00000              0.00000              0.00000
Imp. Intensity (mm/hr).              0.00000              0.00000              0.00000              0.00000              0.00000
Impervious C ..........              0.00000              0.00000              0.00000              0.00000              0.00000
Partial Area (Ha)......              0.00000              0.00000              0.00000              0.00000              0.00000
Partial Area Tc........              0.00000              0.00000              0.00000              0.00000              0.00000
Partial Area Intensity.              0.00000              0.00000              0.00000              0.00000              0.00000

UK Methods
----------
Runoff percentage (%)..              0.00000              0.00000              0.00000              0.00000              0.00000
Effective Area (Ha)....              0.00000              0.00000              0.00000              0.00000              0.00000
Depression Storage (mm)              0.00000              0.00000              0.00000              0.00000              0.00000
Routing coefficient....              0.00000              0.00000              0.00000              0.00000              0.00000


Subcatchment...........   PROP STM MH7 (ST#1         DI3 (STM)#1   PROP STM CBMH8 (#1   PROP STM MH6 (ST#1         HW-1 (STM)#1
Area (hectares)........              0.21000              0.28001              0.25001              0.17000              0.74002
Percent Impervious.....             85.00000             20.00000             85.00000             85.00000             15.00000
Total Rainfall (mm)....             81.58833             81.58833             81.58833             81.58833             81.58833
Max Intensity (mm/hr)..            172.68000            172.68000            172.68000            172.68000            172.68000

Pervious Area
-------------
Total Runoff Depth (mm)             45.82165             38.68482             45.73002             46.06493             30.67630
Peak Runoff Rate (cms).              0.00921              0.02000              0.01070              0.00798              0.02677

Total Impervious Area
---------------------
Total Runoff Depth (mm)              3.17103              3.16730              3.17087              3.17143              3.17104
Peak Runoff Rate (cms).              0.08319              0.02685              0.09871              0.06789              0.05301

Impervious Area with depression storage
---------------------------------------
Total Runoff Depth (mm)             60.03418             59.96285             60.03104             60.04165             60.03415
Peak Runoff Rate (cms).              0.06239              0.02014              0.07403              0.05091              0.03976

Impervious Area without depression storage
------------------------------------------
Total Runoff Depth (mm)             20.51006             20.48650             20.50900             20.51258             20.51014
Peak Runoff Rate (cms).              0.02080              0.00671              0.02468              0.01697              0.01325

Total Area
----------
Total Runoff Depth (mm)             75.33585             47.03772             75.31854             75.38084             38.15650
Peak Runoff Rate (cms).              0.09240              0.04499              0.10941              0.07586              0.07368

Rational Formula
----------------
Pervious Tc. (mins)....              0.00000              0.00000              0.00000              0.00000              0.00000
Perv. Intensity (mm/hr)              0.00000              0.00000              0.00000              0.00000              0.00000
Pervious C ............              0.00000              0.00000              0.00000              0.00000              0.00000
Impervious Tc. (mins)..              0.00000              0.00000              0.00000              0.00000              0.00000
Imp. Intensity (mm/hr).              0.00000              0.00000              0.00000              0.00000              0.00000
Impervious C ..........              0.00000              0.00000              0.00000              0.00000              0.00000
Partial Area (Ha)......              0.00000              0.00000              0.00000              0.00000              0.00000
Partial Area Tc........              0.00000              0.00000              0.00000              0.00000              0.00000
Partial Area Intensity.              0.00000              0.00000              0.00000              0.00000              0.00000

UK Methods
----------
Runoff percentage (%)..              0.00000              0.00000              0.00000              0.00000              0.00000
Effective Area (Ha)....              0.00000              0.00000              0.00000              0.00000              0.00000
Depression Storage (mm)              0.00000              0.00000              0.00000              0.00000              0.00000
Routing coefficient....              0.00000              0.00000              0.00000              0.00000              0.00000


Subcatchment...........         HW-1 (STM)#2
Area (hectares)........              0.31001
Percent Impervious.....             50.00000
Total Rainfall (mm)....             81.58833
Max Intensity (mm/hr)..            172.68000

Pervious Area
-------------
Total Runoff Depth (mm)             43.81008
Peak Runoff Rate (cms).              0.02822

Total Impervious Area
---------------------
Total Runoff Depth (mm)              3.17012
Peak Runoff Rate (cms).              0.07421

Impervious Area with depression storage
---------------------------------------
Total Runoff Depth (mm)             60.01661
Peak Runoff Rate (cms).              0.05566

Impervious Area without depression storage
------------------------------------------
Total Runoff Depth (mm)             20.50432
Peak Runoff Rate (cms).              0.01855

Total Area
----------
Total Runoff Depth (mm)             62.16551
Peak Runoff Rate (cms).              0.10243

Rational Formula
----------------
Pervious Tc. (mins)....              0.00000
Perv. Intensity (mm/hr)              0.00000
Pervious C ............              0.00000
Impervious Tc. (mins)..              0.00000
Imp. Intensity (mm/hr).              0.00000
Impervious C ..........              0.00000
Partial Area (Ha)......              0.00000
Partial Area Tc........              0.00000
Partial Area Intensity.              0.00000

UK Methods
----------
Runoff percentage (%)..              0.00000
Effective Area (Ha)....              0.00000
Depression Storage (mm)              0.00000
Routing coefficient....              0.00000

===> Runoff simulation ended normally.

*==================================================*
|  Table E6. Final Model Condition                 |
|            This table is used for steady state   |
```

```
|            flow comparison and is the information|
|            saved to the hot-restart file.        |
|            Final Time =    36.000 hours         |
*==================================================*

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34/  PROP STM MH1 (STM)/   0.00 /   174.52/PROP STM CBMH4 (STM)/   0.00 /   175.00/
 PROP STM MH5 (STM)/   0.00 /   174.99/  PROP STM MH2 (STM)/   0.00 /   174.61/  PROP STM MH6 (STM)/   0.00 /   174.83/
 PROP STM MH3 (STM)/   0.00 /   174.90/  PROP STM MH7 (STM)/   0.00 /   174.95/PROP STM CBMH8 (STM)/   0.00 /   175.00/
 PROP STM MH9 (STM)/   0.00 /   175.13/       STM7080 (STM)/   0.00 /   174.32/           DI2 (STM)/   0.00 /   175.13/
            ID*477/   0.00 /   174.40/           HW-1 (STM)/   0.00 /   174.36/           J27 (STM)/   0.00 /   174.26/
          DI1 (STM)/   0.00 /   175.06/            DI3 (STM)/   0.00 /   175.19/           DI4 (STM)/   0.00 /   175.09/
     STM MH1A (STM)/   0.01 /   174.34/

          Conduit/       Flow   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00 /  Pipe - (600) (STM)/       0.00 /  Pipe - (602) (STM)/       0.00 /
 Pipe - (605) (STM)/       0.00 /  Pipe - (607) (STM)/       0.00 /  Pipe - (608) (STM)/       0.00 /
 Pipe - (609) (STM)/       0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/       0.00 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/       0.00 /  Pipe - (676) (STM)/       0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/       0.00 /               534.2/       0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/       0.00 /               537.2/       0.00 /
       205mm PLATE/       0.00 /             FREE# 1/       0.00 /

            Conduit/   Velocity
 Pipe - (596) (STM)/       0.08 /  Pipe - (600) (STM)/       0.00 /  Pipe - (602) (STM)/       0.00 /
 Pipe - (605) (STM)/       0.00 /  Pipe - (607) (STM)/       0.00 /  Pipe - (608) (STM)/       0.00 /
 Pipe - (609) (STM)/       0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/       0.00 /
 Pipe - (612) (STM)/       0.09 /  Pipe - (674) (STM)/       0.05 /  Pipe - (676) (STM)/       0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/       0.00 /               534.2/       0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/       0.00 /               537.2/       0.00 /
       205mm PLATE/       0.06 /

       Conduit/      Width
 Pipe - (596) (STM)/       0.29 /  Pipe - (600) (STM)/       1.80 /  Pipe - (602) (STM)/       0.18 /
 Pipe - (605) (STM)/       0.24 /  Pipe - (607) (STM)/       0.12 /  Pipe - (608) (STM)/       0.21 /
 Pipe - (609) (STM)/       0.15 /  Pipe - (610) (STM)/       0.12 /  Pipe - (611) (STM)/       0.12 /
 Pipe - (612) (STM)/       0.18 /  Pipe - (674) (STM)/       0.24 /  Pipe - (676) (STM)/       1.80 /
            Link181/       0.02 /               503.1/       1.80 /               503.2/       1.80 /
              534.1/       1.80 /               534.2/       1.80 /               535.1/       1.80 /
              535.2/       1.80 /               537.1/       1.80 /               537.2/       1.80 /
       205mm PLATE/       0.10 /

       Junction/        EGL
   StartNullStruct1/       0.01 /  PROP STM MH1 (STM)/       0.02 /PROP STM CBMH4 (STM)/       0.00 /
 PROP STM MH5 (STM)/       0.00 /  PROP STM MH2 (STM)/       0.00 /  PROP STM MH6 (STM)/       0.00 /
 PROP STM MH3 (STM)/       0.04 /  PROP STM MH7 (STM)/       0.00 /PROP STM CBMH8 (STM)/       0.00 /
 PROP STM MH9 (STM)/       0.03 /       STM7080 (STM)/       0.00 /           DI2 (STM)/       0.00 /
            ID*477/       0.03 /           HW-1 (STM)/       0.00 /           J27 (STM)/       0.00 /
          DI1 (STM)/       0.00 /            DI3 (STM)/       0.00 /           DI4 (STM)/       0.00 /
     STM MH1A (STM)/       0.01 /

       Junction/  Freeboard
   StartNullStruct1/       0.44 /  PROP STM MH1 (STM)/       2.38 /PROP STM CBMH4 (STM)/       1.84 /
 PROP STM MH5 (STM)/       1.83 /  PROP STM MH2 (STM)/       2.07 /  PROP STM MH6 (STM)/       1.85 /
 PROP STM MH3 (STM)/       1.73 /  PROP STM MH7 (STM)/       1.68 /PROP STM CBMH8 (STM)/       1.53 /
 PROP STM MH9 (STM)/       1.15 /       STM7080 (STM)/       1.64 /           DI2 (STM)/       0.80 /
            ID*477/       1.37 /           HW-1 (STM)/       1.32 /           J27 (STM)/       1.41 /
          DI1 (STM)/       0.47 /            DI3 (STM)/       0.31 /           DI4 (STM)/       0.34 /
     STM MH1A (STM)/       1.06 /

       Junction/ Max Volume
   StartNullStruct1/       1.76 /  PROP STM MH1 (STM)/       1.53 /PROP STM CBMH4 (STM)/       0.95 /
 PROP STM MH5 (STM)/       0.96 /  PROP STM MH2 (STM)/       1.42 /  PROP STM MH6 (STM)/       1.16 /
 PROP STM MH3 (STM)/       1.07 /  PROP STM MH7 (STM)/       1.01 /PROP STM CBMH8 (STM)/       0.95 /
 PROP STM MH9 (STM)/       0.79 /       STM7080 (STM)/       1.65 /           DI2 (STM)/       0.80 /
            ID*477/       1.68 /           HW-1 (STM)/       1.73 /           J27 (STM)/       1.95 /
          DI1 (STM)/       0.88 /            DI3 (STM)/       0.73 /           DI4 (STM)/       0.84 /
     STM MH1A (STM)/       1.65 /

       Junction/Total Fldng
   StartNullStruct1/       0.23 /  PROP STM MH1 (STM)/       0.00 /PROP STM CBMH4 (STM)/       0.00 /
 PROP STM MH5 (STM)/       0.00 /  PROP STM MH2 (STM)/       0.00 /  PROP STM MH6 (STM)/       0.00 /
 PROP STM MH3 (STM)/       0.00 /  PROP STM MH7 (STM)/       0.00 /PROP STM CBMH8 (STM)/       0.00 /
 PROP STM MH9 (STM)/       0.00 /       STM7080 (STM)/       0.00 /           DI2 (STM)/       0.00 /
            ID*477/       0.00 /           HW-1 (STM)/     408.71 /           J27 (STM)/       0.00 /
          DI1 (STM)/      62.74 /            DI3 (STM)/      28.16 /           DI4 (STM)/      22.30 /
     STM MH1A (STM)/       1.62 /

       Conduit/ Cross Sectional Area
 Pipe - (596) (STM)/       0.00 /  Pipe - (600) (STM)/       0.00 /  Pipe - (602) (STM)/       0.00 /
 Pipe - (605) (STM)/       0.00 /  Pipe - (607) (STM)/       0.00 /  Pipe - (608) (STM)/       0.00 /
 Pipe - (609) (STM)/       0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/       0.00 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/       0.00 /  Pipe - (676) (STM)/       0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/       0.00 /               534.2/       0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/       0.00 /               537.2/       0.00 /
       205mm PLATE/       0.00 /

       Conduit/  Final Volume
 Pipe - (596) (STM)/       0.01 /  Pipe - (600) (STM)/       0.00 /  Pipe - (602) (STM)/       0.00 /
 Pipe - (605) (STM)/       0.00 /  Pipe - (607) (STM)/       0.00 /  Pipe - (608) (STM)/       0.00 /
 Pipe - (609) (STM)/       0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/       0.00 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/       0.00 /  Pipe - (676) (STM)/       0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/       0.00 /               534.2/       0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/       0.00 /               537.2/       0.00 /
       205mm PLATE/       0.25 /

       Conduit/ Hydraulic Radius
 Pipe - (596) (STM)/       0.00 /  Pipe - (600) (STM)/       0.00 /  Pipe - (602) (STM)/       0.00 /
 Pipe - (605) (STM)/       0.00 /  Pipe - (607) (STM)/       0.00 /  Pipe - (608) (STM)/       0.00 /
 Pipe - (609) (STM)/       0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/       0.00 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/       0.00 /  Pipe - (676) (STM)/       0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/       0.00 /               534.2/       0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/       0.00 /               537.2/       0.00 /
       205mm PLATE/       0.01 /

       Conduit/ Upstream/ Downstream Elevation
 Pipe - (596) (STM)/   174.32/   174.26  Pipe - (600) (STM)/   174.52/   174.43  Pipe - (602) (STM)/   175.00/   175.00/
 Pipe - (605) (STM)/   174.61/   174.54  Pipe - (607) (STM)/   174.99/   174.99  Pipe - (608) (STM)/   174.99/   174.94/
 Pipe - (609) (STM)/   175.00/   175.00  Pipe - (610) (STM)/   174.95/   174.95  Pipe - (611) (STM)/   175.19/   175.16/
 Pipe - (612) (STM)/   174.34/   174.32  Pipe - (674) (STM)/   174.40/   174.36  Pipe - (676) (STM)/   174.90/   174.90/
            Link181/   174.36/   174.34               503.1/   174.83/   174.83               503.2/   174.83/   174.83/
              534.1/   174.61/   174.61               534.2/   174.90/   174.61               535.1/   174.61/   174.61/
              535.2/   174.61/   174.61               537.1/   174.83/   174.83               537.2/   174.83/   174.83/
       205mm PLATE/   174.34/   174.34

*==========================================================*
|         Table E7 -  Iteration Summary                    |
*==========================================================*

Total number of time steps simulated.............      25920
Total number of passes in the simulation........      94172
Total number of time steps during simulation....      88129
Ratio of actual # of time steps / NTCYC.........      3.400
Average number of iterations per time step......      1.069
Average  time step size(seconds)................      1.471
Smallest time step size(seconds)................      1.000
Largest  time step size(seconds)................      5.000
Average minimum Conduit Courant time step (sec).      3.623
Average minimum implicit time step (sec)........      1.219
Average minimum junction time step (sec)........      1.219
Average Courant Factor Tf.......................      1.219
Number of times omega reduced...................         58

*==========================================================*
|     Table E8 - Junction Time Step Limitation Summary     |
*==========================================================*
```

```
|   Not Convr = Number of times this junction did not     |
|               converge during the simulation.           |
|   Avg Convr = Average junction iterations.              |
|   Conv err  = Mean convergence error.                   |
|   Omega Cng = Change of omega during iterations         |
|   Max Itern = Maximum number of iterations              |
*=========================================================*
```

Junction	Not Convr	Avg Convr	Total Itt	Omega Cng	Max Itern	Ittrn >10	Ittrn >25	Ittrn >40
StartNullStruct1	0	1.09	96019	0	3	0	0	0
PROP STM MH1 (STM)	0	1.03	90983	0	6	0	0	0
PROP STM CBMH4 (STM)	0	1.03	90802	0	6	0	0	0
PROP STM MH5 (STM)	0	1.01	89202	0	4	0	0	0
PROP STM MH2 (STM)	0	1.03	91127	0	6	0	0	0
PROP STM MH6 (STM)	0	1.04	91269	0	7	0	0	0
PROP STM MH3 (STM)	0	1.04	91770	0	7	0	0	0
PROP STM MH7 (STM)	0	1.01	89033	0	10	1	0	0
PROP STM CBMH8 (STM)	0	1.01	89331	0	6	0	0	0
PROP STM MH9 (STM)	0	1.01	88687	0	3	0	0	0
STM7080 (STM)	0	1.04	91628	37	16	11	0	0
DI2 (STM)	0	1.00	88401	0	4	0	0	0
ID*477	0	1.06	93067	0	10	1	0	0
HW-1 (STM)	0	1.11	98027	0	5	0	0	0
J27 (STM)	0	1.06	93568	2	17	7	0	0
DI1 (STM)	0	1.03	90749	0	8	0	0	0
DI3 (STM)	0	1.03	90373	0	3	0	0	0
DI4 (STM)	0	1.02	90328	0	2	0	0	0
STM MH1A (STM)	0	1.03	90611	19	17	5	0	0

```
Total number of iterations for all junctions..   1734975
Minimum number of possible iterations.........   1674451
Efficiency of the simulation.................       1.04
                                          Good Efficiency

*=========================================================*
| Extran Efficiency is an indicator of the efficiency of  |
| the simulation.  Ideal efficiency is one iteration per  |
| time step.  Altering the underrelaxation parameter,     |
| lowering the time step, increasing the flow and head    |
| tolerance are good ways of improving the efficiency,    |
| another is lowering the internal time step. The lower the|
| efficiency generally the faster your model will run.    |
| If your efficiency is less than 1.5 then you may try    |
| increasing your time step so that your overall simulation|
| is faster.  Ideal efficiency would be around 2.0        |
|                                                         |
| Good Efficiency      < 1.5           mean iterations    |
| Excellent Efficiency < 2.5 and > 1.5 mean iterations    |
| Good      Efficiency < 4.0 and > 2.5 mean iterations    |
| Fair      Efficiency < 7.5 and > 4.0 mean iterations    |
| Poor Efficiency      > 7.5           mean iterations    |
*=========================================================*
```

```
*=========================================================*
|        Table E9 - JUNCTION SUMMARY STATISTICS           |
| The Maximum area is only the area of the node, it       |
| does not include the area of the surrounding conduits|
*=========================================================*
```

Junction Name	Ground Elevation meters	Uppermost PipeCrown Elevation meters	Maximum Junction Elevation meters	Time of Occurence Hr.	Min.	Meters of Surcharge at Max Elevation	Freeboard of node meters	Maximum Junction Area m^2	Maximum Gutter Depth meters	Maximum Gutter Width meters	Maximum Gutter Velocity m/s
StartNullStruct1	174.7800	174.3800	175.7746	2	38	1.3946	0.0000	1.2200	0.0000	0.00	0.0000
PROP STM MH1 (STM)	176.9015	175.1398	175.7723	2	38	0.6325	1.1292	1.2200	0.0000	0.00	0.0000
PROP STM CBMH4 (STM)	176.8396	175.5974	175.7785	2	39	0.1811	1.0611	1.2200	0.0000	0.00	0.0000
PROP STM MH5 (STM)	176.8235	175.5176	175.7788	2	39	0.2612	1.0447	1.2200	0.0000	0.00	0.0000
PROP STM MH2 (STM)	176.6840	175.6002	175.7783	2	40	0.1781	0.9057	1.2200	0.0000	0.00	0.0000
PROP STM MH6 (STM)	176.6773	175.7300	175.7784	2	40	0.0484	0.8989	1.2200	0.0000	0.00	0.0000
PROP STM MH3 (STM)	176.6339	175.5400	175.7784	2	40	0.2384	0.8555	1.2200	0.0000	0.00	0.0000
PROP STM MH7 (STM)	176.6287	175.5478	175.7784	2	40	0.2306	0.8503	1.2200	0.0000	0.00	0.0000
PROP STM CBMH8 (STM)	176.5327	175.6000	175.7785	2	39	0.1785	0.7542	1.2200	0.0000	0.00	0.0000
PROP STM MH9 (STM)	176.2783	175.5783	175.7797	2	39	0.2014	0.4986	1.2200	0.0000	0.00	0.0000
STM7080 (STM)	175.9600	175.0700	175.6762	1	19	0.6062	0.2838	1.2200	0.0000	0.00	0.0000
DI2 (STM)	175.9318	175.4270	175.7852	2	39	0.3582	0.1466	1.2200	0.0000	0.00	0.0000
ID*477	175.7715	175.0296	175.7715	2	35	0.7419	0.0000	1.2200	0.0000	0.00	0.0000
HW-1 (STM)	175.6850	174.9600	175.7747	2	38	0.8147	0.0000	1.2200	0.0000	0.00	0.0000
J27 (STM)	175.6681	175.0100	175.8547	3	14	0.8447	0.0000	1.2200	0.0000	0.00	0.0000
DI1 (STM)	175.5379	175.4379	175.7829	2	40	0.3450	0.0000	1.2200	0.0000	0.00	0.0000
DI3 (STM)	175.4923	175.4853	175.7802	2	39	0.2949	0.0000	1.2200	0.0000	0.00	0.0000
DI4 (STM)	175.4347	175.3914	175.7822	2	40	0.3908	0.0000	1.2200	0.0000	0.00	0.0000
STM MH1A (STM)	175.3912	174.7812	175.6787	1	19	0.8975	0.0000	1.2200	0.0000	0.00	0.0000

```
*=========================================================*
|        Table E10 - CONDUIT SUMMARY STATISTICS           |
| Note: The peak flow may be less than the design flow |
| and the conduit may still surcharge because of the      |
| downstream boundary conditions.                         |
|                                                         |
| * denotes an open conduit that has been overtopped      |
|   this is a potential source of severe errors           |
*=========================================================*
```

Conduit Name	Design Flow (cms)	Conduit Design Velocity (m/s)	Maximum Vertical Depth (mm)	Maximum Computed Flow (cms)	Time of Occurence Hr.	Min.	Maximum Computed Velocity (m/s)	Time of Occurence Hr.	Min.	Ratio of Max. to Design Flow	Maximum Water Elev at Pipe Ends Upstream (m)	Dwnstrm (m)	Ratio d/D US	DS
Pipe - (596) (STM)	0.6016	1.3618	750.0000	-0.2756	1	16	0.9978	7	14	-0.4582	175.6762	175.6681	1.808	1.877
Pipe - (600) (STM)	1.6868	1.5618	600.0000	0.3384	1	37	0.4763	1	27	0.2006	175.7723	175.7715	2.089	2.236
Pipe - (602) (STM)	0.1627	1.0227	450.0000	0.0444	1	40	0.8758	1	41	0.2728	175.7797	175.7785	1.448	1.663
Pipe - (605) (STM)	0.3368	1.1910	600.0000	0.3657	1	38	1.5822	1	37	1.0860	175.7783	175.7723	1.942	2.054
Pipe - (607) (STM)	0.0582	0.8240	300.0000	0.0879	1	40	1.2459	1	40	1.5099	175.7852	175.7788	2.194	2.497
Pipe - (608) (STM)	0.2524	1.1660	525.0000	0.1870	1	40	1.3939	1	40	0.7407	175.7788	175.7784	1.498	1.597
Pipe - (609) (STM)	0.0938	0.8490	375.0000	0.1001	1	40	1.2107	1	40	1.0674	175.7829	175.7785	1.920	1.995
Pipe - (610) (STM)	0.0530	0.7498	300.0000	0.0418	1	40	0.8539	1	40	0.7878	175.7822	175.7784	2.303	2.662
Pipe - (611) (STM)	0.0520	0.7355	300.0000	0.0448	1	40	0.9811	1	40	0.8621	175.7802	175.7797	1.983	2.065
Pipe - (612) (STM)	0.1561	0.9817	450.0000	-0.2060	1	16	-1.4620	1	16	-1.3196	175.6787	175.6762	2.995	3.014
Pipe - (674) (STM)	0.3361	1.1887	600.0000	0.3187	1	39	1.1393	1	37	0.9483	175.7715	175.7747	2.290	2.358
Pipe - (676) (STM)	1.9186	1.7765	600.0000	0.0936	1	40	0.6272	1	34	0.0488	175.7785	175.7784	1.302	1.397
Link181	0.0004	0.2269	50.0000	0.0002	1	36	0.1122	0	56	0.4714	175.7747	175.7746	28.29	28.89
503.1	1.6847	1.5599	600.0000	0.0472	1	38	0.3859	1	33	0.0280	175.7784	175.7783	1.384	1.531
503.2	1.9517	1.8071	600.0000	0.0659	1	38	0.4276	1	33	0.0338	175.7784	175.7783	1.384	1.581
534.1	1.7530	1.6231	600.0000	0.1367	1	40	0.4509	1	34	0.0780	175.7784	175.7783	1.464	1.880
534.2	1.8783	1.7392	600.0000	0.1639	1	40	0.4857	1	34	0.0872	175.7784	175.7783	1.464	1.942
535.1	3.0722	1.8964	900.0000	0.0980	1	38	0.3614	1	25	0.0319	175.7784	175.7783	1.054	1.198
535.2	3.0722	1.8964	900.0000	0.0980	1	38	0.3614	1	25	0.0319	175.7784	175.7783	1.054	1.198
537.1	1.7030	1.5768	600.0000	0.0551	1	36	0.4599	1	33	0.0324	175.7785	175.7783	1.297	1.531
537.2	1.8767	1.7377	600.0000	0.0626	1	36	0.4902	1	33	0.0334	175.7785	175.7783	1.297	1.581
205mm PLATE	0.0397	0.1467	204.9803	0.0885	7	10	2.6026	7	11	2.2288	175.7746	175.6787	7.048	6.595
FREE# 1	Undefnd	Undefnd	Undefnd	-0.2781	1	16								

```
*=================================================*
| Table E11.  Area assumptions used in the analysis|
| Subcritical and Critical flow assumptions from   |
| Subroutine Head. See manual for more information.|
*=================================================*
```

Conduit Name	Duration of Dry Flow(min)	Duration of Sub-Critical Flow(min)	Durat. of Upstream Critical Flow(min)	Durat. of Downstream Critical Flow(min)	Maximum Hydraulic Radius-m	Maximum X-Sect Area(m^2)	Maximum Vel*D (m^2/s)
Pipe - (596) (STM)	49.37	2110.63	0.00	0.00	0.228	0.462	0.413
Pipe - (600) (STM)	18.22	773.07	0.00	1368.71	0.326	1.086	0.202
Pipe - (602) (STM)	1608.21	454.23	0.00	97.56	0.136	0.163	0.134
Pipe - (605) (STM)	16.97	643.28	0.00	1499.75	0.182	0.294	0.713
Pipe - (607) (STM)	1604.55	473.48	0.00	81.97	0.091	0.072	0.418
Pipe - (608) (STM)	8.58	514.39	0.00	1637.03	0.159	0.225	0.421
Pipe - (609) (STM)	1573.66	483.05	0.00	103.29	0.114	0.115	0.302
Pipe - (610) (STM)	1590.49	470.08	0.00	99.43	0.090	0.073	0.161

Pipe - (611) (STM)	0.47	434.48	0.00	1725.04	0.091	0.074	0.172
Pipe - (612) (STM)	48.50	2110.91	0.59	0.00	0.137	0.167	0.468
Pipe - (674) (STM)	101.06	2058.94	0.00	0.00	0.183	0.296	0.781
Pipe - (676) (STM)	1558.72	511.28	0.00	89.99	0.335	1.086	0.060
Link181	1044.17	1115.83	0.00	0.00	0.015	0.002	0.061
503.1	630.92	567.09	0.00	961.99	0.334	1.086	0.032
503.2	630.92	1529.08	0.00	0.00	0.326	1.086	0.047
534.1	535.04	680.15	0.00	944.81	0.326	1.087	0.112
534.2	535.04	1624.96	0.00	0.00	0.326	1.087	0.132
535.1	72.51	638.85	0.00	1448.64	0.414	1.629	0.065
535.2	72.51	638.85	0.00	1448.64	0.414	1.629	0.065
537.1	516.75	566.64	0.00	1076.61	0.329	1.086	0.049
537.2	516.75	1643.25	0.00	0.00	0.326	1.086	0.060
205mm PLATE	17.69	2142.31	0.00	0.00	0.062	0.034	1.967

Table E12. Mean Conduit Flow Information

Conduit Name	Mean Flow (cms)	Total Flow (m^3)	Mean Percent Change	Low Flow Weightng	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Area	Mean Conduit Roughness
Pipe - (596) (STM)	0.0148	1917.6989	0.0002	0.9802	0.6285	0.0681	0.1179	0.0130
Pipe - (600) (STM)	0.0133	1721.5587	0.0001	0.9926	0.4360	0.0953	0.4040	0.0130
Pipe - (602) (STM)	0.0010	127.5957	0.0000	0.3473	0.0371	0.0337	0.0406	0.0130
Pipe - (605) (STM)	0.0133	1717.6708	0.0001	0.8419	0.5904	0.0626	0.1021	0.0130
Pipe - (607) (STM)	0.0017	219.6629	0.0000	0.3491	0.0431	0.0238	0.0202	0.0130
Pipe - (608) (STM)	0.0030	388.7362	0.0001	0.6676	0.4389	0.0449	0.0608	0.0130
Pipe - (609) (STM)	0.0031	400.4380	0.0001	0.3667	0.0490	0.0307	0.0314	0.0130
Pipe - (610) (STM)	0.0010	126.2878	0.0000	0.3572	0.0369	0.0241	0.0203	0.0130
Pipe - (611) (STM)	0.0010	128.2003	0.0000	0.4219	0.1112	0.0229	0.0185	0.0130
Pipe - (612) (STM)	0.0148	1917.2831	0.0002	0.9806	0.4875	0.0501	0.0500	0.0130
Pipe - (674) (STM)	0.0111	1442.8559	0.0001	0.8702	0.4987	0.0671	0.1129	0.0130
Pipe - (676) (STM)	0.0031	400.2333	0.0001	0.3753	0.0429	0.0728	0.2853	0.0130
Link181	0.0000	2.3486	0.0000	0.5734	0.0074	0.0071	0.0011	0.0130
503.1	-0.0005	-63.7614	0.0001	0.7422	0.1642	0.0780	0.3126	0.0130
503.2	0.0027	349.5616	0.0001	0.7422	0.1361	0.0761	0.2993	0.0130
534.1	0.0033	426.8073	0.0001	0.7814	0.1527	0.0798	0.3161	0.0130
534.2	0.0041	533.6795	0.0001	0.7814	0.1958	0.0801	0.3172	0.0130
535.1	0.0029	370.9219	0.0001	0.9699	0.3095	0.1085	0.4345	0.0130
535.2	0.0029	370.9219	0.0001	0.9699	0.3095	0.1085	0.4345	0.0130
537.1	-0.0000	-5.1120	0.0001	0.7889	0.1968	0.0728	0.2915	0.0130
537.2	0.0025	321.5174	0.0001	0.7889	0.1457	0.0733	0.2869	0.0130
205mm PLATE	0.0148	1918.1822	0.0000	0.9927	0.4917	0.0313	0.0162	0.0030
FREE# 1	0.0148	1917.5151						

Table E13. Channel losses(H), headwater depth (HW), tailwater depth (TW), critical and normal depth (Yc and Yn). Use this section for culvert comparisons

Conduit Name	Maximum Flow	Head Loss	Friction Loss	Critical Depth	Normal Depth	HW Elevat	TW Elevat	
Pipe - (596) (STM)	0.0915	0.0000	0.0194	0.1804	0.1972	174.6050	174.5971	Max Flow
Pipe - (600) (STM)	0.3382	0.0000	0.0684	0.1530	0.1636	174.9665	174.9661	Max Flow
Pipe - (602) (STM)	0.0444	0.0000	0.0990	0.1439	0.1605	175.2904	175.1739	Max Flow
Pipe - (605) (STM)	0.3657	0.0000	0.1016	0.3957	0.6000	175.0874	174.9816	Max Flow
Pipe - (607) (STM)	0.0879	0.0000	0.2174	0.2308	0.3000	175.5203	175.3084	Max Flow
Pipe - (608) (STM)	0.1869	0.0000	0.0654	0.2905	0.3364	175.3078	175.2305	Max Flow
Pipe - (609) (STM)	0.1000	0.0000	0.0523	.2322	0.3395	175.3302	175.2626	Max Flow
Pipe - (610) (STM)	0.0417	0.0000	0.1197	0.1575	0.2007	175.2902	175.1504	Max Flow
Pipe - (611) (STM)	0.0448	0.0000	0.0378	0.1634	0.2148	175.3730	175.3237	Max Flow
Pipe - (612) (STM)	0.0893	0.0000	0.0154	0.2069	0.2439	174.5538	174.5353	Max Flow
Pipe - (674) (STM)	0.3181	0.0000	0.0669	0.3681	0.4655	175.0489	175.0185	Max Flow
Pipe - (676) (STM)	0.0934	0.0000	0.0547	0.0645	0.0669	175.1474	175.1475	Max Flow
Link181	0.0002	0.0000	0.0000	0.0171	0.0240	174.8773	174.8716	Max Flow
503.1	0.0471	0.0000	0.0863	0.0404	0.0479	175.0996	175.0985	Max Flow
503.2	0.0657	0.0000	0.0928	0.0511	0.0531	175.1017	175.1030	Max Flow
534.1	0.1367	0.0000	0.1010	0.0833	0.0899	175.1475	175.1474	Max Flow
534.2	0.1638	0.0000	0.1808	0.0944	0.0967	175.1516	175.1523	Max Flow
535.1	0.0980	0.0000	0.0812	0.0664	0.0744	175.0871	175.0870	Max Flow
535.2	0.0980	0.0000	0.0812	0.0664	0.0744	175.0871	175.0870	Max Flow
537.1	0.0551	0.0000	0.1375	0.0454	0.0519	175.0667	175.0450	Max Flow
537.2	0.0626	0.0000	0.1394	0.0496	0.0529	175.0700	175.0535	Max Flow
205mm PLATE	0.0885	0.0000	0.9583	0.2919	0.2050	175.5069	174.5486	Max Flow

Table E13a. CULVERT ANALYSIS CLASSIFICATION, and the time the culvert was in a particular classification during the simulation. The time is in minutes. The Dynamic Wave Equation is used for all conduit analysis but the culvert flow classification condition is based on the HW and TW depths.

Conduit Name	Mild Slope Critical D Outlet Control	Mild Slope TW Control Outlet Control	Steep Slope TW Insignf Entrance Control	Slug Flow Outlet/ Entrance Control	Mild Slope TW > D Outlet Control	Mild Slope TW <= D Outlet Control	Outlet Control	Inlet Control	Inlet Configuration
Pipe - (596) (STM)	25.5000	1756.6667	50.0000	0.0000	327.8333	0.0000	0.0000	0.0000	None
Pipe - (600) (STM)	61.1667	1593.1667	15.1667	0.0000	490.5000	0.0000	0.0000	0.0000	None
Pipe - (602) (STM)	95.1667	135.6667	1610.0000	0.0000	319.1667	0.0000	0.0000	0.0000	None
Pipe - (605) (STM)	95.1667	1247.1667	371.3333	0.0000	446.3333	0.0000	0.0000	0.0000	None
Pipe - (607) (STM)	80.6667	101.8333	1605.5000	0.0000	372.0000	0.0000	0.0000	0.0000	None
Pipe - (608) (STM)	512.8333	500.0000	823.1667	0.0000	324.0000	0.0000	0.0000	0.0000	None
Pipe - (609) (STM)	99.0000	142.1667	1574.3333	0.0000	344.5000	0.0000	0.0000	0.0000	None
Pipe - (610) (STM)	98.0000	79.1667	1592.0000	0.0000	390.8333	0.0000	0.0000	0.0000	None
Pipe - (611) (STM)	142.6667	250.8333	1440.8333	0.0000	325.6667	0.0000	0.0000	0.0000	None
Pipe - (612) (STM)	349.8333	1420.0000	48.6667	0.0000	341.5000	0.0000	0.0000	0.0000	None
Pipe - (674) (STM)	800.1667	463.6667	377.6667	0.0000	518.5000	0.0000	0.0000	0.0000	None
Pipe - (676) (STM)	54.1667	247.1667	1558.6667	0.0000	300.0000	0.0000	0.0000	0.0000	None
Link181	0.0000	230.1667	1044.1667	0.0000	885.6667	0.0000	0.0000	0.0000	None
503.1	63.6667	1140.1667	630.6667	0.0000	325.5000	0.0000	0.0000	0.0000	None
503.2	0.1667	1193.5000	630.6667	0.0000	335.6667	0.0000	0.0000	0.0000	None
534.1	19.6667	1202.1667	535.0000	0.0000	403.1667	0.0000	0.0000	0.0000	None
534.2	5.1667	1201.8333	535.0000	0.0000	418.0000	0.0000	0.0000	0.0000	None
535.1	36.3333	1775.0000	71.8333	0.0000	276.8333	0.0000	0.0000	0.0000	None
535.2	36.3333	1775.0000	71.8333	0.0000	276.8333	0.0000	0.0000	0.0000	None
537.1	65.3333	1252.6667	516.5000	0.0000	325.5000	0.0000	0.0000	0.0000	None
537.2	0.1667	1307.6667	516.5000	0.0000	335.6667	0.0000	0.0000	0.0000	None
205mm PLATE	153.3333	1349.8333	17.6667	0.0000	266.8333	101.3333	271.0000	0.0000	None

Kinematic Wave Approximations
Time in Minutes for Each Condition

Conduit Name	Duration of Normal Flow	Slope Criteria	Super-Critical	Roll Waves
Pipe - (596) (STM)	0.0000	566.6306	0.0000	0.0000
Pipe - (600) (STM)	53.7222	767.8194	0.0000	0.0000
Pipe - (602) (STM)	0.1333	1970.7167	0.0000	0.0000
Pipe - (605) (STM)	0.0167	660.6056	1399.8611	0.0000
Pipe - (607) (STM)	0.1833	2013.1208	0.0000	0.0000
Pipe - (608) (STM)	0.0167	2023.8417	0.0000	0.0000
Pipe - (609) (STM)	0.0167	2024.7667	0.0000	0.0000
Pipe - (610) (STM)	0.0167	2049.0167	0.0000	0.0000
Pipe - (611) (STM)	0.0000	2010.0333	0.0000	0.0000
Pipe - (612) (STM)	0.0417	567.3972	0.0000	0.0000
Pipe - (674) (STM)	0.0000	2060.0500	24.7639	0.0000
Pipe - (676) (STM)	0.0000	2055.5000	0.0000	0.0000
Link181	4.6806	2114.8056	0.0000	0.0000
503.1	28.9375	73.7375	0.0208	0.0000
503.2	54.0958	586.3750	0.0208	0.0000
534.1	88.2736	639.4486	0.0208	0.0000
534.2	105.1514	656.4139	0.0208	0.0000
535.1	35.5708	626.8167	0.0000	0.0000
535.2	35.5708	626.8167	0.0000	0.0000

537.1	49.8875	249.9000	0.0000	0.0000
537.2	76.2917	586.3750	0.0000	0.0000
205mm PLATE	0.0417	0.4833	291.6736	0.0000

```
*=======================================================*
|     Table E15 - SPREADSHEET INFO LIST                  |
| Conduit Flow and Junction Depth Information for use in |
| spreadsheets.  The maximum values in this table are the |
| true maximum values because they sample every time step.|
| The values in the review results may only be the       |
| maximum of a subset of all the time steps in the run.  |
| Note: These flows are only the flows in a single barrel.|
*=======================================================*
```

Conduit Name	Maximum Flow (cms)	Total Flow (m^3)	Maximum Velocity (m/s)	Maximum Volume (m^3)
Pipe - (596) (STM)	-0.2756	1917.6989	0.9978	9.5151
Pipe - (600) (STM)	0.3384	1721.5587	0.4763	32.1785
Pipe - (602) (STM)	0.0444	127.5957	0.8758	4.9912
Pipe - (605) (STM)	0.3657	1717.6708	1.5822	7.2330
Pipe - (607) (STM)	0.0879	219.6629	1.2459	1.9617
Pipe - (608) (STM)	0.1870	388.7362	1.3939	3.4652
Pipe - (609) (STM)	0.1001	400.4380	1.2107	1.3157
Pipe - (610) (STM)	0.0418	126.2878	0.8539	2.6700
Pipe - (611) (STM)	0.0448	128.2003	0.9811	0.6409
Pipe - (612) (STM)	-0.2060	1917.2831	-1.4620	0.6227
Pipe - (674) (STM)	0.3187	1442.8559	1.1393	3.7199
Pipe - (676) (STM)	0.0936	400.2333	0.6272	15.9379
Link181	0.0002	2.3486	0.1122	0.0231
503.1	0.0472	-63.7614	0.3859	31.6405
503.2	0.0659	349.5616	0.4276	31.6384
534.1	0.1367	426.8073	0.4509	83.2891
534.2	0.1639	533.6795	0.4857	83.3129
535.1	0.0980	370.9219	0.3614	69.5486
535.2	0.0980	370.9219	0.3614	69.5486
537.1	0.0551	-5.1120	0.4599	49.3731
537.2	0.0626	321.5174	0.4902	49.3801
205mm PLATE	0.0885	1918.1822	2.6026	10.3784
FREE# 1	-0.2781	1917.5151	0.0000	0.0000

Junction Name	Invert Elevation (m)	Maximum Elevation (m)
StartNullStruct1	174.3300	175.7746
PROP STM MH1 (STM)	174.5188	175.7723
PROP STM CBMH4 (STM)	174.9974	175.7785
PROP STM MH5 (STM)	174.9926	175.7788
PROP STM MH2 (STM)	174.6132	175.7783
PROP STM MH6 (STM)	174.8300	175.7784
PROP STM MH3 (STM)	174.9000	175.7784
PROP STM MH7 (STM)	174.9478	175.7784
PROP STM CBMH8 (STM)	175.0000	175.7785
PROP STM MH9 (STM)	175.1283	175.7797
STM7080 (STM)	174.3200	175.6762
DI2 (STM)	175.1270	175.7852
ID*477	174.3976	175.7715
HW-1 (STM)	174.3600	175.7747
J27 (STM)	174.2600	175.8547
DI1 (STM)	175.0629	175.7829
DI3 (STM)	175.1853	175.7802
DI4 (STM)	175.0914	175.7822
STM MH1A (STM)	174.3270	175.6787

```
*=================================================*
|     Table E15a - SPREADSHEET REACH LIST          |
| Peak flow and Total Flow listed by Reach or those |
|      conduits or diversions having the same      |
|      upstream and downstream nodes.              |
*=================================================*
```

Hydraulic results summary

Upstream Node	Downstream Node	Maximum Flow (cms)	Total Flow (m^3)
STM7080 (STM)	J27 (STM)	-0.2756	1917.6989
PROP STM MH1 (STM)	ID*477	0.3384	1721.5587
PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	0.0444	127.5957
PROP STM MH2 (STM)	PROP STM MH1 (STM)	0.3657	1717.6708
DI2 (STM)	PROP STM MH5 (STM)	0.0879	219.6629
PROP STM MH5 (STM)	PROP STM MH3 (STM)	0.1870	388.7362
DI1 (STM)	PROP STM CBMH4 (STM)	0.1001	400.4380
DI4 (STM)	PROP STM MH7 (STM)	0.0418	126.2878
DI3 (STM)	PROP STM MH9 (STM)	0.0448	128.2003
STM MH1A (STM)	STM7080 (STM)	-0.2060	1917.2831
ID*477	HW-1 (STM)	0.3187	1442.8559
PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	0.0936	400.2333
HW-1 (STM)	StartNullStruct1	0.0002	2.3486
PROP STM MH7 (STM)	PROP STM MH6 (STM)	0.1131	285.8002
PROP STM MH3 (STM)	PROP STM MH2 (STM)	0.3004	960.4868
PROP STM MH6 (STM)	PROP STM MH2 (STM)	0.1961	741.8437
PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	0.1177	316.4054
StartNullStruct1	STM MH1A (STM)	0.0885	1918.1822

```
#####################################################
# Table E16. New Conduit Information Section        #
#           Conduit Invert (IE) Elevation and Conduit #
#           Maximum Water Surface (WS) Elevations    #
#####################################################
```

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
Pipe - (596) (STM)	STM7080 (STM)	J27 (STM)	174.3	174.3	175.7	175.7	Circular
Pipe - (600) (STM)	PROP STM MH1 (STM)	ID*477	174.5	174.4	175.8	175.8	Rectangle
Pipe - (602) (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (605) (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	174.6	174.5	175.8	175.8	Circular
Pipe - (607) (STM)	DI2 (STM)	PROP STM MH5 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (608) (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	175.0	174.9	175.8	175.8	Circular
Pipe - (609) (STM)	DI1 (STM)	PROP STM CBMH4 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (610) (STM)	DI4 (STM)	PROP STM MH7 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (611) (STM)	DI3 (STM)	PROP STM MH9 (STM)	175.2	175.2	175.8	175.8	Circular
Pipe - (612) (STM)	STM MH1A (STM)	STM7080 (STM)	174.3	174.3	175.7	175.7	Circular
Pipe - (674) (STM)	ID*477	HW-1 (STM)	174.4	174.4	175.8	175.8	Circular
Pipe - (676) (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	175.0	174.9	175.8	175.8	Rectangle
Link181	HW-1 (STM)	StartNullStruct1	174.4	174.3	175.8	175.8	Circular
503.1	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9	174.9	175.8	175.8	Rectangle
503.2	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9	174.8	175.8	175.8	Rectangle
534.1	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9	174.7	175.8	175.8	Rectangle
534.2	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9	174.6	175.8	175.8	Rectangle
535.1	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8	174.7	175.8	175.8	Rectangle
535.2	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8	174.7	175.8	175.8	Rectangle
537.1	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0	174.9	175.8	175.8	Rectangle
537.2	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0	174.8	175.8	175.8	Rectangle
205mm PLATE	StartNullStruct1	STM MH1A (STM)	174.3	174.3	175.8	175.7	Circ Orif

```
*=========================================================================*
|    Table E18 - Junction Continuity Error.   Division by Volume added 11/96 |
|                                                                          |
|  Continuity Error = Net Flow + Beginning Volume - Ending Volume          |
|                     ----------------------------------------------       |
|                     Total Flow + (Beginning Volume + Ending Volume)/2    |
|                                                                          |
|  Net Flow   = Node Inflow - Node Outflow                                 |
|  Total Flow = absolute (Inflow + Outflow)                                |
|  Intermediate column is a judgement on the node continuity error.       |
|                                                                          |
|  Excellent  < 1 percent    Great  1 to  2 percent  Good  2 to  5 percent |
|  Fair  5 to 10  percent    Poor  10 to 25 percent  Bad  25 to 50 percent |
|  Terrible > 50  percent                                                  |
*=========================================================================*
```

Junction Name	<------Continuity Error -------> Volume	% of Node	% of Inflow	Remaining Volume	Beginning Volume	Net Flow Thru Node	Total Flow Thru Node	Failed to Converge
StartNullStruct1	-0.0156	-0.0004	0.0004	0.0156	0.0000	0.0000	3836.7464	0
PROP STM MH1 (STM)	-4.2430	-0.1234	0.1008	0.0005	0.0000	-4.2424	3439.2296	0
PROP STM CBMH4 (STM)	0.1807	0.0226	0.0043	0.0001	0.0000	0.1808	800.6713	0
PROP STM MH5 (STM)	0.6332	0.0814	0.0150	0.0003	0.0000	0.6335	778.1044	0
PROP STM MH2 (STM)	-15.5470	-0.4546	0.3694	0.0030	0.0000	-15.5440	3420.0014	0
PROP STM MH6 (STM)	-11.6461	-0.7234	0.2767	0.0012	0.0000	-11.6449	1609.9514	0
PROP STM MH3 (STM)	-5.9741	-0.3119	0.1419	0.0026	0.0000	-5.9715	1915.0824	0
PROP STM MH7 (STM)	-1.3915	-0.1994	0.0331	0.0005	0.0000	-1.3910	697.8255	0
PROP STM CBMH8 (STM)	-0.5120	-0.0797	0.0122	0.0006	0.0000	-0.5114	642.5325	0
PROP STM MH9 (STM)	0.6042	0.2362	0.0144	0.0002	0.0000	0.6044	255.7960	0
STM7080 (STM)	-0.8071	-0.0210	0.0192	0.0084	0.0000	-0.7988	3834.9820	0
DI2 (STM)	0.3190	0.0726	0.0076	0.0000	0.0000	0.3190	439.6472	0
ID*477	-2.5938	-0.0820	0.0616	0.0005	0.0000	278.4518	3164.4151	0
HW-1 (STM)	-0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	1921.8631	0
J27 (STM)	-0.0012	-0.0000	0.0000	0.0042	0.0000	0.0030	3851.5704	0
DI1 (STM)	-46.9011	-5.4285	1.1144	0.0000	0.0000	-46.9011	863.9793	0
DI3 (STM)	-24.6107	-8.6449	0.5847	0.0002	0.0000	-24.6105	284.6849	0
DI4 (STM)	-19.5543	-7.0889	0.4646	0.0000	0.0000	-19.5543	275.8428	0
STM MH1A (STM)	0.7172	0.0187	0.0170	0.1120	0.0000	0.8292	3835.4653	0

The total continuity error was -131.34 cubic meters
The remaining total volume was 0.14977 cubic meters

```
Your mean node continuity error was   Excellent
Your worst node continuity error was  Great

  *=====================================================*
  |  Table E19 - Junction Inflow & Outflow Listing    |
  |              Units are either ft^3 or m^3         |
  |              depending on the units in your model.|
  *=====================================================*
```

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inlow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Inflow from 2D Layer	Outflow from Node	Evaporation from Node	Basin Infil.
StartNullStruct1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1916.2156	0.3851	0.0000	0.00
PROP STM MH5 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	169.6869	0.0000	0.0000	0.0000	0.00
PROP STM MH6 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	128.1414	0.0000	0.0000	0.0000	0.00
PROP STM MH3 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	165.6078	0.0000	0.0000	0.0000	0.00
PROP STM MH7 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	158.1980	0.0000	-0.0000	0.0000	0.00
PROP STM CBMH8 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	188.2877	0.0000	0.0000	0.0000	0.00
DI2 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	219.9701	0.0000	0.0000	0.0000	0.00
ID*477	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	281.0451	0.0000	0.00
HW-1 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	475.0595	1.5711	1917.1810	0.0000	0.00
J27 (STM)	0.0000	0.0000	0.0000	0.0000	16.3564	0.0000	0.0000	1933.8742	0.0000	0.00
DI1 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	416.2036	47.3215	62.6825	0.0000	0.00
DI3 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	131.7031	24.7733	28.1225	0.0000	0.00
DI4 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	128.9679	20.5816	22.2392	0.0000	0.00

```
  *=====================================================*
  | Table E20 - Junction Flooding and Volume Listing.   |
  |             The maximum volume is the total volume  |
  |             in the node including the volume in the |
  |             flooded storage area. This is the max   |
  |             volume at any time. The volume in the   |
  |             flooded storage area is the total volume|
  |             above the ground elevation, where the   |
  |             flooded pond storage area starts.       |
  | The fourth column is instantaneous, the fifth is the|
  | sum of the flooded volume over the entire simulation|
  | Units are either ft^3 or m^3 depending on the units.|
  *=====================================================*
```

Junction Name	Surcharged Time (min)	Flooded Time(min)	Out of 1D-System (Flooded Volume)	Maximum Volume	Passed to 2D cell OR Volume Stored in allowed Flood Pond of 1D-System
StartNullStruct1	886.	582.	0.385	1.76	0.385
PROP STM MH1 (STM)	446.	0.000	0.000	1.53	0.000
PROP STM CBMH4 (STM)	278.	0.000	0.000	0.953	0.000
PROP STM MH5 (STM)	307.	0.000	0.000	0.959	0.000
PROP STM MH2 (STM)	277.	0.000	0.000	1.42	0.000
PROP STM MH6 (STM)	189.	0.000	0.000	1.16	0.000
PROP STM MH3 (STM)	300.	0.000	0.000	1.07	0.000
PROP STM MH7 (STM)	298.	0.000	0.000	1.01	0.000
PROP STM CBMH8 (STM)	277.	0.000	0.000	0.950	0.000
PROP STM MH9 (STM)	285.	0.000	0.000	0.795	0.000
STM7080 (STM)	325.	0.000	0.000	1.65	0.000
DI2 (STM)	346.	0.000	0.000	0.803	0.000
ID*477	490.	100.	281.	1.68	0.000
HW-1 (STM)	519.	226.	1.917E+03	1.73	1.917E+03
J27 (STM)	328.	0.000	0.000	1.95	0.000
DI1 (STM)	334.	302.	62.7	0.878	62.7
DI3 (STM)	318.	315.	28.1	0.726	28.1
DI4 (STM)	351.	336.	22.2	0.843	22.2
STM MH1A (STM)	341.	310.	0.000	1.65	1.62

```
  *==================================*
  | Simulation Specific Information  |
  *==================================*
  Number of Input Conduits..........        21 Number of Simulated Conduits......        23
  Number of Natural Channels........         0 Number of Junctions...............        19
  Number of Storage Junctions.......         0 Number of Weirs...................         0
  Number of Orifices................         1 Number of Pumps...................         0
  Number of Free Outfalls...........         1 Number of Tide Gate Outfalls......         0


  *==========================================================*
  | Average % Change in Junction or Conduit is defined as:  |
  | Conduit  % Change ==> 100.0 ( Q(n+1) - Q(n) ) / Qfull   |
  | Junction % Change ==> 100.0 ( Y(n+1) - Y(n) ) / Yfull   |
  *==========================================================*

  The Conduit with the largest average change was..             FREE# 1 with     0.000 percent
  The Junction with the largest average change was.       STM MH1A (STM) with     0.005 percent
  The Conduit with the largest sinuosity was.......  Pipe - (612) (STM) with    17.569


  *==================================================================*
  | Table E21. Continuity balance at the end of the simulation       |
  |            Junction Inflow, Outflow or Street Flooding           |
  | Error = Inflow  + Initial Volume - Outflow - Final   Volume      |
  *==================================================================*
```

Junction	Inflow Volume, m^3	Average Inflow, cms
StartNullStruct1	1916.2156	0.0148
PROP STM MH5 (STM)	169.7053	0.0013
PROP STM MH6 (STM)	128.1553	0.0010
PROP STM MH3 (STM)	165.6261	0.0013
PROP STM MH7 (STM)	158.2147	0.0012
PROP STM CBMH8 (STM)	188.3074	0.0015
DI2 (STM)	219.9843	0.0017
ID*477	0.0005	0.0000
HW-1 (STM)	476.6585	0.0037
J27 (STM)	16.3564	0.0001
DI1 (STM)	463.5413	0.0036
DI3 (STM)	156.4846	0.0012
DI4 (STM)	149.5551	0.0012
StartNullStruct1	-0.3851	-0.0000
ID*477	-281.0451	-0.0022
HW-1 (STM)	-1917.1810	-0.0148
J27 (STM)	-1933.8742	-0.0149
DI1 (STM)	-62.6825	-0.0005
DI3 (STM)	-28.1225	-0.0002
DI4 (STM)	-22.2392	-0.0002

Junction	Outflow Volume m^3	Average Outflow, cms
StartNullStruct1	0.3851	0.0000
ID*477	281.0451	0.0022
HW-1 (STM)	1917.1810	0.0148
J27 (STM)	1933.8742	0.0149
DI1 (STM)	62.6825	0.0005
DI3 (STM)	28.1225	0.0002
DI4 (STM)	22.2392	0.0002

```
  *=====================================================*
  | Initial system volume        =        0.0000 Cu M  |
  | Total system inflow volume   =     4208.6456 Cu M  |
  | Inflow + Initial volume      =     4208.6456 Cu M  |
  *=====================================================*
  | Total system outflow         =     4245.5296 Cu M  |
  | Volume left (Final volume)   =        0.1498 Cu M  |
  | Evaporation                  =        0.0000 Cu M  |
  | Basin Infiltration           =        0.0000 Cu M  |
  | Outflow + Final Volume       =     4245.6793 Cu M  |
  *=====================================================*

  *==============================================*
  | Total Model Continuity Error                 |
```

```
| Error in Continuity, Percent =        -0.8799 |
| Error in Continuity, m^3     =       -37.0337 |
| + Error means a continuity loss, - a gain     |
*===============================================*


##################################################
# Table E22. Numerical Model judgement section    #
##################################################

Overall error was (minimum of Table E18 & E21)              -0.8799 percent
Worst nodal error was in node DI1 (STM)             with    -5.4285 percent
Of the total inflow this loss was                            1.1144 percent
Your overall continuity error was                  Excellent
                                                  Excellent Efficiency
Efficiency of the simulation                       1.04
Most Number of Non Convergences at one Node        0.
Total Number Non Convergences at all Nodes         0.
Total Number of Nodes with Non Convergences        0.


#######################################################
# Table E23. New Basin Design Information               #
#            Maximum Hydraulic Grade Line,              #
#            Out Conduit Sizes and Maximum Flow         #
#######################################################

A) Resize d/s Pipes based on given HGL
B) Resize Basin based on given HGL
C) Resize d/s Pipes and Basin based on HGL and max discharge
D) Resize d/s pipes based on given max discharge

        Basin Name    Type     Max.HGL        Conduit         Depth   Width   Barrels   Max.Flow
                                  (m)                          (m)     (m)                (m^3/s)
-------------------- ------  --------- -------------------- ------- ------- --------- ---------

===> Hydraulic model simulation ended normally.
===> XP-SWMM Simulation ended normally.
===> Your input file was named  : P:\2018\18249\SWMM and REPORT\XPSWMM-REV7\XPSWMM - 100Y\1D\18249 xpswmm-rev-0-100yr_100yr-4hr\18249 xpswmm-rev-0-100yr_100yr-4hr.DAT
===> Your output file was named : P:\2018\18249\SWMM and REPORT\XPSWMM-REV7\XPSWMM - 100Y\1D\18249 xpswmm-rev-0-100yr_100yr-4hr\18249 xpswmm-rev-0-100yr_100yr-4hr.out

*==============================================================*
|         XPSWMM/XPSTORM Simulation Date and Time Summary      |
*==============================================================*
| Starting Date... January     3, 2020  Time...  15:20:43.712  |
|   Ending Date... January     3, 2020  Time...  15:36:34.310  |
|  Elapsed Time...   21.88333 minutes or   1313.00000 seconds  |
*==============================================================*
```

Quality of Results

XPSWMM Output File – Urban Stress Test Storm (24-Hour, 150mm)

```
 Current Directory:   C:\PROGRA~1\Innovyze\XPSWMM~1.1_X
 Engine Name: C:\PROGRA~1\Innovyze\XPSWMM~1.1_X\engine\SWMMEN~2.EXE
 Input File: P:\2018\18249\SWMM and REPORT\XPSWMM-REV7\XPSWMM - UST\1D\18249 xpswmm-rev-0-UST_UST\18249 xpswmm-rev-0-UST_UST.XP

          *==============================================*
          |                   xpswmm                     |
          |     Storm and Wastewater Management Model    |
          |            Developed by Innovyze.            |
          |==============================================|
          |                                              |
          | Last Update      : May 21 2019               |
          | Interface Version: 2019.1                    |
          | Engine Version   : 12.0                      |
          | Data File Version: 12.62                     |
          |                                              |
          |                                              |
          *==============================================*

Engine Name: C:\PROGRA~1\Innovyze\XPSWMM~1.1_X\engine\SWMMEN~2.EXE


*=====================================================*
|       Input and Output file names by Layer          |
*=====================================================*

 Input File  to Layer #     1 JOT.US
 Output File to Layer #     1 JOT.US
 Input File  to Layer #     2 JOT.US
 Output File to Layer #     2 JOT.US

*==============================================================*
|                  Configuration Parameters                    |
|  Configuration Parameters, both those that are hardwired  |
|  and those added to the simulation are listed below.      |
|  Configuration Parameters that start with a $ are set in  |
|  the engine as defaults.  The remaining in UPPERCASE      |
|  have been added to the simulation in the Configuration-> |
|  Configuration Parameters dialog or as Engine Defaults in |
|  the SWMXP.INI file.                                      |
|                                                           |
|  Consult the Help File for the specific meaning/purpose   |
|  of any particular parameter.                             |
|                                                           |
|  Note:                                                    |
|  The second column denotes the value of the parameter.    |
*==============================================================*

 $powerstation                          0.0000         1         2
 $perv                                  0.0000         0         4
 $oldegg                                0.0000         0         7
 $as                                    0.0000         0        11
 $noflat                                0.0000         0        21
 $oldomega                              0.0000         0        24
 $oldvol                                0.0000         1        28
 $implicit                              0.0000         1        29
 $oldhot                                0.0000         1        31
 $oldscs                                0.0000         0        33
 $flood                                 0.0000         1        40
 $nokeys                                0.0000         0        42
 $pzero                                 0.0000         0        55
 $oldvol2                               0.0000         2        59
 $storage2                              0.0000         3        62
 $oldhot1                               0.0000         1        63
 $pumpwt                                0.0000         1        70
 $ecloss                                0.0000         1        77
 $exout                                 0.0000         0        97
 $spatial = 0.90                        0.9000         5       124
 $djref = -1.0                         -0.1000         3       143
 $weirlen = 50                         50.0000         1       153
 $oldbnd                                0.0000         1       154
 $nogrelev                              0.0000         1       161
 $ncmid                                 0.0000         0       164
 $new_nl_97                             0.0000         2       290
 SCSIADEPTH=ON                          0.0000         1       293
 $best97                                0.0000         1       294
 $newbound                              0.0000         1       295
 $q_tol = 0.01                          0.0001         1       316
 $new_storage                           0.0000         1       322
 $old_iteration                         0.0000         1       333
 MINLEN=2                               2.0000         1       346
 $review_elevation                      0.0000         1       383
 $use_half_volume                       0.0000         1       385
 VERT_WALLS=ON                          0.0000         1       389
 $min_ts = 1.0                          1.0000         1       407
 $design_restart = on                   0.0000         1       412
 $zero_value=1.e-05                     0.0000         1       415
 SUBCATCHMENT_RES=ON                    0.0000         1       419
 $relax_depth = on                      0.0000         1       427
 $saveallpts = on                       0.0000         1       434
 PUMP_NEGHD=ON                          0.0000         1       437
 $channel_geometry=1                    0.0000         1       456
 PROJUNITS == METRIC                    0.0000         0       462

 *==============================================================*
 |   The XPSWMM/XPSTORM engine internally uses object IDs    |
 |     instead of full object names to represent objects.    |
 |   Included below is a table of these IDs along with the   |
 |          name of the object that ID corresponds to.       |
 *==============================================================*
        Object ID          Object
           Number           Name
 ================  ====================
              441  StartNullStruct1
              451  PROP STM MH1 (STM)
              452  PROP STM CBMH4 (STM)
              453  PROP STM MH5 (STM)
              458  PROP STM MH2 (STM)
              459  PROP STM MH6 (STM)
              461  PROP STM MH3 (STM)
              462  PROP STM MH7 (STM)
              464  PROP STM CBMH8 (STM)
              471  PROP STM MH9 (STM)
              474  STM7080 (STM)
              475  DI2 (STM)
              477  PROP CDS PMSU5645-10 (STM)
              482  HW-1 (STM)
              484  J27 (STM)
              490  DI1 (STM)
              491  DI3 (STM)
              494  DI4 (STM)
              495  STM MH1A (STM)
              498  Pipe - (596) (STM)
              500  Pipe - (600) (STM)
              501  Pipe - (602) (STM)
              502  Pipe - (605) (STM)
              504  Pipe - (607) (STM)
              505  Pipe - (608) (STM)
              506  Pipe - (609) (STM)
              507  Pipe - (610) (STM)
              508  Pipe - (611) (STM)
              509  Pipe - (612) (STM)
              524  Pipe - (674) (STM)
              526  Pipe - (676) (STM)
              538  Link181
         C(503.1)  503.1
         C(503.2)  503.2
         C(534.1)  534.1
         C(534.2)  534.2
         C(535.1)  535.1
         C(535.2)  535.2
         C(537.1)  537.1
         C(537.2)  537.2
         O(510.1)  205mm PLATE
```

```
*==========================================================*
| Parameter Values on the Tapes Common Block.These are the |
| values read from the data file and dynamically allocated |
| by the model for this simulation.                        |
*==========================================================*

 Number of Subcatchments in the Runoff Block (NW)....    11
 Number of Channel/Pipes in the Runoff Block (NG)....     0
 Runoff Water quality constituents (NRQ).............     0
 Runoff Land Uses per Subcatchment (NLU).............     0
 Number of Elements in the Transport Block (NET).....     0
 Number of Storage Junctions in Transport (NTSE).....     0
 Number of Input Hydrographs in Transport (NTH)......     0
 Number of Elements in the Extran Block (NEE)........    23
 Number of Groundwater Subcatchments in Runoff (NGW).     0
 Number of Interface locations for all Blocks (NIE)..    23
 Number of Pumps in Extran (NEP).....................     0
 Number of Orifices in Extran (NEO)..................     1
 Number of Tide Gates/Free Outfalls in Extran (NTG)..     1
 Number of Extran Weirs (NEW)........................     0
 Number of scs hydrograph points.....................   385
 Number of Extran printout locations (NPO)...........     0
 Number of Tide elements in Extran (NTE).............     1
 Number of Natural channels (NNC)....................     0
 Number of Storage junctions in Extran (NVSE)........     0
 Number of Time history data points in Extran(NTVAL).   190
 Number of Variable storage elements in Extran (NVST)     0
 Number of Input Hydrographs in Extran (NEH).........     0
 Number of Particle sizes in Transport Block (NPS)...     0
 Number of User defined conduits (NHW)...............    11
 Number of Connecting conduits in Extran (NECC)......    20
 Number of Upstream elements in Transport (NTCC).....    10
 Number of Storage/treatment plants (NSTU)...........     1
 Number of Values for R1 lines in Transport (NR1)....     0
 Number of Nodes to be allowed for (NNOD)............    23
 Number of Plugs in a Storage Treatment Unit.........     1


 ######################################################
 #    Entry made to the Runoff Layer(Block) of SWMM    #
 #    Last Updated June, 2014 by Innovyze              #
 ######################################################

 *==========================================================*
 |            RUNOFF TABLES IN THE OUTPUT FILE.             |
 |  These are the more important tables in the output file. |
 |  You can use your editor to find the table numbers,      |
 |  for example: search for Table R3 to check continuity.   |
 |  This output file can be imported into a Word Processor  |
 |  and printed on US letter or A4 paper using portrait     |
 |  mode, courier font, a size of 8 pt. and margins of 0.75 |
 |                                                          |
 | Table R1  - Physical Hydrology Data                      |
 | Table R2  - Infiltration data                            |
 | Table R3  - Raingage and Infiltration Database Names     |
 | Table R4  - Groundwater Data                             |
 | Table R5  - Continuity Check for Surface Water           |
 | Table R6  - Continuity Check for Channels/Pipes          |
 | Table R7  - Continuity Check for Subsurface Water        |
 | Table R8  - Infiltration/Inflow Continuity Check         |
 | Table R9  - Summary Statistics for Subcatchments         |
 | Table R10 - Sensitivity anlysis for Subcatchments        |
 *==========================================================*

                    A1

##########################################
#             RUNOFF JOB CONTROL         #
##########################################

 Snowmelt parameter - ISNOW.......................           0
 Number of rain gages - NRGAG.....................           1
 Quality is not simulated - KWALTY................           0
 Read evaporation data on line(s) F1 (F2) - IVAP..           1
 Hour of day at start of storm - NHR..............           0
 Minute of hour at start of storm - NMN...........           0
 Time TZERO at start of storm (hours).............       0.000
 Use Metric units for I/O - METRIC................           1
  ===> Ft-sec units used in all internal computations
 Runoff input print control...                               0
 Runoff graph plot control....                               0
 Runoff output print control..                               0
 Limit number of groundwater convergence messages to     10000

 Print headers every 50 lines - NOHEAD (0=yes, 1=no)         0

 Print land use load percentages -LANDUPR (0=no, 1=yes)      0
 Month, day, year of start of storm is:             11/ 3/2018
 Wet time step length (seconds)......                    300.0
 Dry time step length (seconds)......                   3600.0
 Wet/Dry time step length (seconds)...                   300.0
 Simulation length is......                               24.0 Hours

 If Horton infiltration model is being used
 A mixture of infiltration options may be used in
 XP-SWMM as a watershed specific option.
 Rate for regeneration of infiltration = REGEN * DECAY
 Decay is read in for each subcatchment
 REGEN = ............................................  0.01000


 Raingage #...............................          1
 KTYPE  - Rainfall input type.............          0
 NHISTO - Total number of rainfall values..        98
 KINC   - Rainfall values(pairs) per line..        10
 KPRINT - Print rainfall(0-Yes,1-No)......          0
 KTIME  - Precipitation time units
 0 --> Minutes  1 --> Hours...............          0
 KPREP  - Precipitation unit type
 0 --> Intensity  1 --> Volume............          0
 KTHIS - Variable rainfall intervals
 0 --> No, >= 1 --> Yes...................          0
 THISTO - Rainfall time interval..........      15.00
 TZRAIN - Starting time(KTIME units)......       0.00


#####################################
# Rainfall input summary from Runoff #
#####################################

 Total rainfall for gage #     1 is  151.2150 mm

   ############################
   #        Data Group F1     #
   # Evaporation Rate (mm/day) #
   ############################

  JAN.  FEB.  MAR.  APR.  MAY   JUN.  JUL.  AUG.  SEP.  OCT.  NOV  DEC.
  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ---- ----
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000


  ##################################################
  #  Table R1.  S U B C A T C H M E N T  D A T A   #
  #             Physical Hydrology Data            #
  ##################################################

                                                                                                  Deprs   Deprs   Prcnt
                                                                   Per-                          -sion   -sion    Zero
       Subcatchment              Channel              Width      Area      cent    Slope    "n"     "n"   Storge  Storge   Deten
  Number         Name          or inlet              (m)       (Ha)     Imperv    m/m   Imprv    Perv   Imprv    Perv   -tion
  ====== ================== ================== ========== ==========  ====== ======= ======= ======= ======= ======= =======
```

```
      1          DI2 (STM)#1            DI2 (STM)   22.000     0.42000     33.00   0.010   0.014   0.300   2.000   5.000  25.000
      2   PROP STM MH5 (ST#1    PROP STM MH5 (STM)   16.000     0.22000     90.00   0.010   0.014   0.300   2.000   5.000  25.000
      3          DI1 (STM)#1            DI1 (STM)   35.000     1.0900      12.00   0.010   0.014   0.300   2.000   5.000  25.000
      4   PROP STM MH3 (ST#1    PROP STM MH3 (STM)   15.000     0.21000     95.00   0.010   0.014   0.300   2.000   5.000  25.000
      5          DI4 (STM)#1            DI4 (STM)   18.000     0.28000     18.00   0.010   0.014   0.300   2.000   5.000  25.000
      6   PROP STM MH7 (ST#1    PROP STM MH7 (STM)   15.000     0.21000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
      7          DI3 (STM)#1            DI3 (STM)   18.000     0.28000     20.00   0.010   0.014   0.300   2.000   5.000  25.000
      8   PROP STM CBMH8 (#1 PROP STM CBMH8 (STM)   17.000     0.25000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
      9   PROP STM MH6 (ST#1    PROP STM MH6 (STM)   14.000     0.17000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
     10         HW-1 (STM)#1           HW-1 (STM)   19.000     0.74000     15.00   0.010   0.014   0.300   2.000   5.000  25.000
     11         HW-1 (STM)#2           HW-1 (STM)   34.000     0.31000     50.00   0.010   0.014   0.300   2.000   5.000  25.000


##############################################################################################
#          Table R2.  SUBCATCHMENT  DATA                                                     #
#                     Infiltration or Time of Concentration Data                             #
#                                                                                            #
# Infiltration Type      Infl #1(#5)       Infl #2(#6)          Infl #3(#7)             Infl #4(#8)  #
# SCS                 ->   Comp CN          Time Conc         Shape Factor        Depth or Fraction  #
# SBUH                ->   Comp CN          Time Conc                 N/A                      N/A  #
# Green Ampt          ->   Suction          Hydr Cond           Initial MD                     N/A  #
# Horton              ->  Max Rate           Min Rate   Decay Rate (1/sec)      Max. Infilt. Volume  #
# Proportional        ->  Constant                N/A                 N/A                      N/A  #
# Initial/Cont Loss   ->   Initial          Continuing                 N/A                      N/A  #
# Initial/Proportional ->  Initial           Constant                 N/A                      N/A  #
# Laurenson Parameters ->  B Value        Pervious "n"      Impervious Cont                 Exponent  #
# Rational Formula    -> Tc Method   Flow Path Length      Flow Path Slope  Roughness or Retardance  #
#                                (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)             #
#                     Rational Formula Tc Method: 1 = Constant                                     #
#                                                 2 = Friend's Equation                            #
#                                                 3 = Kinematic Wave                               #
#                                                 4 = Alameda Method                               #
#                                                 5 = Izzard's Formula                             #
#                                                 6 = Kerby's Equation                             #
#                                                 7 = Kirpich's Equation                           #
#                                                 8 = Bransby Williams Equation                    #
#                                                 9 = Federal Aviation Authority Equation          #
##############################################################################################

        Subcatchment            Infl      Infl      Infl      Infl      Infl      Infl      Infl      Infl
  Number             Name       # 1       # 2       # 3       # 4       # 5       # 6       # 7       # 8
  ------------------------    --------- --------- --------- --------- --------- --------- --------- ---------
    1          DI2 (STM)#1     250.000     1.800     0.260
    2   PROP STM MH5 (ST#1     250.000     1.800     0.260
    3          DI1 (STM)#1     250.000     1.800     0.260
    4   PROP STM MH3 (ST#1     250.000     1.800     0.260
    5          DI4 (STM)#1     250.000     1.800     0.260
    6   PROP STM MH7 (ST#1     250.000     1.800     0.260
    7          DI3 (STM)#1     250.000     1.800     0.260
    8   PROP STM CBMH8 (#1     250.000     1.800     0.260
    9   PROP STM MH6 (ST#1     250.000     1.800     0.260
   10         HW-1 (STM)#1     250.000     1.800     0.260
   11         HW-1 (STM)#2     250.000     1.800     0.260


#############################################################
#     Table R3.  SUBCATCHMENT  DATA                         #
#                Rainfall and Infiltration Database Names  #
#############################################################

        Subcatchment             Gage  Infiltration       Routing
  Number             Name         No      Type             Type
  ------ -------------------- ------- ------------ --------------------
       1          DI2 (STM)#1      1   Green Ampt  Non-linear reservoir
       2   PROP STM MH5 (ST#1      1   Green Ampt  Non-linear reservoir
       3          DI1 (STM)#1      1   Green Ampt  Non-linear reservoir
       4   PROP STM MH3 (ST#1      1   Green Ampt  Non-linear reservoir
       5          DI4 (STM)#1      1   Green Ampt  Non-linear reservoir
       6   PROP STM MH7 (ST#1      1   Green Ampt  Non-linear reservoir
       7          DI3 (STM)#1      1   Green Ampt  Non-linear reservoir
       8   PROP STM CBMH8 (#1      1   Green Ampt  Non-linear reservoir
       9   PROP STM MH6 (ST#1      1   Green Ampt  Non-linear reservoir
      10         HW-1 (STM)#1      1   Green Ampt  Non-linear reservoir
      11         HW-1 (STM)#2      1   Green Ampt  Non-linear reservoir

 Total Number of Subcatchments...              11
 Total Tributary Area (hectares).           4.18
 Impervious Area (hectares)......           1.57
 Pervious Area (hectares)........           2.61
 Total Width (metres)............         223.00
 Impervious Area (%)............          37.67


  ##################################################
  #          S U B C A T C H M E N T  D A T A      #
  #   Default, Ratio values for subcatchment data  #
  #   Used with the calibrate node in the runoff.  #
  # 1 - width     2 - area       3 - impervious %  #
  # 4 - slope     5 - imp "n"    6 - perv "n"      #
  # 7 - imp ds    8 - perv ds    9 - 1st infil     #
  #10 - 2nd infil              11 - 3rd infil     #
  ##################################################

 Column           1         2         3         4         5         6         7         8         9        10        11
 Default     0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
 Ratio       1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000

 ***********************************************************
 *     Arrangement of Subcatchments and Channel/Pipes      *
 ***********************************************************


     Inlet
 DI2 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI2 (STM)#1
 PROP STM MH5 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH5 (ST#1
 DI1 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI1 (STM)#1
 PROP STM MH3 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH3 (ST#1
 DI4 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI4 (STM)#1
 PROP STM MH7 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH7 (ST#1
 DI3 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI3 (STM)#1
 PROP STM CBMH8 (STM)      No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM CBMH8 (#1
 PROP STM MH6 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH6 (ST#1
 HW-1 (STM)                No Tributary Channel/Pipes
               Tributary Subareas........ HW-1 (STM)#1 HW-1 (STM)#2


 ***********************************************************
 * Hydrographs will be stored for the following  10 INLETS *
 ***********************************************************
  DI2 (STM)           PROP STM MH5 (STM)  DI1 (STM)
  PROP STM MH3 (STM)  DI4 (STM)           PROP STM MH7 (STM)
  DI3 (STM)           PROP STM CBMH8 (STM)PROP STM MH6 (STM)
  HW-1 (STM)


 ************************************************
 *  Quality Simulation not included in this run *
 ************************************************



 ****************************************************
 *  Precipitation Interface File Summary            *
```

```
*  Number of precipitation station....        1   *
**************************************************

Location Station Number
-------- --------------
       1.            1

XXX End of Header Section XXX

#####################################################
#    Entry made to the HYDRAULIC Layer of XP-SWMM     #
#    Last Updated in June, 2014 by Innovyze           #
#####################################################

#####################################################
#    Entry made to the Runoff Layer(Block) of SWMM    #
#    Last Updated June, 2014 by Innovyze              #
#####################################################

*==========================================================*
|         RUNOFF TABLES IN THE OUTPUT FILE.                |
|  These are the more important tables in the output file. |
|  You can use your editor to find the table numbers,      |
|  for example: search for Table R3 to check continuity.   |
|  This output file can be imported into a Word Processor  |
|  and printed on US letter or A4 paper using portrait     |
|  mode, courier font, a size of 8 pt. and margins of 0.75 |
|                                                          |
| Table R1  - Physical Hydrology Data                      |
| Table R2  - Infiltration data                            |
| Table R3  - Raingage and Infiltration Database Names     |
| Table R4  - Groundwater Data                             |
| Table R5  - Continuity Check for Surface Water           |
| Table R6  - Continuity Check for Channels/Pipes          |
| Table R7  - Continuity Check for Subsurface Water        |
| Table R8  - Infiltration/Inflow Continuity Check         |
| Table R9  - Summary Statistics for Subcatchments         |
| Table R10 - Sensitivity anlysis for Subcatchments        |
*==========================================================*

                    A1

##########################################
#             RUNOFF JOB CONTROL         #
##########################################

Snowmelt parameter - ISNOW.......................          0
Number of rain gages - NRGAG.....................          1
Quality is not simulated - KWALTY................          0
Read evaporation data on line(s) F1 (F2) - IVAP..          1
Hour of day at start of storm - NHR..............          0
Minute of hour at start of storm - NMN...........          0
Time TZERO at start of storm (hours).............      0.000
Use Metric units for I/O - METRIC................          1
 ===> Ft-sec units used in all internal computations
Runoff input print control...                              0
Runoff graph plot control....                              0
Runoff output print control..                              0
Limit number of groundwater convergence messages to      10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no)        0

Print land use load percentages -LANDUPR (0=no, 1=yes)     0
Month, day, year of start of storm is:            11/ 3/2018
Wet time step length (seconds)......                   300.0
Dry time step length (seconds)......                  3600.0
Wet/Dry time step length (seconds)...                  300.0
Simulation length is......                              24.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAY
Decay is read in for each subcatchment
REGEN = ...........................................  0.01000


Raingage #...............................          1
KTYPE  - Rainfall input type.............          0
NHISTO - Total number of rainfall values..        98
KINC   - Rainfall values(pairs) per line..        10
KPRINT - Print rainfall(0-Yes,1-No)......          0
KTIME  - Precipitation time units
0 --> Minutes  1 --> Hours...............          0
KPREP  - Precipitation unit type
0 --> Intensity  1 --> Volume............          0
KTHIS - Variable rainfall intervals
0 --> No, >= 1 --> Yes...................          0
THISTO - Rainfall time interval...........      15.00
TZRAIN - Starting time(KTIME units).......       0.00


#####################################
# Rainfall input summary from Runoff #
#####################################

Total rainfall for gage #     1 is  151.2150 mm

  ############################
  #        Data Group F1     #
  # Evaporation Rate (mm/day) #
  ############################

 JAN.  FEB.  MAR.  APR.  MAY   JUN.  JUL.  AUG.  SEP.  OCT.  NOV  DEC.
 ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ---- ----
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000


 ##################################################
 #  Table R1.  S U B C A T C H M E N T  D A T A    #
 #             Physical Hydrology Data             #
 ##################################################

                                                                                                                  Deprs   Deprs   Prcnt
                                                                                  Per-                            -sion   -sion    Zero
      Subcatchment              Channel              Width      Area       cent    Slope    "n"     "n"   Storge  Storge   Deten
 Number           Name         or inlet               (m)       (Ha)      Imperv     m/m   Imprv    Perv   Imprv    Perv   -tion
 ====== ==================== ==================== ========== ========== ====== ======= ======= ======= ======= ======= =======
      1          DI2 (STM)#1          DI2 (STM)   22.000     0.42000     33.00   0.010   0.014   0.300   2.000   5.000  25.000
      2   PROP STM MH5 (ST#1   PROP STM MH5 (STM)   16.000     0.22000     90.00   0.010   0.014   0.300   2.000   5.000  25.000
      3          DI1 (STM)#1          DI1 (STM)   35.000      1.0900     12.00   0.010   0.014   0.300   2.000   5.000  25.000
      4   PROP STM MH3 (ST#1   PROP STM MH3 (STM)   15.000     0.21000     95.00   0.010   0.014   0.300   2.000   5.000  25.000
      5          DI4 (STM)#1          DI4 (STM)   18.000     0.28000     18.00   0.010   0.014   0.300   2.000   5.000  25.000
      6   PROP STM MH7 (ST#1   PROP STM MH7 (STM)   15.000     0.21000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
      7          DI3 (STM)#1          DI3 (STM)   18.000     0.28000     20.00   0.010   0.014   0.300   2.000   5.000  25.000
      8   PROP STM CBMH8 (#1 PROP STM CBMH8 (STM)   17.000     0.25000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
      9   PROP STM MH6 (ST#1   PROP STM MH6 (STM)   14.000     0.17000     85.00   0.010   0.014   0.300   2.000   5.000  25.000
     10         HW-1 (STM)#1         HW-1 (STM)   19.000     0.74000     15.00   0.010   0.014   0.300   2.000   5.000  25.000
     11         HW-1 (STM)#2         HW-1 (STM)   34.000     0.31000     50.00   0.010   0.014   0.300   2.000   5.000  25.000


##############################################################################################
#          Table R2.  SUBCATCHMENT  DATA                                                     #
#                     Infiltration or Time of Concentration Data                             #
#                                                                                            #
# Infiltration Type      Infl #1(#5)       Infl #2(#6)          Infl #3(#7)             Infl #4(#8)  #
# SCS                 ->   Comp CN          Time Conc         Shape Factor        Depth or Fraction  #
# SBUH                ->   Comp CN          Time Conc                  N/A                      N/A  #
# Green Ampt          ->   Suction          Hydr Cond            Initial MD                     N/A  #
# Horton              ->  Max Rate           Min Rate   Decay Rate (1/sec)      Max. Infilt. Volume  #
# Proportional        ->  Constant                N/A                  N/A                      N/A  #
# Initial/Cont Loss   ->   Initial          Continuing                 N/A                      N/A  #
# Initial/Proportional ->  Initial           Constant                  N/A                      N/A  #
```

```
# Laurenson Parameters ->   B Value       Pervious "n"      Impervious Cont                 Exponent  #
# Rational Formula     -> Tc Method   Flow Path Length     Flow Path Slope  Roughness or Retardance  #
#                              (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data)               #
#                        Rational Formula Tc Method: 1 = Constant                                    #
#                                                    2 = Friend's Equation                           #
#                                                    3 = Kinematic Wave                              #
#                                                    4 = Alameda Method                              #
#                                                    5 = Izzard's Formula                            #
#                                                    6 = Kerby's Equation                            #
#                                                    7 = Kirpich's Equation                          #
#                                                    8 = Bransby Williams Equation                   #
#                                                    9 = Federal Aviation Authority Equation         #
#######################################################################################################
```

Number	Subcatchment Name	Infl # 1	Infl # 2	Infl # 3	Infl # 4	Infl # 5	Infl # 6	Infl # 7	Infl # 8
1	DI2 (STM)#1	250.000	1.800	0.260					
2	PROP STM MH5 (ST#1	250.000	1.800	0.260					
3	DI1 (STM)#1	250.000	1.800	0.260					
4	PROP STM MH3 (ST#1	250.000	1.800	0.260					
5	DI4 (STM)#1	250.000	1.800	0.260					
6	PROP STM MH7 (ST#1	250.000	1.800	0.260					
7	DI3 (STM)#1	250.000	1.800	0.260					
8	PROP STM CBMH8 (#1	250.000	1.800	0.260					
9	PROP STM MH6 (ST#1	250.000	1.800	0.260					
10	HW-1 (STM)#1	250.000	1.800	0.260					
11	HW-1 (STM)#2	250.000	1.800	0.260					

```
#########################################################
#     Table R3.  SUBCATCHMENT  DATA                     #
#                Rainfall and Infiltration Database Names  #
#########################################################
```

Number	Subcatchment Name	Gage No	Infiltration Type	Routing Type
1	DI2 (STM)#1	1	Green Ampt	Non-linear reservoir
2	PROP STM MH5 (ST#1	1	Green Ampt	Non-linear reservoir
3	DI1 (STM)#1	1	Green Ampt	Non-linear reservoir
4	PROP STM MH3 (ST#1	1	Green Ampt	Non-linear reservoir
5	DI4 (STM)#1	1	Green Ampt	Non-linear reservoir
6	PROP STM MH7 (ST#1	1	Green Ampt	Non-linear reservoir
7	DI3 (STM)#1	1	Green Ampt	Non-linear reservoir
8	PROP STM CBMH8 (#1	1	Green Ampt	Non-linear reservoir
9	PROP STM MH6 (ST#1	1	Green Ampt	Non-linear reservoir
10	HW-1 (STM)#1	1	Green Ampt	Non-linear reservoir
11	HW-1 (STM)#2	1	Green Ampt	Non-linear reservoir

```
Total Number of Subcatchments...              11
Total Tributary Area (hectares).            4.18
Impervious Area (hectares).......           1.57
Pervious Area (hectares)........            2.61
Total Width (metres)............          223.00
Impervious Area (%)............           37.67


 ##################################################
 #          S U B C A T C H M E N T  D A T A      #
 #   Default, Ratio values for subcatchment data  #
 #   Used with the calibrate node in the runoff.  #
 # 1 - width     2 - area      3 - impervious %   #
 # 4 - slope     5 - imp "n"   6 - perv "n"       #
 # 7 - imp ds    8 - perv ds   9 - 1st infil      #
 #10 - 2nd infil              11 - 3rd infil      #
 ##################################################

Column           1         2         3         4         5         6         7         8         9        10        11
Default     0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
Ratio       1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000

*************************************************************
*     Arrangement of Subcatchments and Channel/Pipes        *
*************************************************************


    Inlet
DI2 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI2 (STM)#1
PROP STM MH5 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH5 (ST#1
DI1 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI1 (STM)#1
PROP STM MH3 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH3 (ST#1
DI4 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI4 (STM)#1
PROP STM MH7 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH7 (ST#1
DI3 (STM)                 No Tributary Channel/Pipes
               Tributary Subareas........ DI3 (STM)#1
PROP STM CBMH8 (STM)      No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM CBMH8 (#1
PROP STM MH6 (STM)        No Tributary Channel/Pipes
               Tributary Subareas........ PROP STM MH6 (ST#1
HW-1 (STM)                No Tributary Channel/Pipes
               Tributary Subareas........ HW-1 (STM)#1 HW-1 (STM)#2


*************************************************************
* Hydrographs will be stored for the following  10 INLETS *
*************************************************************
 DI2 (STM)             PROP STM MH5 (STM)  DI1 (STM)
 PROP STM MH3 (STM)  DI4 (STM)             PROP STM MH7 (STM)
 DI3 (STM)             PROP STM CBMH8 (STM)PROP STM MH6 (STM)
 HW-1 (STM)


 ************************************************
 *  Quality Simulation not included in this run *
 ************************************************




 ****************************************************
 *  Precipitation Interface File Summary            *
 *  Number of precipitation station....          1  *
 ****************************************************

 Location Station Number
 -------- --------------
        1.             1


     A1


 *==============================================================*
 |        HYDRAULICS TABLES IN THE OUTPUT FILE                  |
 |  These are the more important tables in the output file.     |
 |  You can use your editor to find the table numbers,          |
 |  for example: search for Table E20 to check continuity.      |
 |  This output file can be imported into a Word Processor      |
 |  and printed on US letter or A4 paper using portrait         |
 |  mode, courier font, a size of 8 pt. and margins of 0.75     |
 |                                                              |
 | Table E1   - Basic Conduit Data                              |
 | Table E2   - Conduit Factor Data                             |
 | Table E3a  - Junction Data                                   |
 | Table E3b  - Junction Data                                   |
```

```
| Table E4   - Conduit Connectivity Data                    |
| Table E4a  - Dry Weather Flow Data                        |
| Table E4b  - Real Time Control Data                       |
| Table E5   - Junction Time Step Limitation Summary        |
| Table E5a  - Conduit Explicit Condition Summary           |
| Table E6   - Final Model Condition                        |
| Table E7   - Iteration Summary                            |
| Table E8   - Junction Time Step Limitation Summary        |
| Table E9   - Junction  Summary  Statistics                |
| Table E10  - Conduit   Summary  Statistics                |
| Table E11  - Area assumptions used in the analysis        |
| Table E12  - Mean conduit information                     |
| Table E13  - Channel losses(H) and culvert info           |
| Table E13a - Culvert Analysis Classification              |
| Table E14  - Natural Channel Overbank Flow Information    |
| Table E14a - Natural Channel Encroachment Information     |
| Table E14b - Floodplain Mapping                           |
| Table E15  - Spreadsheet Info List                        |
| Table E15a - Spreadsheet Reach List                       |
| Table E16  - New Conduit Output Section                   |
| Table E17  - Pump Operation                               |
| Table E18  - Junction Continuity Error                    |
| Table E19  - Junction Inflow & Outflow Listing            |
| Table E20  - Junction Flooding and Volume List            |
| Table E21  - Continuity balance at simulation end         |
| Table E22  - Model Judgement Section                      |
*==========================================================*

Time Control from Hydraulics Job Control
Year.........    2018 Month.......      11
Day..........       3 Hour........       0
Minute.......       0 Second......       0


Control information for simulation
----------------------------------

Integration cycles.................     25920
Length of integration step is......      5.00 seconds
Simulation length..................     36.00 hours
Do not create equiv. pipes(NEQUAL).         0
Use metric units for I/O...........         1
Printing starts in cycle...........         1
Intermediate printout intervals of.       500 cycles
Intermediate printout intervals of.     41.67 minutes
Summary printout intervals of......       500 cycles
Summary printout time interval of..     41.67 minutes
Hot start file parameter (REDO)....         0
Initial time.......................      0.00 hours

Iteration variables: Flow Tolerance.   0.00010
                     Head Tolerance.   0.00005
    Minimum depth (m or ft).........   0.00001
    Underrelaxation parameter.......   0.85000
    Time weighting parameter........   0.85000
    Conduit roughness factor........   1.00000
    Flow adjustment factor..........   1.00000
    Initial Condition Smoothing.....         0
    Courant Time Step Factor........   1.00000
    Default Expansion/Contraction K.   0.00000
    Default Entrance/Exit K.........   0.00000
    Routing Method..................   Dynamic Wave
Default surface area of junctions...      1.22 square meters.
Minimum Junction/Conduit Depth......   0.00001 meter.
Ponding Area Coefficient............   5000.00
Ponding Area Exponent...............    1.0000
Minimum Orifice Length..............      1.00 meters.
NJSW input hydrograph junctions.....     0
     or user defined hydrographs....

*====================================================*
|          Table E1 - Conduit Data                   |
*====================================================*

                                                                                                  Trapezoid  Hazen
 Inp                Conduit      Length    Conduit      Area    Manning  Max Width      Depth       Side  Williams
 Num                   Name        (m)      Class    ( m^2)      Coef.     (m)         (m)      Slopes  c-factor
---- -------------------- ---------- ----------  -------  -------  ---------      -----     -------  -------
   1   Pipe - (596) (STM)    20.5450   Circular    0.4418    0.0130     0.7500     0.7500
   2   Pipe - (600) (STM)    29.6119  Rectangle    1.0800    0.0130     1.8000     0.6000
   3   Pipe - (602) (STM)    30.2024   Circular    0.1590    0.0130     0.4500     0.4500
   4   Pipe - (605) (STM)    24.4022   Circular    0.2827    0.0130     0.6000     0.6000
   5   Pipe - (607) (STM)    26.8475   Circular    0.0707    0.0130     0.3000     0.3000
   6   Pipe - (608) (STM)    15.2695   Circular    0.2165    0.0130     0.5250     0.5250
   7   Pipe - (609) (STM)    11.3637   Circular    0.1104    0.0130     0.3750     0.3750
   8   Pipe - (610) (STM)    37.1498   Circular    0.0707    0.0130     0.3000     0.3000
   9   Pipe - (611) (STM)     8.6495   Circular    0.0707    0.0130     0.3000     0.3000
  10   Pipe - (612) (STM)     3.7348   Circular    0.1590    0.0130     0.4500     0.4500
  11   Pipe - (674) (STM)    12.5501   Circular    0.2827    0.0130     0.6000     0.6000
  12   Pipe - (676) (STM)    14.7281  Rectangle    1.0800    0.0130     1.8000     0.6000
  13              Link181    10.0000   Circular    0.0020    0.0130     0.0500     0.0500
  14                503.1    29.2192  Rectangle    1.0800    0.0130     1.8000     0.6000
  15                503.2    29.2100  Rectangle    1.0800    0.0130     1.8000     0.6000
  16                534.1    76.7816  Rectangle    1.0800    0.0130     1.8000     0.6000
  17                534.2    76.7800  Rectangle    1.0800    0.0130     1.8000     0.6000
  18                535.1    42.8888  Rectangle    1.6200    0.0130     1.8000     0.9000
  19                535.2    42.8888  Rectangle    1.6200    0.0130     1.8000     0.9000
  20                537.1    45.5948  Rectangle    1.0800    0.0130     1.8000     0.6000
  21                537.2    45.5900  Rectangle    1.0800    0.0130     1.8000     0.6000
Total length of all conduits ....        634.0078 meters

*====================================================*
| If there are messages about (sqrt(g*d)*dt/dx), or |
| the sqrt(wave celerity)*time step/conduit length  |
| in the output file all it means is that the       |
| program will lower the internal time step to      |
| satisfy this condition (explicit condition).      |
| You control the actual internal time step by      |
| using the minimum courant time step factor in the |
| HYDRAULICS job control.  The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection.    |
| You have further control by using the modify      |
| conduit option in the HYDRAULICS Job Control.     |
*====================================================*


             Conduit     Courant
                Name       Ratio
--------------------   ---------
 Pipe - (596) (STM)        0.66
 Pipe - (600) (STM)        0.41
 Pipe - (602) (STM)        0.35
 Pipe - (605) (STM)        0.50
 Pipe - (607) (STM)        0.32
 Pipe - (608) (STM)        0.74
 Pipe - (609) (STM)        0.84
 Pipe - (610) (STM)        0.23
 Pipe - (611) (STM)        0.99
 Pipe - (612) (STM)        2.81  ===> Warning ! (sqrt(wave celerity)*time step/conduit length)
 Pipe - (674) (STM)        0.97
 Pipe - (676) (STM)        0.82
            Link181        0.35
              503.1        0.42
              503.2        0.42
              534.1        0.16
              534.2        0.16
              535.1        0.35
              535.2        0.35
              537.1        0.27
              537.2        0.27

*==================*
```

| Conduit Volume |

Full pipe or full open conduit volume
Input full depth volume........... 5.4891E+02 cubic meters

Table E3a - Junction Data

Inp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst cms	Initial Depth-m	Interface Flow (%)
1	StartNullStruct1	174.7800	174.3800	174.3300	0.0000	0.0000	100.0000
2	PROP STM MH1 (STM)	176.9015	175.1398	174.5188	0.0000	0.0000	100.0000
3	PROP STM CBMH4 (STM)	176.8396	175.5974	174.9974	0.0000	0.0000	100.0000
4	PROP STM MH5 (STM)	176.8235	175.5176	174.9926	0.0000	0.0000	100.0000
5	PROP STM MH2 (STM)	176.6840	175.6002	174.6132	0.0000	0.0000	100.0000
6	PROP STM MH6 (STM)	176.6773	175.7300	174.8300	0.0000	0.0000	100.0000
7	PROP STM MH3 (STM)	176.6339	175.5400	174.9000	0.0000	0.0000	100.0000
8	PROP STM MH7 (STM)	176.6287	175.5478	174.9478	0.0000	0.0000	100.0000
9	PROP STM CBMH8 (STM)	176.5327	175.6000	175.0000	0.0000	0.0000	100.0000
10	PROP STM MH9 (STM)	176.2783	175.5783	175.1283	0.0000	0.0000	100.0000
11	STM7080 (STM)	175.9600	175.0700	174.3200	0.0000	0.0000	100.0000
12	DI2 (STM)	175.9318	175.4270	175.1270	0.0000	0.0000	100.0000
13	ID*477	175.7715	175.0296	174.3976	0.0000	0.0000	100.0000
14	HW-1 (STM)	175.6850	174.9600	174.3600	0.0000	0.0000	100.0000
15	J27 (STM)	175.6681	175.0100	174.2600	0.0000	0.0000	100.0000
16	DI1 (STM)	175.5379	175.4379	175.0629	0.0000	0.0000	100.0000
17	DI3 (STM)	175.4923	175.4853	175.1853	0.0000	0.0000	100.0000
18	DI4 (STM)	175.4347	175.3914	175.0914	0.0000	0.0000	100.0000
19	STM MH1A (STM)	175.3912	174.7812	174.3312	0.0000	0.0000	100.0000

Table E3b - Junction Data

Inp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Capacity	Pavement Shape	Pavement Slope
1	StartNullStruct1	0.0000	0.0000	2D Invert	Normal		0	0.00
2	PROP STM MH1 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
3	PROP STM CBMH4 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
4	PROP STM MH5 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
5	PROP STM MH2 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
6	PROP STM MH6 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
7	PROP STM MH3 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
8	PROP STM MH7 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
9	PROP STM CBMH8 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
10	PROP STM MH9 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
11	STM7080 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
12	DI2 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
13	ID*477	0.0000	0.0000	No Ponding	Normal		0	0.00
14	HW-1 (STM)	0.0000	0.0000	2D Invert	Normal		0	0.00
15	J27 (STM)	0.0000	0.0000	No Ponding	Normal		0	0.00
16	DI1 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
17	DI3 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
18	DI4 (STM)	0.0000	0.0000	2D Spill L	Normal		0	0.00
19	STM MH1A (STM)	0.0000	0.0000	Sealed	Normal		0	0.00

Table E4 - Conduit Connectivity

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation	
1	Pipe - (596) (STM)	STM7080 (STM)	J27 (STM)	174.3200	174.2600	No Design
2	Pipe - (600) (STM)	PROP STM MH1 (STM)	ID*477	174.5188	174.4296	No Design
3	Pipe - (602) (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	175.1283	175.0300	No Design
4	Pipe - (605) (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	174.6132	174.5398	No Design
5	Pipe - (607) (STM)	DI2 (STM)	PROP STM MH5 (STM)	175.1270	175.0296	No Design
6	Pipe - (608) (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	174.9926	174.9400	No Design
7	Pipe - (609) (STM)	DI1 (STM)	PROP STM CBMH4 (STM)	175.0629	175.0304	No Design
8	Pipe - (610) (STM)	DI4 (STM)	PROP STM MH7 (STM)	175.0914	174.9798	No Design
9	Pipe - (611) (STM)	DI3 (STM)	PROP STM MH9 (STM)	175.1853	175.1603	No Design
10	Pipe - (612) (STM)	STM MH1A (STM)	STM7080 (STM)	174.3312	174.3200	No Design
11	Pipe - (674) (STM)	ID*477	HW-1 (STM)	174.3976	174.3600	No Design
12	Pipe - (676) (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	174.9974	174.9400	No Design
13	Link181	HW-1 (STM)	StartNullStruct1	174.3600	174.3300	No Design
14	503.1	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9478	174.8600	No Design
15	503.2	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9478	174.8300	No Design
16	534.1	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9000	174.6502	No Design
17	534.2	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9000	174.6132	No Design
18	535.1	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8300	174.7002	No Design
19	535.2	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8300	174.7002	No Design
20	537.1	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0000	174.8600	No Design
21	537.2	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0000	174.8300	No Design

Orifice Data

Conduit Name	From Junction	To Junction	Type	Area (m2)	Depth (m)	Discharge Coefficient	Height Above Junction (m)
205mm PLATE	StartNullStruct1	STM MH1A (STM)	Circ Side	0.03	0.00	0.600	0.000

====> EQUIVALENT PIPE INFORMATION FOR ORIFICE 1
CONDUIT NAME........................... 205mm PLATE
Upstream node........................... StartNullStruct1
Downstream node......................... STM MH1A (STM)
PIPE DIAMETER........................ 0.20
PIPE LENGTH.......................... 300.00
MANNINGS ROUGHNESS................... 0.0030
INVERT ELEVATION AT UPSTREAM END..... 174.3300
INVERT ELEVATION AT DOWNSTREAM END... 174.3270

Note: For a Bottom-outlet orifice the invert elevation of the downstream node will be adjusted to accomodate the equivalent conduit. Conduit grades are not affected.

FREE OUTFALL DATA (DATA GROUP I1)
BOUNDARY CONDITION ON DATA GROUP J1

Outfall at Junction....J27 (STM) has boundary condition number... 1

INTERNAL CONNECTIVITY INFORMATION

CONDUIT	JUNCTION	JUNCTION
205mm PLATE	StartNullStruct1	STM MH1A (STM)
FREE# 1	J27 (STM)	BOUNDARY

Boundary Condition Information
Data Groups J1-J4

XP Note Field Summary

```
 XP-2D single precision engine engaged.

 +==================================+
 |   Conduit Convergence Criteria   |
 +==================================+

              Conduit        Full      Conduit
                Name         Flow       Slope
--------------------  ----------  ----------
  Pipe - (596) (STM)       0.6016      0.0029
  Pipe - (600) (STM)       1.6868      0.0030
  Pipe - (602) (STM)       0.1627      0.0033
  Pipe - (605) (STM)       0.3368      0.0030
  Pipe - (607) (STM)       0.0582      0.0036
  Pipe - (608) (STM)       0.2524      0.0034
  Pipe - (609) (STM)       0.0938      0.0029
  Pipe - (610) (STM)       0.0530      0.0030
  Pipe - (611) (STM)       0.0520      0.0029
  Pipe - (612) (STM)       0.1561      0.0030
  Pipe - (674) (STM)       0.3361      0.0030
  Pipe - (676) (STM)       1.9186      0.0039
            Link181        0.0004      0.0030
              503.1        1.6847      0.0030
              503.2        1.9517      0.0040
              534.1        1.7530      0.0033
              534.2        1.8783      0.0037
              535.1        3.0722      0.0030
              535.2        3.0722      0.0030
              537.1        1.7030      0.0031
              537.2        1.8767      0.0037
        205mm PLATE        0.0397      0.0000

 +==================================+
 |    Initial Model Condition       |
 | Initial Time =       0.00 hours  |
 +==================================+

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.00 /   174.33   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.00 /   174.99   PROP STM MH2 (STM)/   0.00 /   174.61   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.00 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.00 /   175.13
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.00 /   175.06            DI3 (STM)/   0.00 /   175.19            DI4 (STM)/   0.00 /   175.09
     STM MH1A (STM)/   0.00 /   174.33

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00               FREE# 1/       0.00

           Conduit/   Velocity
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00

           Conduit/ Cross Sectional Area
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00

           Conduit/ Hydraulic Radius
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00
 Pipe - (605) (STM)/       0.00   Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00
 Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00   Pipe - (611) (STM)/       0.00
 Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00
              534.1/       0.00                534.2/       0.00                535.1/       0.00
              535.2/       0.00                537.1/       0.00                537.2/       0.00
        205mm PLATE/       0.00

           Conduit/ Upstream/ Downstream Elevation
 Pipe - (596) (STM)/   174.26/   174.26  Pipe - (600) (STM)/   174.40/   174.40  Pipe - (602) (STM)/   175.00/   175.00
 Pipe - (605) (STM)/   174.52/   174.52  Pipe - (607) (STM)/   174.99/   174.99  Pipe - (608) (STM)/   174.90/   174.90
 Pipe - (609) (STM)/   175.00/   175.00  Pipe - (610) (STM)/   174.95/   174.95  Pipe - (611) (STM)/   175.13/   175.13
 Pipe - (612) (STM)/   174.32/   174.32  Pipe - (674) (STM)/   174.36/   174.36  Pipe - (676) (STM)/   174.90/   174.90
            Link181/   174.33/   174.33                503.1/   174.83/   174.83                503.2/   174.83/   174.83
              534.1/   174.61/   174.61                534.2/   174.61/   174.61                535.1/   174.61/   174.61
              535.2/   174.61/   174.61                537.1/   174.83/   174.83                537.2/   174.83/   174.83
        205mm PLATE/   174.33/   174.33

Cycle        500      Time          0 Hrs - 41.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.00 /   174.33   PROP STM MH1 (STM)/   0.00 /   174.52 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.01 /   175.01   PROP STM MH2 (STM)/   0.01 /   174.62   PROP STM MH6 (STM)/   0.00 /   174.83
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.01 /   175.13        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.01 /   175.14
            ID*477/   0.00 /   174.40           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.01 /   175.08            DI3 (STM)/   0.01 /   175.19            DI4 (STM)/   0.01 /   175.10
     STM MH1A (STM)/   0.00 /   174.33

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00             FREE# 1/       0.00

Cycle       1000      Time          1 Hrs - 23.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.01 /   174.34   PROP STM MH1 (STM)/   0.01 /   174.53 PROP STM CBMH4 (STM)/   0.00 /   175.00
 PROP STM MH5 (STM)/   0.03 /   175.02   PROP STM MH2 (STM)/   0.05 /   174.66   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.01 /   175.14        STM7080 (STM)/   0.00 /   174.32            DI2 (STM)/   0.02 /   175.15
            ID*477/   0.04 /   174.44           HW-1 (STM)/   0.00 /   174.36            J27 (STM)/   0.00 /   174.26
          DI1 (STM)/   0.02 /   175.09            DI3 (STM)/   0.02 /   175.20            DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.00 /   174.33

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00             FREE# 1/       0.00

Cycle       1500      Time          2 Hrs -  5.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.06 /   174.39   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.03   PROP STM MH2 (STM)/   0.07 /   174.68   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
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 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.03 /   174.35           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.07 /   174.46          HW-1 (STM)/   0.03 /   174.39           J27 (STM)/   0.08 /   174.34
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.20           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.03 /   174.36

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.00             FREE# 1/       0.00

Cycle       2000      Time          2 Hrs - 46.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.10 /   174.43   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.03   PROP STM MH2 (STM)/   0.07 /   174.68   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.05 /   174.37           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.07 /   174.47          HW-1 (STM)/   0.07 /   174.43           J27 (STM)/   0.08 /   174.34
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.20           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.06 /   174.39

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.01             FREE# 1/       0.01

Cycle       2500      Time          3 Hrs - 28.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.12 /   174.45   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.03   PROP STM MH2 (STM)/   0.07 /   174.69   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.07 /   174.39           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.07 /   174.47          HW-1 (STM)/   0.09 /   174.45           J27 (STM)/   0.10 /   174.36
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.21           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.08 /   174.40

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.01             FREE# 1/       0.01

Cycle       3000      Time          4 Hrs - 10.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.13 /   174.46   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.03   PROP STM MH2 (STM)/   0.07 /   174.69   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.07 /   174.39           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.08 /   174.48          HW-1 (STM)/   0.10 /   174.46           J27 (STM)/   0.10 /   174.36
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.21           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.08 /   174.41

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.01             FREE# 1/       0.01

Cycle       3500      Time          4 Hrs - 51.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.14 /   174.47   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.03   PROP STM MH2 (STM)/   0.08 /   174.69   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.00 /   175.00
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.08 /   174.40           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.08 /   174.48          HW-1 (STM)/   0.11 /   174.47           J27 (STM)/   0.10 /   174.36
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.21           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.09 /   174.41

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.01             FREE# 1/       0.01

Cycle       4000      Time          5 Hrs - 33.33 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.14 /   174.47   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.03   PROP STM MH2 (STM)/   0.08 /   174.69   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.01 /   175.01
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.08 /   174.40           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.09 /   174.48          HW-1 (STM)/   0.11 /   174.47           J27 (STM)/   0.11 /   174.37
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.21           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.09 /   174.42

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.01             FREE# 1/       0.01

Cycle       4500      Time          6 Hrs - 15.00 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.15 /   174.48   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.04 /   175.04   PROP STM MH2 (STM)/   0.08 /   174.69   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.00 /   174.95 PROP STM CBMH8 (STM)/   0.01 /   175.01
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.08 /   174.40           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.09 /   174.49          HW-1 (STM)/   0.12 /   174.48           J27 (STM)/   0.11 /   174.37
          DI1 (STM)/   0.03 /   175.09           DI3 (STM)/   0.02 /   175.21           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.09 /   174.42

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
             534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
             537.2/       0.00          205mm PLATE/       0.01             FREE# 1/       0.01

Cycle       5000      Time          6 Hrs - 56.67 Min

          Junction / Depth  / Elevation    ===>  "+" Junction is Surcharged.
   StartNullStruct1/   0.15 /   174.48   PROP STM MH1 (STM)/   0.02 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.05 /   175.04   PROP STM MH2 (STM)/   0.08 /   174.70   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.01 /   174.95 PROP STM CBMH8 (STM)/   0.01 /   175.01
 PROP STM MH9 (STM)/   0.02 /   175.15       STM7080 (STM)/   0.09 /   174.41           DI2 (STM)/   0.03 /   175.16
            ID*477/   0.10 /   174.50          HW-1 (STM)/   0.12 /   174.48           J27 (STM)/   0.11 /   174.37
          DI1 (STM)/   0.03 /   175.10           DI3 (STM)/   0.02 /   175.21           DI4 (STM)/   0.02 /   175.11
     STM MH1A (STM)/   0.09 /   174.42

           Conduit/       FLOW   ===> "+" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01*  Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
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            534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.01              FREE# 1/       0.01

Cycle       5500      Time          7 Hrs - 38.33 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.17 /   174.50   PROP STM MH1 (STM)/   0.03 /   174.54 PROP STM CBMH4 (STM)/   0.01 /   175.00
 PROP STM MH5 (STM)/   0.05 /   175.04   PROP STM MH2 (STM)/   0.09 /   174.70   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.00 /   174.90   PROP STM MH7 (STM)/   0.01 /   174.95 PROP STM CBMH8 (STM)/   0.01 /   175.01
 PROP STM MH9 (STM)/   0.02 /   175.15        STM7080 (STM)/   0.09 /   174.41            DI2 (STM)/   0.04 /   175.17
            ID*477/   0.11 /   174.51           HW-1 (STM)/   0.14 /   174.50            J27 (STM)/   0.12 /   174.38
          DI1 (STM)/   0.04 /   175.10            DI3 (STM)/   0.03 /   175.21            DI4 (STM)/   0.03 /   175.12
     STM MH1A (STM)/   0.10 /   174.43

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
            534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.02              FREE# 1/       0.02

Cycle       6000      Time          8 Hrs - 20.00 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.19 /   174.52   PROP STM MH1 (STM)/   0.03 /   174.55 PROP STM CBMH4 (STM)/   0.01 /   175.01
 PROP STM MH5 (STM)/   0.06 /   175.05   PROP STM MH2 (STM)/   0.11 /   174.72   PROP STM MH6 (STM)/   0.01 /   174.84
 PROP STM MH3 (STM)/   0.01 /   174.91   PROP STM MH7 (STM)/   0.01 /   174.95 PROP STM CBMH8 (STM)/   0.01 /   175.01
 PROP STM MH9 (STM)/   0.03 /   175.16        STM7080 (STM)/   0.10 /   174.42            DI2 (STM)/   0.04 /   175.17
            ID*477/   0.13 /   174.53           HW-1 (STM)/   0.16 /   174.52            J27 (STM)/   0.13 /   174.39
          DI1 (STM)/   0.04 /   175.11            DI3 (STM)/   0.03 /   175.22            DI4 (STM)/   0.03 /   175.12
     STM MH1A (STM)/   0.11 /   174.44

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.01   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.00
           Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
            534.2/       0.01                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.00          205mm PLATE/       0.02              FREE# 1/       0.02

Cycle       6500      Time          9 Hrs -  1.67 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   0.25 /   174.58   PROP STM MH1 (STM)/   0.08 /   174.60 PROP STM CBMH4 (STM)/   0.01 /   175.01
 PROP STM MH5 (STM)/   0.09 /   175.08   PROP STM MH2 (STM)/   0.15 /   174.77   PROP STM MH6 (STM)/   0.02 /   174.85
 PROP STM MH3 (STM)/   0.01 /   174.91   PROP STM MH7 (STM)/   0.01 /   174.96 PROP STM CBMH8 (STM)/   0.01 /   175.01
 PROP STM MH9 (STM)/   0.04 /   175.17        STM7080 (STM)/   0.13 /   174.45            DI2 (STM)/   0.07 /   175.20
            ID*477/   0.19 /   174.59           HW-1 (STM)/   0.22 /   174.58            J27 (STM)/   0.17 /   174.43
          DI1 (STM)/   0.07 /   175.13            DI3 (STM)/   0.05 /   175.23            DI4 (STM)/   0.04 /   175.14
     STM MH1A (STM)/   0.13 /   174.46

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.05   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.05
 Pipe - (607) (STM)/       0.01   Pipe - (608) (STM)/       0.01   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.04   Pipe - (676) (STM)/       0.01
           Link181/       0.00                503.1/       0.00                503.2/       0.01                534.1/       0.01
            534.2/       0.01                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.01          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle       7000      Time          9 Hrs - 43.33 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.05 /   175.38   PROP STM MH1 (STM)/   0.88*/   175.40 PROP STM CBMH4 (STM)/   0.42 /   175.42
 PROP STM MH5 (STM)/   0.43 /   175.42   PROP STM MH2 (STM)/   0.80 /   175.42   PROP STM MH6 (STM)/   0.59 /   175.42
 PROP STM MH3 (STM)/   0.52 /   175.42   PROP STM MH7 (STM)/   0.47 /   175.42 PROP STM CBMH8 (STM)/   0.42 /   175.42
 PROP STM MH9 (STM)/   0.29 /   175.42        STM7080 (STM)/   0.20 /   174.52            DI2 (STM)/   0.36 /   175.49
            ID*477/   1.00*/   175.39           HW-1 (STM)/   1.02 /   175.38            J27 (STM)/   0.22 /   174.48
          DI1 (STM)/   0.38 /   175.44            DI3 (STM)/   0.24 /   175.43            DI4 (STM)/   0.36 /   175.45
     STM MH1A (STM)/   0.21 /   174.54

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.08   Pipe - (600) (STM)/       0.18   Pipe - (602) (STM)/       0.03   Pipe - (605) (STM)/       0.18
 Pipe - (607) (STM)/       0.05   Pipe - (608) (STM)/       0.08   Pipe - (609) (STM)/       0.08   Pipe - (610) (STM)/       0.03
 Pipe - (611) (STM)/       0.03   Pipe - (612) (STM)/       0.08   Pipe - (674) (STM)/       0.18   Pipe - (676) (STM)/       0.07
           Link181/       0.00                503.1/       0.00                503.2/       0.04                534.1/       0.06
            534.2/       0.09                535.1/       0.02                535.2/       0.02                537.1/       0.01
            537.2/       0.03          205mm PLATE/       0.08              FREE# 1/       0.08

Cycle       7500      Time         10 Hrs - 25.00 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.79*/   175.78
 PROP STM MH5 (STM)/   0.79*/   175.78   PROP STM MH2 (STM)/   1.17*/   175.78   PROP STM MH6 (STM)/   0.95*/   175.78
 PROP STM MH3 (STM)/   0.88*/   175.78   PROP STM MH7 (STM)/   0.84*/   175.78 PROP STM CBMH8 (STM)/   0.78*/   175.78
 PROP STM MH9 (STM)/   0.66*/   175.78        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.67 /   175.80
            ID*477/   1.37*/   175.77           HW-1 (STM)/   1.41 /   175.77            J27 (STM)/   1.56 /   175.82
          DI1 (STM)/   0.73 /   175.79            DI3 (STM)/   0.60 /   175.78            DI4 (STM)/   0.70 /   175.79
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.13   Pipe - (602) (STM)/       0.01   Pipe - (605) (STM)/       0.13
 Pipe - (607) (STM)/       0.02   Pipe - (608) (STM)/       0.03   Pipe - (609) (STM)/       0.05   Pipe - (610) (STM)/       0.01
 Pipe - (611) (STM)/       0.01   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/      -0.03   Pipe - (676) (STM)/       0.05
           Link181/       0.00                503.1/      -0.00                503.2/       0.02                534.1/       0.04
            534.2/       0.04                535.1/       0.02                535.2/       0.02                537.1/       0.00
            537.2/       0.02          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle       8000      Time         11 Hrs -  6.67 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.78*/   175.78
 PROP STM MH5 (STM)/   0.78*/   175.78   PROP STM MH2 (STM)/   1.16*/   175.78   PROP STM MH6 (STM)/   0.95*/   175.78
 PROP STM MH3 (STM)/   0.88*/   175.78   PROP STM MH7 (STM)/   0.83*/   175.78 PROP STM CBMH8 (STM)/   0.78*/   175.78
 PROP STM MH9 (STM)/   0.65*/   175.78        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.65 /   175.78
            ID*477/   1.37*/   175.77           HW-1 (STM)/   1.41 /   175.77            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.72 /   175.78            DI3 (STM)/   0.59 /   175.78            DI4 (STM)/   0.69 /   175.78
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.09   Pipe - (602) (STM)/       0.01   Pipe - (605) (STM)/       0.09
 Pipe - (607) (STM)/       0.01   Pipe - (608) (STM)/       0.02   Pipe - (609) (STM)/       0.03   Pipe - (610) (STM)/       0.01
 Pipe - (611) (STM)/       0.01   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/      -0.00   Pipe - (676) (STM)/       0.03
           Link181/       0.00                503.1/      -0.00                503.2/       0.02                534.1/       0.03
            534.2/       0.03                535.1/       0.02                535.2/       0.02                537.1/       0.00
            537.2/       0.01          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle       8500      Time         11 Hrs - 48.33 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.78*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.83*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.65*/   175.77        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.65 /   175.78
            ID*477/   1.37*/   175.77           HW-1 (STM)/   1.41 /   175.77            J27 (STM)/   1.74 /   176.00
          DI1 (STM)/   0.71 /   175.78            DI3 (STM)/   0.59 /   175.77            DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.06   Pipe - (602) (STM)/       0.01   Pipe - (605) (STM)/       0.06
 Pipe - (607) (STM)/       0.01   Pipe - (608) (STM)/       0.01   Pipe - (609) (STM)/       0.02   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.01   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.02
           Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.02
            534.2/       0.02                535.1/       0.01                535.2/       0.01                537.1/       0.00
            537.2/       0.01          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle       9000      Time         12 Hrs - 30.00 Min

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.78*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.82*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.65 /   175.77
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            ID*477/   1.37*/   175.77          HW-1 (STM)/   1.41 /   175.77           J27 (STM)/   1.71 /   175.97
         DI1 (STM)/   0.71 /   175.77           DI3 (STM)/   0.59 /   175.77           DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.04   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.04
 Pipe - (607) (STM)/       0.01   Pipe - (608) (STM)/       0.01   Pipe - (609) (STM)/       0.02   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.02
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.01
              534.2/       0.01                535.1/       0.01                535.2/       0.01                537.1/       0.00
              537.2/       0.01          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle       9500      Time         13 Hrs - 11.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.77*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.82*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.65 /   175.77
            ID*477/   1.37*/   175.77          HW-1 (STM)/   1.41 /   175.77           J27 (STM)/   1.78 /   176.04
         DI1 (STM)/   0.71 /   175.77           DI3 (STM)/   0.59 /   175.77           DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.03   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.03
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.01   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.01
              534.2/       0.01                535.1/       0.01                535.2/       0.01                537.1/      -0.00
              537.2/       0.00          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle      10000      Time         13 Hrs - 53.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.77*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.82*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.65 /   175.77
            ID*477/   1.37*/   175.77          HW-1 (STM)/   1.41 /   175.77           J27 (STM)/   1.75 /   176.01
         DI1 (STM)/   0.71 /   175.77           DI3 (STM)/   0.59 /   175.77           DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.03   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.03
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.01
              534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle      10500      Time         14 Hrs - 35.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.77*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.82*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.64 /   175.77
            ID*477/   1.37*/   175.77          HW-1 (STM)/   1.41 /   175.77           J27 (STM)/   1.77 /   176.03
         DI1 (STM)/   0.71 /   175.77           DI3 (STM)/   0.59 /   175.77           DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.01                534.1/       0.01
              534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle      11000      Time         15 Hrs - 16.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.44 /   175.77   PROP STM MH1 (STM)/   1.25*/   175.77 PROP STM CBMH4 (STM)/   0.77*/   175.77
 PROP STM MH5 (STM)/   0.78*/   175.77   PROP STM MH2 (STM)/   1.16*/   175.77   PROP STM MH6 (STM)/   0.94*/   175.77
 PROP STM MH3 (STM)/   0.87*/   175.77   PROP STM MH7 (STM)/   0.82*/   175.77 PROP STM CBMH8 (STM)/   0.77*/   175.77
 PROP STM MH9 (STM)/   0.64*/   175.77         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.64 /   175.77
            ID*477/   1.37*/   175.77          HW-1 (STM)/   1.41 /   175.77           J27 (STM)/   1.74 /   176.00
         DI1 (STM)/   0.71 /   175.77           DI3 (STM)/   0.58 /   175.77           DI4 (STM)/   0.68 /   175.77
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.01
              534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00          205mm PLATE/       0.03              FREE# 1/       0.03

WARNING !! SIMULATION CONTINUES AFTER THE TIME
HISTORY STAGE ENDS FOR TIDAL BOUNDARY CONDITION      1
PROGRAM DEFAULTS TO THE LAST STAGE VALUE.

Cycle      11500      Time         15 Hrs - 58.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.43 /   175.76   PROP STM MH1 (STM)/   1.24*/   175.76 PROP STM CBMH4 (STM)/   0.76*/   175.76
 PROP STM MH5 (STM)/   0.77*/   175.76   PROP STM MH2 (STM)/   1.15*/   175.76   PROP STM MH6 (STM)/   0.93*/   175.76
 PROP STM MH3 (STM)/   0.86*/   175.76   PROP STM MH7 (STM)/   0.81*/   175.76 PROP STM CBMH8 (STM)/   0.76*/   175.76
 PROP STM MH9 (STM)/   0.63*/   175.76         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.63 /   175.76
            ID*477/   1.36*/   175.76          HW-1 (STM)/   1.40 /   175.76           J27 (STM)/   1.66 /   175.92
         DI1 (STM)/   0.70 /   175.76           DI3 (STM)/   0.58 /   175.76           DI4 (STM)/   0.67 /   175.76
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.01
              534.2/       0.01                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle      12000      Time         16 Hrs - 40.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.42 /   175.75   PROP STM MH1 (STM)/   1.23*/   175.75 PROP STM CBMH4 (STM)/   0.75*/   175.75
 PROP STM MH5 (STM)/   0.76*/   175.75   PROP STM MH2 (STM)/   1.14*/   175.75   PROP STM MH6 (STM)/   0.92*/   175.75
 PROP STM MH3 (STM)/   0.85*/   175.75   PROP STM MH7 (STM)/   0.80*/   175.75 PROP STM CBMH8 (STM)/   0.75*/   175.75
 PROP STM MH9 (STM)/   0.62*/   175.75         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.63 /   175.75
            ID*477/   1.35*/   175.75          HW-1 (STM)/   1.39 /   175.75           J27 (STM)/   1.66 /   175.92
         DI1 (STM)/   0.69 /   175.75           DI3 (STM)/   0.57 /   175.75           DI4 (STM)/   0.66 /   175.75
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.03   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.01   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.03   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.01
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00          205mm PLATE/       0.03              FREE# 1/       0.03

Cycle      12500      Time         17 Hrs - 21.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.41 /   175.74   PROP STM MH1 (STM)/   1.22*/   175.74 PROP STM CBMH4 (STM)/   0.74*/   175.74
 PROP STM MH5 (STM)/   0.75*/   175.74   PROP STM MH2 (STM)/   1.13*/   175.74   PROP STM MH6 (STM)/   0.91*/   175.74
 PROP STM MH3 (STM)/   0.84*/   175.74   PROP STM MH7 (STM)/   0.79*/   175.74 PROP STM CBMH8 (STM)/   0.74*/   175.74
 PROP STM MH9 (STM)/   0.61*/   175.74         STM7080 (STM)/   1.35*/   175.67           DI2 (STM)/   0.61 /   175.74
            ID*477/   1.34*/   175.74          HW-1 (STM)/   1.38 /   175.74           J27 (STM)/   1.66 /   175.92
         DI1 (STM)/   0.68 /   175.74           DI3 (STM)/   0.56 /   175.74           DI4 (STM)/   0.65 /   175.74
     STM MH1A (STM)/   1.34*/   175.67

           Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.02   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.02
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 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.02   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00           205mm PLATE/      0.02              FREE# 1/       0.02

Cycle      13000      Time         18 Hrs -  3.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.40 /   175.73   PROP STM MH1 (STM)/   1.21*/   175.73 PROP STM CBMH4 (STM)/   0.73*/   175.73
 PROP STM MH5 (STM)/   0.74*/   175.73   PROP STM MH2 (STM)/   1.12*/   175.73   PROP STM MH6 (STM)/   0.90*/   175.73
 PROP STM MH3 (STM)/   0.83*/   175.73   PROP STM MH7 (STM)/   0.78*/   175.73 PROP STM CBMH8 (STM)/   0.73*/   175.73
 PROP STM MH9 (STM)/   0.60*/   175.73        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.60 /   175.73
             ID*477/   1.33*/   175.73           HW-1 (STM)/   1.37 /   175.73            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.67 /   175.73            DI3 (STM)/   0.54 /   175.73            DI4 (STM)/   0.64 /   175.73
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/      0.02              FREE# 1/       0.02

Cycle      13500      Time         18 Hrs - 45.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.39 /   175.72   PROP STM MH1 (STM)/   1.20*/   175.72 PROP STM CBMH4 (STM)/   0.72*/   175.72
 PROP STM MH5 (STM)/   0.73*/   175.72   PROP STM MH2 (STM)/   1.11*/   175.72   PROP STM MH6 (STM)/   0.89*/   175.72
 PROP STM MH3 (STM)/   0.82*/   175.72   PROP STM MH7 (STM)/   0.77*/   175.72 PROP STM CBMH8 (STM)/   0.72*/   175.72
 PROP STM MH9 (STM)/   0.59*/   175.72        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.59 /   175.72
             ID*477/   1.32*/   175.72           HW-1 (STM)/   1.36 /   175.72            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.66 /   175.72            DI3 (STM)/   0.53 /   175.72            DI4 (STM)/   0.63 /   175.72
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00           205mm PLATE/      0.02              FREE# 1/       0.02

Cycle      14000      Time         19 Hrs - 26.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.38 /   175.71   PROP STM MH1 (STM)/   1.19*/   175.71 PROP STM CBMH4 (STM)/   0.71*/   175.71
 PROP STM MH5 (STM)/   0.72*/   175.71   PROP STM MH2 (STM)/   1.10*/   175.71   PROP STM MH6 (STM)/   0.88*/   175.71
 PROP STM MH3 (STM)/   0.81*/   175.71   PROP STM MH7 (STM)/   0.76*/   175.71 PROP STM CBMH8 (STM)/   0.71*/   175.71
 PROP STM MH9 (STM)/   0.58*/   175.71        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.58 /   175.71
             ID*477/   1.31*/   175.71           HW-1 (STM)/   1.35 /   175.71            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.65 /   175.71            DI3 (STM)/   0.52 /   175.71            DI4 (STM)/   0.62 /   175.71
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00           205mm PLATE/      0.02              FREE# 1/       0.02

Cycle      14500      Time         20 Hrs -  8.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.37 /   175.70   PROP STM MH1 (STM)/   1.18*/   175.70 PROP STM CBMH4 (STM)/   0.70*/   175.70
 PROP STM MH5 (STM)/   0.71*/   175.70   PROP STM MH2 (STM)/   1.09*/   175.70   PROP STM MH6 (STM)/   0.87*/   175.70
 PROP STM MH3 (STM)/   0.80*/   175.70   PROP STM MH7 (STM)/   0.75*/   175.70 PROP STM CBMH8 (STM)/   0.70*/   175.70
 PROP STM MH9 (STM)/   0.57*/   175.70        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.57 /   175.70
             ID*477/   1.30*/   175.70           HW-1 (STM)/   1.34 /   175.70            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.64 /   175.70            DI3 (STM)/   0.52 /   175.70            DI4 (STM)/   0.61 /   175.70
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00           205mm PLATE/      0.02              FREE# 1/       0.02

Cycle      15000      Time         20 Hrs - 50.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.37 /   175.70   PROP STM MH1 (STM)/   1.18*/   175.69 PROP STM CBMH4 (STM)/   0.70*/   175.70
 PROP STM MH5 (STM)/   0.70*/   175.69   PROP STM MH2 (STM)/   1.08*/   175.70   PROP STM MH6 (STM)/   0.87*/   175.70
 PROP STM MH3 (STM)/   0.80*/   175.70   PROP STM MH7 (STM)/   0.75*/   175.70 PROP STM CBMH8 (STM)/   0.70*/   175.70
 PROP STM MH9 (STM)/   0.57*/   175.70        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.57 /   175.70
             ID*477/   1.30*/   175.69           HW-1 (STM)/   1.34 /   175.70            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.63 /   175.70            DI3 (STM)/   0.51 /   175.70            DI4 (STM)/   0.60 /   175.70
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.02   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.02   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00           205mm PLATE/      0.02              FREE# 1/       0.02

Cycle      15500      Time         21 Hrs - 31.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.36 /   175.69   PROP STM MH1 (STM)/   1.17*/   175.69 PROP STM CBMH4 (STM)/   0.69*/   175.69
 PROP STM MH5 (STM)/   0.70*/   175.69   PROP STM MH2 (STM)/   1.08*/   175.69   PROP STM MH6 (STM)/   0.86 /   175.69
 PROP STM MH3 (STM)/   0.79*/   175.69   PROP STM MH7 (STM)/   0.74*/   175.69 PROP STM CBMH8 (STM)/   0.69*/   175.69
 PROP STM MH9 (STM)/   0.56*/   175.69        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.56 /   175.69
             ID*477/   1.29*/   175.69           HW-1 (STM)/   1.33 /   175.69            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.63 /   175.69            DI3 (STM)/   0.51 /   175.69            DI4 (STM)/   0.60 /   175.69
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/       0.00           205mm PLATE/      0.01              FREE# 1/       0.01

Cycle      16000      Time         22 Hrs - 13.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.36 /   175.69   PROP STM MH1 (STM)/   1.17*/   175.69 PROP STM CBMH4 (STM)/   0.70*/   175.69
 PROP STM MH5 (STM)/   0.70*/   175.69   PROP STM MH2 (STM)/   1.08*/   175.69   PROP STM MH6 (STM)/   0.86 /   175.69
 PROP STM MH3 (STM)/   0.79*/   175.69   PROP STM MH7 (STM)/   0.74*/   175.69 PROP STM CBMH8 (STM)/   0.69*/   175.69
 PROP STM MH9 (STM)/   0.56*/   175.69        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.57 /   175.69
             ID*477/   1.30*/   175.69           HW-1 (STM)/   1.33 /   175.69            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.63 /   175.69            DI3 (STM)/   0.51 /   175.69            DI4 (STM)/   0.60 /   175.69
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/      0.01              FREE# 1/       0.01

Cycle      16500      Time         22 Hrs - 55.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.36 /   175.69   PROP STM MH1 (STM)/   1.17*/   175.69 PROP STM CBMH4 (STM)/   0.70*/   175.69
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 PROP STM MH5 (STM)/   0.70*/   175.69   PROP STM MH2 (STM)/   1.08*/   175.69   PROP STM MH6 (STM)/   0.86 /   175.69
 PROP STM MH3 (STM)/   0.79*/   175.69   PROP STM MH7 (STM)/   0.75*/   175.69 PROP STM CBMH8 (STM)/   0.69*/   175.69
 PROP STM MH9 (STM)/   0.57*/   175.69        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.57 /   175.69
            ID*477/   1.30*/   175.69           HW-1 (STM)/   1.33 /   175.69            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.63 /   175.69            DI3 (STM)/   0.51 /   175.69            DI4 (STM)/   0.60 /   175.69
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.01              FREE# 1/       0.01

Cycle      17000      Time         23 Hrs - 36.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.36 /   175.69   PROP STM MH1 (STM)/   1.17*/   175.69 PROP STM CBMH4 (STM)/   0.69*/   175.69
 PROP STM MH5 (STM)/   0.70*/   175.69   PROP STM MH2 (STM)/   1.08*/   175.69   PROP STM MH6 (STM)/   0.86 /   175.69
 PROP STM MH3 (STM)/   0.79*/   175.69   PROP STM MH7 (STM)/   0.74*/   175.69 PROP STM CBMH8 (STM)/   0.69*/   175.69
 PROP STM MH9 (STM)/   0.56*/   175.69        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.56 /   175.69
            ID*477/   1.29*/   175.69           HW-1 (STM)/   1.33 /   175.69            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.63 /   175.69            DI3 (STM)/   0.50 /   175.69            DI4 (STM)/   0.60 /   175.69
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.01   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.01
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.01   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.01              FREE# 1/       0.01

Cycle      17500      Time         24 Hrs - 18.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.35 /   175.68   PROP STM MH1 (STM)/   1.16*/   175.68 PROP STM CBMH4 (STM)/   0.68*/   175.68
 PROP STM MH5 (STM)/   0.68*/   175.68   PROP STM MH2 (STM)/   1.06*/   175.68   PROP STM MH6 (STM)/   0.85 /   175.68
 PROP STM MH3 (STM)/   0.78*/   175.68   PROP STM MH7 (STM)/   0.73*/   175.68 PROP STM CBMH8 (STM)/   0.68*/   175.68
 PROP STM MH9 (STM)/   0.55*/   175.68        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
            ID*477/   1.28*/   175.68           HW-1 (STM)/   1.32 /   175.68            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.61 /   175.68            DI3 (STM)/   0.49 /   175.68            DI4 (STM)/   0.59 /   175.68
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.01   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.01   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/      -0.00                535.2/      -0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.01              FREE# 1/       0.01

Cycle      18000      Time         25 Hrs -  0.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.67
 PROP STM MH5 (STM)/   0.67*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.77*/   175.67   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.53 /   175.66
            ID*477/   1.27*/   175.67           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.58 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/      -0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      18500      Time         25 Hrs - 41.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.66 PROP STM CBMH4 (STM)/   0.67*/   175.67
 PROP STM MH5 (STM)/   0.68*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.77*/   175.67   PROP STM MH7 (STM)/   0.72*/   175.66 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.66        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
            ID*477/   1.27*/   175.66           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67            DI3 (STM)/   0.48 /   175.66            DI4 (STM)/   0.57 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/      -0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/      -0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/      -0.00
              534.2/      -0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
              537.2/      -0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      19000      Time         26 Hrs - 23.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.66
            ID*477/   1.27*/   175.67           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/      -0.00
            Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      19500      Time         27 Hrs -  5.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
            ID*477/   1.27*/   175.67           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67            DI3 (STM)/   0.48 /   175.66            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/      -0.00
            Link181/       0.00                503.1/       0.00                503.2/      -0.00                534.1/       0.00
              534.2/       0.00                535.1/      -0.00                535.2/      -0.00                537.1/       0.00
              537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      20000      Time         27 Hrs - 46.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.66
            ID*477/   1.27*/   175.66           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

             Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/      -0.00
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 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/      -0.00
              534.2/      -0.00                535.1/      -0.00                535.2/      -0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      20500      Time         28 Hrs - 28.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.66 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.68*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.77*/   175.67   PROP STM MH7 (STM)/   0.71*/   175.66 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.66         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
             ID*477/   1.27*/   175.66            HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67             DI3 (STM)/   0.48 /   175.66            DI4 (STM)/   0.57 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/       0.00
              534.2/       0.00                535.1/      -0.00                535.2/      -0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      21000      Time         29 Hrs - 10.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.66 PROP STM CBMH4 (STM)/   0.67*/   175.67
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.77*/   175.67   PROP STM MH7 (STM)/   0.71*/   175.66 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.67         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.66
             ID*477/   1.27*/   175.66            HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67             DI3 (STM)/   0.48 /   175.66            DI4 (STM)/   0.57 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/      -0.00                503.1/       0.00                503.2/       0.00                534.1/      -0.00
              534.2/      -0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      21500      Time         29 Hrs - 51.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.67
 PROP STM MH5 (STM)/   0.67*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.67         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
             ID*477/   1.27*/   175.67            HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67             DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/      -0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/      -0.00   Pipe - (676) (STM)/       0.00
            Link181/      -0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      22000      Time         30 Hrs - 33.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.53*/   175.66         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.66
             ID*477/   1.27*/   175.67            HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.66             DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/      -0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/       0.00
              534.2/       0.00                535.1/      -0.00                535.2/      -0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      22500      Time         31 Hrs - 15.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.66 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.66         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
             ID*477/   1.27*/   175.67            HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.66             DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/      -0.00   Pipe - (676) (STM)/      -0.00
            Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/      -0.00
              534.2/      -0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
              537.2/       0.00           205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      23000      Time         31 Hrs - 56.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.33 /   175.66   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.66   PROP STM MH6 (STM)/   0.83 /   175.66
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.71*/   175.66 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.66         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
             ID*477/   1.27*/   175.66            HW-1 (STM)/   1.30 /   175.66            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.66             DI3 (STM)/   0.48 /   175.66            DI4 (STM)/   0.57 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/      -0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/       0.00
              534.2/       0.00                535.1/      -0.00                535.2/      -0.00                537.1/      -0.00
              537.2/      -0.00           205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      23500      Time         32 Hrs - 38.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.33 /   175.66   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.66   PROP STM MH6 (STM)/   0.83 /   175.66
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.71*/   175.66 PROP STM CBMH8 (STM)/   0.67*/   175.67
 PROP STM MH9 (STM)/   0.54*/   175.66         STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
             ID*477/   1.27*/   175.66            HW-1 (STM)/   1.30 /   175.66            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67             DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.67
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/      -0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
            Link181/       0.00                503.1/      -0.00                503.2/       0.00                534.1/      -0.00
              534.2/      -0.00                535.1/      -0.00                535.2/      -0.00                537.1/      -0.00
              537.2/      -0.00           205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      24000      Time         33 Hrs - 20.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.66 PROP STM CBMH4 (STM)/   0.67*/   175.67
 PROP STM MH5 (STM)/   0.67*/   175.67   PROP STM MH2 (STM)/   1.05*/   175.66   PROP STM MH6 (STM)/   0.83 /   175.66
```

```
 PROP STM MH3 (STM)/   0.77*/   175.67   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.53*/   175.66        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.66
           ID*477/   1.27*/   175.67           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.66            DI3 (STM)/   0.48 /   175.66            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/      -0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/       0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/       0.00   Pipe - (612) (STM)/       0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/       0.00
             Link181/      -0.00                503.1/      -0.00                503.2/      -0.00                534.1/       0.00
               534.2/       0.00                535.1/      -0.00                535.2/      -0.00                537.1/       0.00
               537.2/       0.00          205mm PLATE/       0.00              FREE# 1/       0.00

Cycle      24500      Time         34 Hrs -  1.67 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.33 /   175.66   PROP STM MH1 (STM)/   1.15*/   175.66 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.66   PROP STM MH6 (STM)/   0.83 /   175.66
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
           ID*477/   1.27*/   175.66           HW-1 (STM)/   1.30 /   175.66            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.67            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/       0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/      -0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/      -0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/      -0.00
             Link181/      -0.00                503.1/      -0.00                503.2/      -0.00                534.1/      -0.00
               534.2/      -0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
               537.2/       0.00          205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      25000      Time         34 Hrs - 43.33 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67   PROP STM MH1 (STM)/   1.15*/   175.66 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.66   PROP STM MH6 (STM)/   0.83 /   175.66
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.54*/   175.67        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.66
           ID*477/   1.27*/   175.66           HW-1 (STM)/   1.31 /   175.67            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.66            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/      -0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/       0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/      -0.00
             Link181/       0.00                503.1/      -0.00                503.2/      -0.00                534.1/       0.00
               534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/       0.00
               537.2/       0.00          205mm PLATE/       0.00              FREE# 1/      -0.00

Cycle      25500      Time         35 Hrs - 25.00 Min

          Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.33 /   175.66   PROP STM MH1 (STM)/   1.15*/   175.67 PROP STM CBMH4 (STM)/   0.67*/   175.66
 PROP STM MH5 (STM)/   0.67*/   175.66   PROP STM MH2 (STM)/   1.05*/   175.67   PROP STM MH6 (STM)/   0.84 /   175.67
 PROP STM MH3 (STM)/   0.76*/   175.66   PROP STM MH7 (STM)/   0.72*/   175.67 PROP STM CBMH8 (STM)/   0.66*/   175.66
 PROP STM MH9 (STM)/   0.53*/   175.66        STM7080 (STM)/   1.35*/   175.67            DI2 (STM)/   0.54 /   175.67
           ID*477/   1.27*/   175.67           HW-1 (STM)/   1.30 /   175.66            J27 (STM)/   1.66 /   175.92
          DI1 (STM)/   0.60 /   175.66            DI3 (STM)/   0.48 /   175.67            DI4 (STM)/   0.57 /   175.66
     STM MH1A (STM)/   1.34*/   175.67

            Conduit/       FLOW   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/      -0.00   Pipe - (600) (STM)/       0.00   Pipe - (602) (STM)/       0.00   Pipe - (605) (STM)/      -0.00
 Pipe - (607) (STM)/      -0.00   Pipe - (608) (STM)/       0.00   Pipe - (609) (STM)/      -0.00   Pipe - (610) (STM)/       0.00
 Pipe - (611) (STM)/      -0.00   Pipe - (612) (STM)/      -0.00   Pipe - (674) (STM)/       0.00   Pipe - (676) (STM)/      -0.00
             Link181/       0.00                503.1/       0.00                503.2/       0.00                534.1/       0.00
               534.2/       0.00                535.1/       0.00                535.2/       0.00                537.1/      -0.00
               537.2/      -0.00          205mm PLATE/       0.00              FREE# 1/      -0.00


 +=====================================================*
 | Table E5 - Junction Time Limitation Summary         |
 |            (0.10 or 0.25)* Depth * Area             |
 | Time step = ------------------------------          |
 |                  Sum of Flow                        |
 +=====================================================*
 |  The time this junction was the limiting junction |
 |                is listed in the third column.     |
 +=====================================================*

            Junction     Time(.10)  Time(.25)  Time(sec)
---------------------   ---------  --------  ---------
    StartNullStruct1          0.96      2.40     6065.0
  PROP STM MH1 (STM)          9.30     23.24        0.0
PROP STM CBMH4 (STM)          7.76     19.39        0.0
  PROP STM MH5 (STM)          9.05     22.63        0.0
  PROP STM MH2 (STM)         18.99     47.47        0.0
  PROP STM MH6 (STM)         47.21     50.00        0.0
  PROP STM MH3 (STM)          9.23     23.08        0.0
  PROP STM MH7 (STM)          1.82      4.56    37590.0
PROP STM CBMH8 (STM)          5.19     12.96        0.0
  PROP STM MH9 (STM)         18.64     46.61        0.0
       STM7080 (STM)          1.69      4.23        0.0
           DI2 (STM)         23.57     50.00        0.0
             ID*477           0.21      0.54    54845.0
          HW-1 (STM)          0.09      0.22    31100.0
           J27 (STM)         50.00     50.00        0.0
           DI1 (STM)          0.46      1.14        0.0
           DI3 (STM)         40.12     50.00        0.0
           DI4 (STM)         50.00     50.00        0.0
      STM MH1A (STM)          1.57      3.93        0.0
The junction requiring the smallest time step was...PROP CDS PMSU5645-10 (STM)


 +==========================================================*
 |       Table E5a - Conduit Explicit Condition Summary     |
 |       Courant   =         Conduit Length                 |
 |       Time step = -------------------------------        |
 |                     Velocity + sqrt(g*depth)             |
 |                                                          |
 |                  Conduit Implicit Condition Summary      |
 |       Courant   =         Conduit Length                 |
 |       Time step = -------------------------------        |
 |                              Velocity                    |
 +==========================================================*
 |  The 3rd column is the Explicit time step times the      |
 |      minimum courant time step factor                    |
 |                                                          |
 |  Minimum Conduit Time Step in seconds in the 4th column  |
 |  in the list. Maximum possible is 10 * maximum time step |
 |                                                          |
 |  The 5th column is the maximum change at any time step   |
 |  during the simulation. The 6th column is the wobble     |
 |  value which is an indicator of the flow stability.      |
 |                                                          |
 |  You should use this section to find those conduits that |
 |  are slowing your model down.  Use modify conduits to    |
 |  alter the length of the slow conduits to make your      |
 |  simulation faster, or change the conduit name to        |
 |  "CHME?????" where ????? are any characters, this will   |
 |  lengthen the conduit based on the model time step,      |
 |  not the value listed in modify conduits.                |
 +==========================================================*

             Conduit  Time(exp)  Expl*Cmin  Time(imp) Time(min)  Max Qchange   Wobble  Type of Soln
       --------------  ---------  ---------  --------- ---------  -----------  -------  ------------
  Pipe - (596) (STM)       5.41       5.41      23.11     118.9          0.012   11.532   Normal Soln
  Pipe - (600) (STM)       7.90       7.90      50.00       0.0          0.004    3.984   Normal Soln
  Pipe - (602) (STM)      10.78      10.78      34.41       0.0         -0.001   24.823   Normal Soln
  Pipe - (605) (STM)       6.21       6.21      15.61       0.0         -0.002   13.189   Normal Soln
  Pipe - (607) (STM)       8.85       8.85      23.40       0.0         -0.001   39.055   Normal Soln
```

```
   Pipe - (608) (STM)      4.99      4.99     11.32       0.0         -0.003    29.053   Normal Soln
   Pipe - (609) (STM)      3.60      3.60      9.32       8.7         -0.001    43.982   Normal Soln
   Pipe - (610) (STM)     12.44     12.44     43.92       0.0         -0.001    38.079   Normal Soln
   Pipe - (611) (STM)      3.24      3.24      8.77      48.4          0.001    68.307   Normal Soln
   Pipe - (612) (STM)      0.98      0.98      3.15    1757.4         -0.009    42.101   Normal Soln
   Pipe - (674) (STM)      3.13      3.13     11.08     226.6         -0.003    18.932   Normal Soln
   Pipe - (676) (STM)      5.04      5.04     22.37       0.0         -0.008     5.674   Normal Soln
              Link181      3.18      3.18     50.00       0.0         -0.000    10.048   Normal Soln
                503.1      9.70      9.70     50.00       0.0         -0.015     9.570   Normal Soln
                503.2      9.49      9.49     50.00       0.0         -0.015     8.273   Normal Soln
                534.1     22.79     22.79     50.00       0.0         -0.007     2.728   Normal Soln
                534.2     22.41     22.41     50.00       0.0         -0.010     2.564   Normal Soln
                535.1     13.11     13.11     50.00       0.0         -0.002     1.795   Normal Soln
                535.2     13.11     13.11     50.00       0.0         -0.002     1.795   Normal Soln
                537.1     15.15     15.15     50.00       0.0          0.007     5.004   Normal Soln
                537.2     14.83     14.83     50.00       0.0          0.007     5.499   Normal Soln
         205mm PLATE     49.35     49.35     50.00       0.0         -0.041     6.215   Normal Soln
The conduit with the smallest time step limitation was..Pipe - (612) (STM)
The conduit with the largest wobble was.................Pipe - (611) (STM)
The conduit with the largest flow change in any
consecutive time step...................................205mm PLATE

 ************************************************
 *      End of time step DO-loop in Runoff      *
 ************************************************

 Final Date (Mo/Day/Year)   =            11/ 4/2018
 Total number of time steps =                   288
 Final Julian Date          =               2018308
 Final time of day          =                    0. seconds.
 Final time of day          =                 0.00   hours.
 Final running time         =               24.0000   hours.
 Final running time         =                1.0000    days.

 ****************************************************
 *     Extrapolation Summary for Watersheds         *
 * Explains the number of time steps and iterations *
 * used in the solution of the subcatchments.       *
 * # Steps ==> Total Number of Extrapolated Steps   *
 * # Calls ==> Total Number of OVERLND Calls        *
 ****************************************************

         Subcatchment   # Steps  # Calls              Subcatchment   # Steps  # Calls              Subcatchment   # Steps  # Calls
---------------------  -------  --------     ---------------------  -------  --------     ---------------------  -------  --------
          DI2 (STM)#1      4389       683        PROP STM MH5 (ST#1      4299       629             DI1 (STM)#1      4563       741
   PROP STM MH3 (ST#1      4305       623            DI4 (STM)#1      4485       683       PROP STM MH7 (ST#1      4294       634
          DI3 (STM)#1      4434       682        PROP STM CBMH8 (#1      4293       635       PROP STM MH6 (ST#1      4300       632
         HW-1 (STM)#1      4515       741             HW-1 (STM)#2      4364       648


#######################################################
# Rainfall input summary from Runoff Continuity Check   #
#######################################################

 Total rainfall read for gage #         1 is       150.61 mm
 Total rainfall duration for gage #     1 is      1425.00 minutes

 ************************************************************
 * Table R5. CONTINUITY CHECK FOR SURFACE WATER             *
 *       Any continuity error can be fixed by lowering the  *
 *       wet and transition time step. The transition time  *
 *       should not be much greater than the wet time step. *
 ************************************************************
                                                                     Millimeters over
                                                     cubic meters    Total Basin
 Total Precipitation (Rain plus Snow)               6.295602E+03       150.612
 Total Infiltration                                 2.294581E+03        54.894
 Total Evaporation                                  0.000000E+00         0.000
 Surface Runoff from Watersheds                     3.859986E+03        92.344
 Total Water remaining in Surface Storage           1.518681E+02         3.633
 Infiltration over the Pervious Area...             2.294581E+03        88.077
                         --------
 Infiltration + Evaporation +
 Surface Runoff + Snow removal +
 Water remaining in Surface Storage +
 Water remaining in Snow Cover.........             6.306436E+03       150.872
 Total Precipitation + Initial Storage.             6.295602E+03       150.612


 The error in continuity is calculated as
 ****************************************
 * Precipitation + Initial Snow Cover  *
 *     - Infiltration -                 *
 *Evaporation - Snow removal -          *
 *Surface Runoff from Watersheds -      *
 *Water in Surface Storage -            *
 *Water remaining in Snow Cover         *
 *--------------------------------------*
 * Precipitation + Initial Snow Cover  *
 ****************************************
 Percent Continuity Error...............                          -0.1721


 ****************************************************
 * Table R6. Continuity Check for Channel/Pipes     *
 *           You should have zero continuity error  *
 *           if you are not using runoff hydraulics *
 ****************************************************
                                                                     Millimeters over
                                                     cubic meters    Total Basin
 Initial Channel/Pipe Storage................       0.000000E+00          0.000
 Final Channel/Pipe Storage..................       0.000000E+00          0.000
 Surface Runoff from Watersheds..............       3.859986E+03         92.344
 Groundwater Subsurface Inflow or Diversion..       0.000000E+00          0.000
 Evaporation Loss from Channels..............       0.000000E+00          0.000
 Groundwater Flow Diverted Out of Network....       0.000000E+00          0.000
 Channel/Pipe/Inlet Outflow..................       3.859986E+03         92.344
 Initial Storage + Inflow....................       3.859986E+03         92.344
 Final Storage + Outflow + Diverted GW.......       3.859986E+03         92.344
 *******************************************
 * Final Storage + Outflow + Evaporation  - *
 * Watershed Runoff - Groundwater Inflow  - *
 *     Initial Channel/Pipe Storage         *
 *     ---------------------------------    *
 *  Final Storage + Outflow  + Evaporation  *
 *******************************************
 Percent Continuity Error....................                     -0.0000

         ##############################################
         # Table R9. Summary Statistics for Subcatchments #
         ##############################################

 Note: Total Runoff Depth includes pervious & impervious areas.
       Pervious and Impervious Runoff Depth is only the runoff from those two areas.
       For catchments receiving redirected flow, this flow will only be shown if the flow is not
       directed directly to the outlet. Flow that is getting redirected is also listed with
       the original subcatchment.


 Subcatchment...........          DI2 (STM)#1   PROP STM MH5 (ST#1          DI1 (STM)#1   PROP STM MH3 (ST#1          DI4 (STM)#1
 Area (hectares)........              0.42001             0.22000             1.09002             0.21000             0.28001
 Percent Impervious.....             33.00000            90.00000            12.00000            95.00000            18.00000
 Total Rainfall (mm)....            150.61250           150.61250           150.61250           150.61250           150.61250
 Max Intensity (mm/hr)..            145.10000           145.10000           145.10000           145.10000           145.10000

 Pervious Area
 -------------
 Total Runoff Depth (mm)             59.84249            63.03079            57.10825            63.34244            59.85048
 Peak Runoff Rate (cms).              0.03021             0.00759             0.06231             0.00397             0.02469

 Total Impervious Area
 ---------------------
 Total Runoff Depth (mm)              5.86391             5.84823             5.86961             5.84597             5.87053
```

```
Peak Runoff Rate (cms).              0.05580             0.07890             0.05272             0.07929             0.02031

Impervious Area with depression storage
---------------------------------------
Total Runoff Depth (mm)            111.33247           111.03374           111.44095           110.99068           111.45842
Peak Runoff Rate (cms).              0.04185             0.05918             0.03954             0.05947             0.01524

Impervious Area without depression storage
------------------------------------------
Total Runoff Depth (mm)             37.61091            37.51128            37.64715            37.49693            37.65304
Peak Runoff Rate (cms).              0.01395             0.01973             0.01318             0.01982             0.00508

Total Area
----------
Total Runoff Depth (mm)             89.24579           139.99359            68.14583           144.23035            75.91746
Peak Runoff Rate (cms).              0.08410             0.08649             0.10230             0.08326             0.04345

Rational Formula
----------------
Pervious Tc. (mins)....              0.00000             0.00000             0.00000             0.00000             0.00000
Perv. Intensity (mm/hr)              0.00000             0.00000             0.00000             0.00000             0.00000
Pervious C ............              0.00000             0.00000             0.00000             0.00000             0.00000
Impervious Tc. (mins)..              0.00000             0.00000             0.00000             0.00000             0.00000
Imp. Intensity (mm/hr).              0.00000             0.00000             0.00000             0.00000             0.00000
Impervious C ..........              0.00000             0.00000             0.00000             0.00000             0.00000
Partial Area (Ha)......              0.00000             0.00000             0.00000             0.00000             0.00000
Partial Area Tc........              0.00000             0.00000             0.00000             0.00000             0.00000
Partial Area Intensity.              0.00000             0.00000             0.00000             0.00000             0.00000

UK Methods
----------
Runoff percentage (%)..              0.00000             0.00000             0.00000             0.00000             0.00000
Effective Area (Ha)....              0.00000             0.00000             0.00000             0.00000             0.00000
Depression Storage (mm)              0.00000             0.00000             0.00000             0.00000             0.00000
Routing coefficient....              0.00000             0.00000             0.00000             0.00000             0.00000


Subcatchment...........   PROP STM MH7 (ST#1         DI3 (STM)#1   PROP STM CBMH8 (#1   PROP STM MH6 (ST#1         HW-1 (STM)#1
Area (hectares)........              0.21000             0.28001             0.25001             0.17000             0.74002
Percent Impervious.....             85.00000            20.00000            85.00000            85.00000            15.00000
Total Rainfall (mm)....            150.61250           150.61250           150.61250           150.61250           150.61250
Max Intensity (mm/hr)..            145.10000           145.10000           145.10000           145.10000           145.10000

Pervious Area
-------------
Total Runoff Depth (mm)             62.74498            59.92110            62.70618            62.85021            56.24934
Peak Runoff Rate (cms).              0.00964             0.02441             0.01127             0.00817             0.03529

Total Impervious Area
---------------------
Total Runoff Depth (mm)              5.84941             5.87033             5.84792             5.85344             5.86506
Peak Runoff Rate (cms).              0.07122             0.02257             0.08465             0.05786             0.04471

Impervious Area with depression storage
---------------------------------------
Total Runoff Depth (mm)            111.05624           111.45460           111.02786           111.13295           111.35433
Peak Runoff Rate (cms).              0.05341             0.01693             0.06349             0.04340             0.03353

Impervious Area without depression storage
------------------------------------------
Total Runoff Depth (mm)             37.51878            37.65174            37.50932            37.54436            37.61821
Peak Runoff Rate (cms).              0.01780             0.00564             0.02116             0.01447             0.01118

Total Area
----------
Total Runoff Depth (mm)            135.70052            77.75815           135.66253           135.80325            70.15782
Peak Runoff Rate (cms).              0.08086             0.04561             0.09592             0.06603             0.07203

Rational Formula
----------------
Pervious Tc. (mins)....              0.00000             0.00000             0.00000             0.00000             0.00000
Perv. Intensity (mm/hr)              0.00000             0.00000             0.00000             0.00000             0.00000
Pervious C ............              0.00000             0.00000             0.00000             0.00000             0.00000
Impervious Tc. (mins)..              0.00000             0.00000             0.00000             0.00000             0.00000
Imp. Intensity (mm/hr).              0.00000             0.00000             0.00000             0.00000             0.00000
Impervious C ..........              0.00000             0.00000             0.00000             0.00000             0.00000
Partial Area (Ha)......              0.00000             0.00000             0.00000             0.00000             0.00000
Partial Area Tc........              0.00000             0.00000             0.00000             0.00000             0.00000
Partial Area Intensity.              0.00000             0.00000             0.00000             0.00000             0.00000

UK Methods
----------
Runoff percentage (%)..              0.00000             0.00000             0.00000             0.00000             0.00000
Effective Area (Ha)....              0.00000             0.00000             0.00000             0.00000             0.00000
Depression Storage (mm)              0.00000             0.00000             0.00000             0.00000             0.00000
Routing coefficient....              0.00000             0.00000             0.00000             0.00000             0.00000


Subcatchment...........         HW-1 (STM)#2
Area (hectares)........              0.31001
Percent Impervious.....             50.00000
Total Rainfall (mm)....            150.61250
Max Intensity (mm/hr)..            145.10000

Pervious Area
-------------
Total Runoff Depth (mm)             61.94492
Peak Runoff Rate (cms).              0.03282

Total Impervious Area
---------------------
Total Runoff Depth (mm)              5.86812
Peak Runoff Rate (cms).              0.06246

Impervious Area with depression storage
---------------------------------------
Total Runoff Depth (mm)            111.41260
Peak Runoff Rate (cms).              0.04684

Impervious Area without depression storage
------------------------------------------
Total Runoff Depth (mm)             37.63766
Peak Runoff Rate (cms).              0.01561

Total Area
----------
Total Runoff Depth (mm)            105.49759
Peak Runoff Rate (cms).              0.09528

Rational Formula
----------------
Pervious Tc. (mins)....              0.00000
Perv. Intensity (mm/hr)              0.00000
Pervious C ............              0.00000
Impervious Tc. (mins)..              0.00000
Imp. Intensity (mm/hr).              0.00000
Impervious C ..........              0.00000
Partial Area (Ha)......              0.00000
Partial Area Tc........              0.00000
Partial Area Intensity.              0.00000

UK Methods
----------
Runoff percentage (%)..              0.00000
Effective Area (Ha)....              0.00000
Depression Storage (mm)              0.00000
Routing coefficient....              0.00000

===> Runoff simulation ended normally.

*==================================================*
|  Table E6. Final Model Condition                 |
|            This table is used for steady state   |
```

```
|            flow comparison and is the information|
|            saved to the hot-restart file.        |
|            Final Time =    36.000 hours         |
*==================================================*

         Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
   StartNullStruct1/   1.34 /   175.67/  PROP STM MH1 (STM)/   1.15*/   175.66/PROP STM CBMH4 (STM)/   0.67*/   175.66/
 PROP STM MH5 (STM)/   0.67*/   175.66/  PROP STM MH2 (STM)/   1.05*/   175.66/  PROP STM MH6 (STM)/   0.83 /   175.66/
 PROP STM MH3 (STM)/   0.76*/   175.66/  PROP STM MH7 (STM)/   0.71*/   175.66/PROP STM CBMH8 (STM)/   0.66*/   175.66/
 PROP STM MH9 (STM)/   0.54*/   175.66/       STM7080 (STM)/   1.35*/   175.67/           DI2 (STM)/   0.53 /   175.66/
           ID*477/   1.27*/   175.66/          HW-1 (STM)/   1.31 /   175.67/           J27 (STM)/   1.66 /   175.92/
         DI1 (STM)/   0.60 /   175.66/           DI3 (STM)/   0.48 /   175.66/           DI4 (STM)/   0.57 /   175.67/
     STM MH1A (STM)/   1.34*/   175.67/

          Conduit/       Flow   ===> "*" Conduit uses the normal flow option.
 Pipe - (596) (STM)/       0.00 /  Pipe - (600) (STM)/      -0.00 /  Pipe - (602) (STM)/      -0.00 /
 Pipe - (605) (STM)/      -0.00 /  Pipe - (607) (STM)/      -0.00 /  Pipe - (608) (STM)/      -0.00 /
 Pipe - (609) (STM)/      -0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/      -0.00 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/      -0.00 /  Pipe - (676) (STM)/      -0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/      -0.00 /               534.2/      -0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/      -0.00 /               537.2/      -0.00 /
       205mm PLATE/       0.00 /             FREE# 1/       0.00 /

            Conduit/   Velocity
 Pipe - (596) (STM)/       0.00 /  Pipe - (600) (STM)/      -0.00 /  Pipe - (602) (STM)/      -0.00 /
 Pipe - (605) (STM)/      -0.01 /  Pipe - (607) (STM)/      -0.00 /  Pipe - (608) (STM)/      -0.00 /
 Pipe - (609) (STM)/      -0.02 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/      -0.01 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/      -0.01 /  Pipe - (676) (STM)/      -0.00 /
            Link181/       0.00 /               503.1/       0.00 /               503.2/       0.00 /
              534.1/      -0.00 /               534.2/      -0.00 /               535.1/       0.00 /
              535.2/       0.00 /               537.1/      -0.00 /               537.2/      -0.00 /
       205mm PLATE/       0.00 /

       Conduit/      Width
 Pipe - (596) (STM)/       0.00 /  Pipe - (600) (STM)/       0.01 /  Pipe - (602) (STM)/       0.01 /
 Pipe - (605) (STM)/       0.00 /  Pipe - (607) (STM)/       0.00 /  Pipe - (608) (STM)/       0.00 /
 Pipe - (609) (STM)/       0.00 /  Pipe - (610) (STM)/       0.00 /  Pipe - (611) (STM)/       0.00 /
 Pipe - (612) (STM)/       0.00 /  Pipe - (674) (STM)/       0.00 /  Pipe - (676) (STM)/       0.01 /
            Link181/       0.00 /               503.1/       0.01 /               503.2/       0.01 /
              534.1/       0.01 /               534.2/       0.01 /               535.1/       1.62 /
              535.2/       1.62 /               537.1/       0.01 /               537.2/       0.01 /
       205mm PLATE/       0.00 /

       Junction/        EGL
   StartNullStruct1/       1.34 /  PROP STM MH1 (STM)/       1.15 /PROP STM CBMH4 (STM)/       0.67 /
 PROP STM MH5 (STM)/       0.67 /  PROP STM MH2 (STM)/       1.05 /  PROP STM MH6 (STM)/       0.83 /
 PROP STM MH3 (STM)/       0.76 /  PROP STM MH7 (STM)/       0.71 /PROP STM CBMH8 (STM)/       0.66 /
 PROP STM MH9 (STM)/       0.54 /       STM7080 (STM)/       1.35 /           DI2 (STM)/       0.53 /
            ID*477/       1.27 /          HW-1 (STM)/       1.31 /           J27 (STM)/       1.66 /
         DI1 (STM)/       0.60 /           DI3 (STM)/       0.48 /           DI4 (STM)/       0.57 /
     STM MH1A (STM)/       1.34 /

       Junction/  Freeboard
   StartNullStruct1/      -0.89 /  PROP STM MH1 (STM)/       1.24 /PROP STM CBMH4 (STM)/       1.18 /
 PROP STM MH5 (STM)/       1.16 /  PROP STM MH2 (STM)/       1.02 /  PROP STM MH6 (STM)/       1.01 /
 PROP STM MH3 (STM)/       0.97 /  PROP STM MH7 (STM)/       0.97 /PROP STM CBMH8 (STM)/       0.87 /
 PROP STM MH9 (STM)/       0.61 /       STM7080 (STM)/       0.29 /           DI2 (STM)/       0.27 /
            ID*477/       0.11 /          HW-1 (STM)/       0.02 /           J27 (STM)/      -0.25 /
         DI1 (STM)/      -0.13 /           DI3 (STM)/      -0.17 /           DI4 (STM)/      -0.23 /
     STM MH1A (STM)/      -0.28 /

       Junction/ Max Volume
   StartNullStruct1/       1.76 /  PROP STM MH1 (STM)/       1.53 /PROP STM CBMH4 (STM)/       0.96 /
 PROP STM MH5 (STM)/       0.97 /  PROP STM MH2 (STM)/       1.43 /  PROP STM MH6 (STM)/       1.16 /
 PROP STM MH3 (STM)/       1.08 /  PROP STM MH7 (STM)/       1.02 /PROP STM CBMH8 (STM)/       0.96 /
 PROP STM MH9 (STM)/       0.80 /       STM7080 (STM)/       1.70 /           DI2 (STM)/       0.82 /
            ID*477/       1.68 /          HW-1 (STM)/       1.73 /           J27 (STM)/       2.21 /
         DI1 (STM)/       0.89 /           DI3 (STM)/       0.73 /           DI4 (STM)/       0.85 /
     STM MH1A (STM)/       1.72 /

       Junction/Total Fldng
   StartNullStruct1/       0.07 /  PROP STM MH1 (STM)/       0.00 /PROP STM CBMH4 (STM)/       0.00 /
 PROP STM MH5 (STM)/       0.00 /  PROP STM MH2 (STM)/       0.00 /  PROP STM MH6 (STM)/       0.00 /
 PROP STM MH3 (STM)/       0.00 /  PROP STM MH7 (STM)/       0.00 /PROP STM CBMH8 (STM)/       0.00 /
 PROP STM MH9 (STM)/       0.00 /       STM7080 (STM)/       0.00 /           DI2 (STM)/       0.00 /
            ID*477/       0.00 /          HW-1 (STM)/    1132.41 /           J27 (STM)/       0.00 /
         DI1 (STM)/      88.90 /           DI3 (STM)/      42.71 /           DI4 (STM)/      37.10 /
     STM MH1A (STM)/       7.99 /

       Conduit/ Cross Sectional Area
 Pipe - (596) (STM)/       0.44 /  Pipe - (600) (STM)/       1.09 /  Pipe - (602) (STM)/       0.16 /
 Pipe - (605) (STM)/       0.28 /  Pipe - (607) (STM)/       0.07 /  Pipe - (608) (STM)/       0.22 /
 Pipe - (609) (STM)/       0.11 /  Pipe - (610) (STM)/       0.07 /  Pipe - (611) (STM)/       0.07 /
 Pipe - (612) (STM)/       0.16 /  Pipe - (674) (STM)/       0.28 /  Pipe - (676) (STM)/       1.08 /
            Link181/       0.00 /               503.1/       1.08 /               503.2/       1.08 /
              534.1/       1.08 /               534.2/       1.08 /               535.1/       1.51 /
              535.2/       1.51 /               537.1/       1.08 /               537.2/       1.08 /
       205mm PLATE/       0.03 /

       Conduit/  Final Volume
 Pipe - (596) (STM)/       9.12 /  Pipe - (600) (STM)/      32.15 /  Pipe - (602) (STM)/       4.83 /
 Pipe - (605) (STM)/       6.94 /  Pipe - (607) (STM)/       1.91 /  Pipe - (608) (STM)/       3.31 /
 Pipe - (609) (STM)/       1.26 /  Pipe - (610) (STM)/       2.64 /  Pipe - (611) (STM)/       0.61 /
 Pipe - (612) (STM)/       0.60 /  Pipe - (674) (STM)/       3.57 /  Pipe - (676) (STM)/      15.92 /
            Link181/       0.02 /               503.1/      31.59 /               503.2/      31.58 /
              534.1/      83.19 /               534.2/      83.21 /               535.1/      64.92 /
              535.2/      64.92 /               537.1/      49.32 /               537.2/      49.33 /
       205mm PLATE/      10.25 /

       Conduit/ Hydraulic Radius
 Pipe - (596) (STM)/       0.19 /  Pipe - (600) (STM)/       0.23 /  Pipe - (602) (STM)/       0.11 /
 Pipe - (605) (STM)/       0.15 /  Pipe - (607) (STM)/       0.08 /  Pipe - (608) (STM)/       0.13 /
 Pipe - (609) (STM)/       0.09 /  Pipe - (610) (STM)/       0.07 /  Pipe - (611) (STM)/       0.08 /
 Pipe - (612) (STM)/       0.11 /  Pipe - (674) (STM)/       0.15 /  Pipe - (676) (STM)/       0.23 /
            Link181/       0.01 /               503.1/       0.23 /               503.2/       0.23 /
              534.1/       0.23 /               534.2/       0.23 /               535.1/       0.37 /
              535.2/       0.37 /               537.1/       0.23 /               537.2/       0.23 /
       205mm PLATE/       0.05 /

       Conduit/ Upstream/ Downstream Elevation
 Pipe - (596) (STM)/   175.67/   175.92  Pipe - (600) (STM)/   175.66/   175.66  Pipe - (602) (STM)/   175.66/   175.66/
 Pipe - (605) (STM)/   175.66/   175.66  Pipe - (607) (STM)/   175.66/   175.66  Pipe - (608) (STM)/   175.66/   175.66/
 Pipe - (609) (STM)/   175.66/   175.66  Pipe - (610) (STM)/   175.67/   175.66  Pipe - (611) (STM)/   175.66/   175.66/
 Pipe - (612) (STM)/   175.67/   175.67  Pipe - (674) (STM)/   175.66/   175.67  Pipe - (676) (STM)/   175.66/   175.66/
            Link181/   175.67/   175.67               503.1/   175.66/   175.66               503.2/   175.66/   175.66/
              534.1/   175.66/   175.66               534.2/   175.66/   175.66               535.1/   175.66/   175.66/
              535.2/   175.66/   175.66               537.1/   175.66/   175.66               537.2/   175.66/   175.66/
       205mm PLATE/   175.67/   175.67

*==========================================================*
|         Table E7 -  Iteration Summary                    |
*==========================================================*

Total number of time steps simulated.............      25920
Total number of passes in the simulation........     109624
Total number of time steps during simulation.....    104198
Ratio of actual # of time steps / NTCYC.........      4.020
Average number of iterations per time step......      1.052
Average  time step size(seconds)................      1.244
Smallest time step size(seconds)................      1.000
Largest  time step size(seconds)................      5.000
Average minimum Conduit Courant time step (sec).      1.880
Average minimum implicit time step (sec)........      1.320
Average minimum junction time step (sec)........      1.320
Average Courant Factor Tf.......................      1.320
Number of times omega reduced...................       3457

*=====================================================*
|     Table E8 - Junction Time Step Limitation Summary |
*=====================================================*
```

```
|   Not Convr = Number of times this junction did not     |
|               converge during the simulation.           |
|   Avg Convr = Average junction iterations.              |
|   Conv err  = Mean convergence error.                   |
|   Omega Cng = Change of omega during iterations         |
|   Max Itern = Maximum number of iterations              |
*=========================================================*
```

Junction	Not Convr	Avg Convr	Total Itt	Omega Cng	Max Itern	Ittrn >10	Ittrn >25	Ittrn >40
StartNullStruct1	0	1.03	107226	0	5	0	0	0
PROP STM MH1 (STM)	0	1.12	116903	92	16	13	0	0
PROP STM CBMH4 (STM)	0	1.23	128554	777	18	188	0	0
PROP STM MH5 (STM)	0	1.08	112992	0	9	0	0	0
PROP STM MH2 (STM)	0	1.12	116523	1	8	0	0	0
PROP STM MH6 (STM)	0	1.32	137852	40	16	39	0	0
PROP STM MH3 (STM)	0	1.31	136112	755	20	201	0	0
PROP STM MH7 (STM)	0	1.22	127636	465	15	299	0	0
PROP STM CBMH8 (STM)	0	1.18	122967	176	16	9	0	0
PROP STM MH9 (STM)	0	1.07	111721	0	8	0	0	0
STM7080 (STM)	0	1.23	127871	540	481	133	1	1
DI2 (STM)	0	1.01	105312	1	64	1	1	1
ID*477	0	1.18	122542	139	17	32	0	0
HW-1 (STM)	0	1.10	114734	0	10	1	0	0
J27 (STM)	0	1.22	127475	2	13	3	0	0
DI1 (STM)	0	1.06	109966	0	7	0	0	0
DI3 (STM)	0	1.07	111588	0	6	0	0	0
DI4 (STM)	0	1.05	109910	0	6	0	0	0
STM MH1A (STM)	0	1.14	119151	469	495	8	2	2

```
Total number of iterations for all junctions..   2267035
Minimum number of possible iterations.........   1979762
Efficiency of the simulation.................       1.15
                                          Good Efficiency

*=========================================================*
| Extran Efficiency is an indicator of the efficiency of  |
| the simulation.  Ideal efficiency is one iteration per  |
| time step.  Altering the underrelaxation parameter,     |
| lowering the time step, increasing the flow and head    |
| tolerance are good ways of improving the efficiency,    |
| another is lowering the internal time step. The lower the|
| efficiency generally the faster your model will run.    |
| If your efficiency is less than 1.5 then you may try    |
| increasing your time step so that your overall simulation|
| is faster.  Ideal efficiency would be around 2.0        |
|                                                         |
| Good Efficiency      < 1.5           mean iterations    |
| Excellent Efficiency < 2.5 and > 1.5 mean iterations    |
| Good      Efficiency < 4.0 and > 2.5 mean iterations    |
| Fair      Efficiency < 7.5 and > 4.0 mean iterations    |
| Poor Efficiency      > 7.5           mean iterations    |
*=========================================================*
```

```
*=========================================================*
|        Table E9 - JUNCTION SUMMARY STATISTICS           |
| The Maximum area is only the area of the node, it       |
| does not include the area of the surrounding conduits|
*=========================================================*
```

Junction Name	Ground Elevation meters	Uppermost PipeCrown Elevation meters	Maximum Junction Elevation meters	Time of Occurence Hr.	Min.	Meters of Surcharge at Max Elevation	Freeboard of node meters	Maximum Junction Area m^2	Maximum Gutter Depth meters	Maximum Gutter Width meters	Maximum Gutter Velocity m/s
StartNullStruct1	174.7800	174.3800	175.7763	10	21	1.3963	0.0000	1.2200	0.0000	0.00	0.0000
PROP STM MH1 (STM)	176.9015	175.1398	175.7725	10	21	0.6327	1.1290	1.2200	0.0000	0.00	0.0000
PROP STM CBMH4 (STM)	176.8396	175.5974	175.7833	10	23	0.1859	1.0563	1.2200	0.0000	0.00	0.0000
PROP STM MH5 (STM)	176.8235	175.5176	175.7839	10	24	0.2663	1.0396	1.2200	0.0000	0.00	0.0000
PROP STM MH2 (STM)	176.6840	175.6002	175.7829	10	23	0.1827	0.9011	1.2200	0.0000	0.00	0.0000
PROP STM MH6 (STM)	176.6773	175.7300	175.7830	10	23	0.0530	0.8943	1.2200	0.0000	0.00	0.0000
PROP STM MH3 (STM)	176.6339	175.5400	175.7832	10	23	0.2432	0.8507	1.2200	0.0000	0.00	0.0000
PROP STM MH7 (STM)	176.6287	175.5478	175.7831	10	23	0.2353	0.8456	1.2200	0.0000	0.00	0.0000
PROP STM CBMH8 (STM)	176.5327	175.6000	175.7831	10	23	0.1831	0.7496	1.2200	0.0000	0.00	0.0000
PROP STM MH9 (STM)	176.2783	175.5783	175.7843	10	23	0.2060	0.4940	1.2200	0.0000	0.00	0.0000
STM7080 (STM)	175.9600	175.0700	175.7164	9	59	0.6464	0.2436	1.2200	0.0000	0.00	0.0000
DI2 (STM)	175.9318	175.4270	175.7968	10	22	0.3698	0.1350	1.2200	0.0000	0.00	0.0000
ID*477	175.7715	175.0296	175.7715	10	18	0.7419	0.0000	1.2200	0.0000	0.00	0.0000
HW-1 (STM)	175.6850	174.9600	175.7763	10	21	0.8163	0.0000	1.2200	0.0000	0.00	0.0000
J27 (STM)	175.6681	175.0100	176.0719	14	59	1.0619	0.0000	1.2200	0.0000	0.00	0.0000
DI1 (STM)	175.5379	175.4379	175.7915	10	25	0.3536	0.0000	1.2200	0.0000	0.00	0.0000
DI3 (STM)	175.4923	175.4853	175.7852	10	23	0.2999	0.0000	1.2200	0.0000	0.00	0.0000
DI4 (STM)	175.4347	175.3914	175.7895	10	24	0.3981	0.0000	1.2200	0.0000	0.00	0.0000
STM MH1A (STM)	175.3912	174.7812	175.7343	9	59	0.9531	0.0000	1.2200	0.0000	0.00	0.0000

```
*=========================================================*
|        Table E10 - CONDUIT SUMMARY STATISTICS           |
| Note: The peak flow may be less than the design flow |
| and the conduit may still surcharge because of the      |
| downstream boundary conditions.                         |
|                                                         |
| * denotes an open conduit that has been overtopped      |
|   this is a potential source of severe errors           |
*=========================================================*
```

Conduit Name	Design Flow (cms)	Conduit Design Velocity (m/s)	Maximum Vertical Depth (mm)	Maximum Computed Flow (cms)	Time of Occurence Hr.	Min.	Maximum Computed Velocity (m/s)	Time of Occurence Hr.	Min.	Ratio of Max. to Design Flow	Maximum Water Elev at Pipe Ends Upstream (m)	Dwnstrm (m)	Ratio d/D US	DS
Pipe - (596) (STM)	0.6016	1.3618	750.0000	0.1072	9	56	0.8892	9	54	0.1782	175.7163	175.6681	1.862	1.877
Pipe - (600) (STM)	1.6868	1.5618	600.0000	0.3303	9	25	0.4382	9	22	0.1958	175.7725	175.7715	2.090	2.236
Pipe - (602) (STM)	0.1627	1.0227	450.0000	0.0455	9	30	0.8778	9	30	0.2796	175.7843	175.7831	1.458	1.674
Pipe - (605) (STM)	0.3368	1.1910	600.0000	0.3541	9	25	1.5639	9	24	1.0515	175.7829	175.7725	1.950	2.055
Pipe - (607) (STM)	0.0582	0.8240	300.0000	0.0838	9	30	1.1474	9	30	1.4381	175.7968	175.7839	2.233	2.514
Pipe - (608) (STM)	0.2524	1.1660	525.0000	0.1696	9	30	1.3495	9	30	0.6720	175.7839	175.7832	1.507	1.606
Pipe - (609) (STM)	0.0938	0.8490	375.0000	0.1020	9	30	1.2189	9	30	1.0884	175.7915	175.7833	1.943	2.008
Pipe - (610) (STM)	0.0530	0.7498	300.0000	0.0428	9	30	0.8458	9	29	0.8084	175.7895	175.7831	2.327	2.678
Pipe - (611) (STM)	0.0520	0.7355	300.0000	0.0455	9	30	0.9858	9	30	0.8746	175.7852	175.7843	2.000	2.080
Pipe - (612) (STM)	0.1561	0.9817	450.0000	0.0895	9	54	1.1870	9	54	0.5733	175.7343	175.7163	3.118	3.103
Pipe - (674) (STM)	0.3361	1.1887	600.0000	0.3079	9	25	1.1333	9	24	0.9161	175.7715	175.7763	2.290	2.360
Pipe - (676) (STM)	1.9186	1.7765	600.0000	0.0962	9	30	0.6585	9	20	0.0502	175.7833	175.7832	1.310	1.405
Link181	0.0004	0.2269	50.0000	0.0002	9	22	0.1040	9	22	0.4780	175.7763	175.7763	28.33	28.93
503.1	1.6847	1.5599	600.0000	0.0397	9	27	0.4263	9	19	0.0236	175.7831	175.7830	1.392	1.538
503.2	1.9517	1.8071	600.0000	0.0604	9	30	0.4678	9	19	0.0310	175.7831	175.7830	1.392	1.588
534.1	1.7530	1.6231	600.0000	0.1244	9	26	0.4902	9	20	0.0710	175.7832	175.7829	1.472	1.888
534.2	1.8783	1.7392	600.0000	0.1505	9	29	0.5210	9	20	0.0801	175.7832	175.7829	1.472	1.950
535.1	3.0722	1.8964	900.0000	0.0909	9	24	0.3759	9	18	0.0296	175.7830	175.7829	1.059	1.203
535.2	3.0722	1.8964	900.0000	0.0909	9	24	0.3759	9	18	0.0296	175.7830	175.7829	1.059	1.203
537.1	1.7030	1.5768	600.0000	0.0503	9	24	0.4820	9	20	0.0295	175.7831	175.7830	1.305	1.538
537.2	1.8767	1.7377	600.0000	0.0579	9	25	0.5056	9	21	0.0309	175.7831	175.7830	1.305	1.588
205mm PLATE	0.0397	0.1467	204.9803	0.0897	9	55	2.6383	9	55	2.2597	175.7763	175.7343	7.056	6.866
FREE# 1	Undefnd	Undefnd	Undefnd	0.1081	9	56								

```
*=================================================*
| Table E11.  Area assumptions used in the analysis|
| Subcritical and Critical flow assumptions from   |
| Subroutine Head. See manual for more information.|
*=================================================*
```

Conduit Name	Duration of Dry Flow(min)	Duration of Sub-Critical Flow(min)	Durat. of Upstream Critical Flow(min)	Durat. of Downstream Critical Flow(min)	Maximum Hydraulic Radius-m	Maximum X-Sect Area(m^2)	Maximum Vel*D (m^2/s)
Pipe - (596) (STM)	84.89	2075.11	0.00	0.00	0.227	0.462	0.197
Pipe - (600) (STM)	30.50	2087.08	0.00	42.42	0.326	1.086	0.198
Pipe - (602) (STM)	20.25	1589.82	0.00	549.93	0.135	0.163	0.144
Pipe - (605) (STM)	24.64	1595.50	0.00	539.86	0.183	0.295	0.686
Pipe - (607) (STM)	15.75	1604.71	0.00	539.54	0.091	0.073	0.353
Pipe - (608) (STM)	15.89	1588.77	0.00	555.34	0.159	0.225	0.387
Pipe - (609) (STM)	15.47	1587.15	0.00	557.38	0.114	0.116	0.323
Pipe - (610) (STM)	15.92	1591.47	0.00	552.62	0.090	0.072	0.178

Pipe - (611) (STM)	15.92	1585.25	0.00	558.83	0.091	0.074	0.174
Pipe - (612) (STM)	87.53	2072.08	0.39	0.00	0.137	0.167	0.407
Pipe - (674) (STM)	39.00	2121.00	0.00	0.00	0.183	0.296	0.732
Pipe - (676) (STM)	18.72	1599.72	0.00	541.56	0.326	1.086	0.060
Link181	98.19	2061.81	0.00	0.00	0.015	0.002	0.060
503.1	15.97	1603.94	0.00	540.08	0.332	1.086	0.031
503.2	15.97	2144.03	0.00	0.00	0.326	1.086	0.042
534.1	15.97	2084.11	0.00	59.92	0.326	1.087	0.104
534.2	15.97	2144.03	0.00	0.00	0.326	1.087	0.123
535.1	15.97	1705.33	0.00	438.69	0.414	1.629	0.061
535.2	15.97	1705.33	0.00	438.69	0.414	1.629	0.061
537.1	15.81	1603.59	0.00	540.60	0.326	1.086	0.046
537.2	15.81	2144.19	0.00	0.00	0.326	1.086	0.056
205mm PLATE	35.44	2124.56	0.00	0.00	0.061	0.034	2.211

Table E12. Mean Conduit Flow Information

Conduit Name	Mean Flow (cms)	Total Flow (m^3)	Mean Percent Change	Low Flow Weightng	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Area	Mean Conduit Roughness
Pipe - (596) (STM)	0.0130	1684.0731	0.0004	0.9707	0.0897	0.1607	0.3627	0.0130
Pipe - (600) (STM)	0.0184	2387.1778	0.0003	0.9895	0.1056	0.1903	0.9014	0.0130
Pipe - (602) (STM)	0.0016	205.0894	0.0002	0.9923	0.1170	0.0949	0.1314	0.0130
Pipe - (605) (STM)	0.0186	2407.7986	0.0002	0.9909	0.1381	0.1320	0.2379	0.0130
Pipe - (607) (STM)	0.0029	372.1749	0.0001	0.9941	0.1286	0.0655	0.0594	0.0130
Pipe - (608) (STM)	0.0052	674.6256	0.0004	0.9941	0.1305	0.1131	0.1793	0.0130
Pipe - (609) (STM)	0.0054	694.1249	0.0002	0.9944	0.1313	0.0810	0.0919	0.0130
Pipe - (610) (STM)	0.0015	196.9341	0.0001	0.9938	0.1107	0.0643	0.0589	0.0130
Pipe - (611) (STM)	0.0016	209.8944	0.0002	0.9941	0.1185	0.0644	0.0586	0.0130
Pipe - (612) (STM)	0.0131	1691.3411	0.0004	0.9697	0.1332	0.0997	0.1338	0.0130
Pipe - (674) (STM)	0.0129	1677.5330	0.0003	0.9863	0.1066	0.1330	0.2396	0.0130
Pipe - (676) (STM)	0.0053	683.1132	0.0006	0.9935	0.1849	0.1862	0.8821	0.0130
Link181	0.0000	3.1832	0.0000	0.9661	0.0068	0.0121	0.0022	0.0130
503.1	-0.0002	-30.3756	0.0009	0.9945	0.1755	0.1859	0.8844	0.0130
503.2	0.0037	474.1838	0.0009	0.9945	0.1157	0.1863	0.8842	0.0130
534.1	0.0055	717.1918	0.0003	0.9945	0.1442	0.1870	0.8876	0.0130
534.2	0.0066	848.8887	0.0003	0.9945	0.1662	0.1875	0.8888	0.0130
535.1	0.0039	501.4309	0.0003	0.9945	0.1613	0.2682	1.2927	0.0130
535.2	0.0039	501.4309	0.0003	0.9945	0.1613	0.2682	1.2927	0.0130
537.1	0.0007	86.7617	0.0004	0.9945	0.1734	0.1861	0.8825	0.0130
537.2	0.0031	398.5287	0.0005	0.9945	0.1130	0.1863	0.8825	0.0130
205mm PLATE	0.0131	1699.0126	0.0000	0.9877	0.2133	0.0501	0.0315	0.0030
FREE# 1	0.0130	1683.9447						

Table E13. Channel losses(H), headwater depth (HW), tailwater depth (TW), critical and normal depth (Yc and Yn). Use this section for culvert comparisons

Conduit Name	Maximum Flow	Head Loss	Friction Loss	Critical Depth	Normal Depth	HW Elevat	TW Elevat	
Pipe - (596) (STM)	0.1007	0.0000	0.0461	0.1891	0.2075	175.0468	175.0573	Max Flow
Pipe - (600) (STM)	0.3301	0.0000	0.0549	0.1506	0.1610	174.9631	174.9633	Max Flow
Pipe - (602) (STM)	0.0455	0.0000	0.0980	0.1457	0.1627	175.2914	175.1904	Max Flow
Pipe - (605) (STM)	0.3541	0.0000	0.1001	0.3893	0.5260	175.0782	174.9771	Max Flow
Pipe - (607) (STM)	0.0837	0.0000	0.1835	0.2255	0.3000	175.4785	175.2909	Max Flow
Pipe - (608) (STM)	0.1695	0.0000	0.0639	0.2760	0.3151	175.2909	175.2161	Max Flow
Pipe - (609) (STM)	0.1020	0.0000	0.0529	0.2346	0.3750	175.3331	175.2650	Max Flow
Pipe - (610) (STM)	0.0428	0.0000	0.1189	0.1596	0.2045	175.2953	175.1800	Max Flow
Pipe - (611) (STM)	0.0454	0.0000	0.0380	0.1646	0.2173	175.3745	175.3249	Max Flow
Pipe - (612) (STM)	0.0895	0.0000	0.0170	0.2071	0.2443	174.5481	174.5270	Max Flow
Pipe - (674) (STM)	0.3071	0.0000	0.0274	0.3616	0.4510	174.9711	174.9432	Max Flow
Pipe - (676) (STM)	0.0962	0.0000	0.0562	0.0659	0.0683	175.1724	175.1719	Max Flow
Link181	0.0002	0.0000	0.0000	0.0172	0.0242	174.8348	174.8290	Max Flow
503.1	0.0397	0.0000	0.0823	0.0357	0.0423	175.1052	175.1054	Max Flow
503.2	0.0601	0.0000	0.0905	0.0484	0.0505	175.1709	175.1711	Max Flow
534.1	0.1243	0.0000	0.1626	0.0783	0.0845	175.0926	175.0911	Max Flow
534.2	0.1503	0.0000	0.1784	0.0889	0.0914	175.1677	175.1685	Max Flow
535.1	0.0908	0.0000	0.0962	0.0627	0.0710	175.0564	175.0568	Max Flow
535.2	0.0908	0.0000	0.0962	0.0627	0.0710	175.0564	175.0568	Max Flow
537.1	0.0503	0.0000	0.1311	0.0423	0.0493	175.0650	175.0475	Max Flow
537.2	0.0579	0.0000	0.1568	0.0471	0.0506	175.0749	175.0665	Max Flow
205mm PLATE	0.0897	0.0000	0.9824	0.2967	0.2050	175.5381	174.5547	Max Flow

Table E13a. CULVERT ANALYSIS CLASSIFICATION, and the time the culvert was in a particular classification during the simulation. The time is in minutes. The Dynamic Wave Equation is used for all conduit analysis but the culvert flow classification condition is based on the HW and TW depths.

Conduit Name	Mild Slope Critical D Outlet Control	Mild Slope TW Control Outlet Control	Steep Slope TW Insignf Entrance Control	Slug Flow Outlet/ Entrance Control	Mild Slope TW > D Outlet Control	Mild Slope TW <= D Outlet Control	Outlet Control	Inlet Control	Inlet Configuration
Pipe - (596) (STM)	0.0000	511.8333	84.8333	0.0000	1563.3333	0.0000	0.0000	0.0000	None
Pipe - (600) (STM)	20.3333	516.3333	30.5000	0.0000	1592.8333	0.0000	0.0000	0.0000	None
Pipe - (602) (STM)	547.1667	18.0000	22.1667	0.0000	1572.6667	0.0000	0.0000	0.0000	None
Pipe - (605) (STM)	533.3333	10.5000	26.3333	0.0000	1589.8333	0.0000	0.0000	0.0000	None
Pipe - (607) (STM)	537.3333	22.8333	17.0000	0.0000	1582.8333	0.0000	0.0000	0.0000	None
Pipe - (608) (STM)	536.3333	33.0000	16.8333	0.0000	1573.8333	0.0000	0.0000	0.0000	None
Pipe - (609) (STM)	552.3333	14.1667	16.1667	0.0000	1577.3333	0.0000	0.0000	0.0000	None
Pipe - (610) (STM)	550.0000	6.6667	17.6667	0.0000	1585.6667	0.0000	0.0000	0.0000	None
Pipe - (611) (STM)	552.5000	16.5000	16.8333	0.0000	1574.1667	0.0000	0.0000	0.0000	None
Pipe - (612) (STM)	2.3333	506.0000	87.5000	0.0000	1564.1667	0.0000	0.0000	0.0000	None
Pipe - (674) (STM)	112.3333	414.1667	39.6667	0.0000	1593.8333	0.0000	0.0000	0.0000	None
Pipe - (676) (STM)	463.8333	110.1667	18.6667	0.0000	1567.3333	0.0000	0.0000	0.0000	None
Link181	0.0000	19.1667	98.1667	0.0000	2042.6667	0.0000	0.0000	0.0000	None
503.1	365.1667	205.0000	15.8333	0.0000	1574.0000	0.0000	0.0000	0.0000	None
503.2	0.0000	568.1667	15.8333	0.0000	1576.0000	0.0000	0.0000	0.0000	None
534.1	28.1667	528.8333	15.8333	0.0000	1587.1667	0.0000	0.0000	0.0000	None
534.2	0.1667	555.3333	15.8333	0.0000	1588.6667	0.0000	0.0000	0.0000	None
535.1	421.0000	162.1667	15.8333	0.0000	1561.0000	0.0000	0.0000	0.0000	None
535.2	421.0000	162.1667	15.8333	0.0000	1561.0000	0.0000	0.0000	0.0000	None
537.1	363.1667	207.1667	15.6667	0.0000	1574.0000	0.0000	0.0000	0.0000	None
537.2	0.0000	568.3333	15.6667	0.0000	1576.0000	0.0000	0.0000	0.0000	None
205mm PLATE	496.5000	20.1667	35.3333	0.0000	961.3333	620.6667	26.0000	0.0000	None

Kinematic Wave Approximations
Time in Minutes for Each Condition

Conduit Name	Duration of Normal Flow	Slope Criteria	Super-Critical	Roll Waves
Pipe - (596) (STM)	0.0000	1238.0056	0.0000	0.0000
Pipe - (600) (STM)	349.8889	1730.6667	0.0000	0.0000
Pipe - (602) (STM)	0.0000	1148.3861	0.0000	0.0000
Pipe - (605) (STM)	0.0167	1263.6722	0.0000	0.0000
Pipe - (607) (STM)	0.0500	1229.8250	0.0000	0.0000
Pipe - (608) (STM)	0.0167	1225.1833	0.0000	0.0000
Pipe - (609) (STM)	0.0000	1256.7139	0.0000	0.0000
Pipe - (610) (STM)	0.0500	1263.3583	0.0000	0.0000
Pipe - (611) (STM)	0.0000	1232.4667	0.0000	0.0000
Pipe - (612) (STM)	0.0333	1233.8611	0.0000	0.0000
Pipe - (674) (STM)	0.0000	1609.7528	27.0139	0.0000
Pipe - (676) (STM)	0.0000	1261.9889	0.0000	0.0000
Link181	4.1944	1903.9889	0.0000	0.0000
503.1	0.0000	344.1361	0.0000	0.0000
503.2	2.6458	1287.5694	0.0000	0.0000
534.1	11.6694	1279.1472	0.0000	0.0000
534.2	12.0111	1279.1306	0.0000	0.0000
535.1	4.6111	1283.1250	0.0000	0.0000
535.2	4.6111	1283.1250	0.0000	0.0000

537.1	0.0333	724.2222	0.0000	0.0000
537.2	5.2500	1255.6722	0.0000	0.0000
205mm PLATE	0.0500	40.8472	36.0167	0.0000

Table E15 - SPREADSHEET INFO LIST

Conduit Flow and Junction Depth Information for use in spreadsheets. The maximum values in this table are the true maximum values because they sample every time step. The values in the review results may only be the maximum of a subset of all the time steps in the run. Note: These flows are only the flows in a single barrel.

Conduit Name	Maximum Flow (cms)	Total Flow (m^3)	Maximum Velocity (m/s)	Maximum Volume (m^3)
Pipe - (596) (STM)	0.1072	1684.0731	0.8892	9.5121
Pipe - (600) (STM)	0.3303	2387.1778	0.4382	32.1785
Pipe - (602) (STM)	0.0455	205.0894	0.8778	4.9884
Pipe - (605) (STM)	0.3541	2407.7986	1.5639	7.2329
Pipe - (607) (STM)	0.0838	372.1749	1.1474	1.9768
Pipe - (608) (STM)	0.1696	674.6256	1.3495	3.4652
Pipe - (609) (STM)	0.1020	694.1249	1.2189	1.3157
Pipe - (610) (STM)	0.0428	196.9341	0.8458	2.6818
Pipe - (611) (STM)	0.0455	209.8944	0.9858	0.6409
Pipe - (612) (STM)	0.0895	1691.3411	1.1870	0.6227
Pipe - (674) (STM)	0.3079	1677.5330	1.1333	3.7199
Pipe - (676) (STM)	0.0962	683.1132	0.6585	15.9385
Link181	0.0002	3.1832	0.1040	0.0231
503.1	0.0397	-30.3756	0.4263	31.6417
503.2	0.0604	474.1838	0.4678	31.6396
534.1	0.1244	717.1918	0.4902	83.2923
534.2	0.1505	848.8887	0.5210	83.3161
535.1	0.0909	501.4309	0.3759	69.5504
535.2	0.0909	501.4309	0.3759	69.5504
537.1	0.0503	86.7617	0.4820	49.3750
537.2	0.0579	398.5287	0.5056	49.3820
205mm PLATE	0.0897	1699.0126	2.6383	10.3666
FREE# 1	0.1081	1683.9447	0.0000	0.0000

Junction Name	Invert Elevation (m)	Maximum Elevation (m)
StartNullStruct1	174.3300	175.7763
PROP STM MH1 (STM)	174.5188	175.7725
PROP STM CBMH4 (STM)	174.9974	175.7833
PROP STM MH5 (STM)	174.9926	175.7839
PROP STM MH2 (STM)	174.6132	175.7829
PROP STM MH6 (STM)	174.8300	175.7830
PROP STM MH3 (STM)	174.9000	175.7832
PROP STM MH7 (STM)	174.9478	175.7831
PROP STM CBMH8 (STM)	175.0000	175.7831
PROP STM MH9 (STM)	175.1283	175.7843
STM7080 (STM)	174.3200	175.7164
DI2 (STM)	175.1270	175.7968
ID*477	174.3976	175.7715
HW-1 (STM)	174.3600	175.7763
J27 (STM)	174.2600	176.0719
DI1 (STM)	175.0629	175.7915
DI3 (STM)	175.1853	175.7852
DI4 (STM)	175.0914	175.7895
STM MH1A (STM)	174.3270	175.7343

Table E15a - SPREADSHEET REACH LIST

Peak flow and Total Flow listed by Reach or those conduits or diversions having the same upstream and downstream nodes.

Upstream Node	Downstream Node	Maximum Flow (cms)	Total Flow (m^3)
STM7080 (STM)	J27 (STM)	0.1072	1684.0731
PROP STM MH1 (STM)	ID*477	0.3303	2387.1778
PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	0.0455	205.0894
PROP STM MH2 (STM)	PROP STM MH1 (STM)	0.3541	2407.7986
DI2 (STM)	PROP STM MH5 (STM)	0.0838	372.1749
PROP STM MH5 (STM)	PROP STM MH3 (STM)	0.1696	674.6256
DI1 (STM)	PROP STM CBMH4 (STM)	0.1020	694.1249
DI4 (STM)	PROP STM MH7 (STM)	0.0428	196.9341
DI3 (STM)	PROP STM MH9 (STM)	0.0455	209.8944
STM MH1A (STM)	STM7080 (STM)	0.0895	1691.3411
ID*477	HW-1 (STM)	0.3079	1677.5330
PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	0.0962	683.1132
HW-1 (STM)	StartNullStruct1	0.0002	3.1832
PROP STM MH7 (STM)	PROP STM MH6 (STM)	0.0985	443.8082
PROP STM MH3 (STM)	PROP STM MH2 (STM)	0.2723	1566.0805
PROP STM MH6 (STM)	PROP STM MH2 (STM)	0.1818	1002.8618
PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	0.1080	485.2905
StartNullStruct1	STM MH1A (STM)	0.0897	1699.0126

Table E16. New Conduit Information Section
Conduit Invert (IE) Elevation and Conduit Maximum Water Surface (WS) Elevations

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
Pipe - (596) (STM)	STM7080 (STM)	J27 (STM)	174.3	174.3	175.7	175.7	Circular
Pipe - (600) (STM)	PROP STM MH1 (STM)	ID*477	174.5	174.4	175.8	175.8	Rectangle
Pipe - (602) (STM)	PROP STM MH9 (STM)	PROP STM CBMH8 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (605) (STM)	PROP STM MH2 (STM)	PROP STM MH1 (STM)	174.6	174.5	175.8	175.8	Circular
Pipe - (607) (STM)	DI2 (STM)	PROP STM MH5 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (608) (STM)	PROP STM MH5 (STM)	PROP STM MH3 (STM)	175.0	174.9	175.8	175.8	Circular
Pipe - (609) (STM)	DI1 (STM)	PROP STM CBMH4 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (610) (STM)	DI4 (STM)	PROP STM MH7 (STM)	175.1	175.0	175.8	175.8	Circular
Pipe - (611) (STM)	DI3 (STM)	PROP STM MH9 (STM)	175.2	175.2	175.8	175.8	Circular
Pipe - (612) (STM)	STM MH1A (STM)	STM7080 (STM)	174.3	174.3	175.7	175.7	Circular
Pipe - (674) (STM)	ID*477	HW-1 (STM)	174.4	174.4	175.8	175.8	Circular
Pipe - (676) (STM)	PROP STM CBMH4 (STM)	PROP STM MH3 (STM)	175.0	174.9	175.8	175.8	Rectangle
Link181	HW-1 (STM)	StartNullStruct1	174.4	174.3	175.8	175.8	Circular
503.1	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9	174.9	175.8	175.8	Rectangle
503.2	PROP STM MH7 (STM)	PROP STM MH6 (STM)	174.9	174.8	175.8	175.8	Rectangle
534.1	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9	174.7	175.8	175.8	Rectangle
534.2	PROP STM MH3 (STM)	PROP STM MH2 (STM)	174.9	174.6	175.8	175.8	Rectangle
535.1	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8	174.7	175.8	175.8	Rectangle
535.2	PROP STM MH6 (STM)	PROP STM MH2 (STM)	174.8	174.7	175.8	175.8	Rectangle
537.1	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0	174.9	175.8	175.8	Rectangle
537.2	PROP STM CBMH8 (STM)	PROP STM MH6 (STM)	175.0	174.8	175.8	175.8	Rectangle
205mm PLATE	StartNullStruct1	STM MH1A (STM)	174.3	174.3	175.8	175.7	Circ Orif

Table E18 - Junction Continuity Error. Division by Volume added 11/96

Continuity Error = (Net Flow + Beginning Volume - Ending Volume) / (Total Flow + (Beginning Volume + Ending Volume)/2)

Net Flow = Node Inflow - Node Outflow
Total Flow = absolute (Inflow + Outflow)
Intermediate column is a judgement on the node continuity error.

Excellent < 1 percent   Great 1 to 2 percent   Good 2 to 5 percent
Fair 5 to 10 percent   Poor 10 to 25 percent   Bad 25 to 50 percent
Terrible > 50 percent

Junction Name	Continuity Error Volume	Continuity Error % of Node	Continuity Error % of Inflow	Remaining Volume	Beginning Volume	Net Flow Thru Node	Total Flow Thru Node	Failed to Converge
StartNullStruct1	-1.6289	-0.0479	0.0287	1.6289	0.0000	-0.0000	3398.1015	0
PROP STM MH1 (STM)	-0.4204	-0.0087	0.0074	20.9350	0.0000	20.5146	4794.9764	0
PROP STM CBMH4 (STM)	1.7101	0.1237	0.0301	9.4034	0.0000	11.1135	1377.2381	0
PROP STM MH5 (STM)	1.4982	0.1105	0.0264	3.4292	0.0000	4.9274	1354.1873	0
PROP STM MH2 (STM)	6.3004	0.1247	0.1108	154.8206	0.0000	161.1210	4976.7410	0
PROP STM MH6 (STM)	7.8170	0.3402	0.1375	148.8518	0.0000	156.6688	2223.1414	0
PROP STM MH3 (STM)	0.2728	0.0083	0.0048	93.6779	0.0000	93.9506	3226.0984	0
PROP STM MH7 (STM)	3.6249	0.3615	0.0638	33.7874	0.0000	37.4123	985.9249	0
PROP STM CBMH8 (STM)	5.8223	0.5518	0.1024	52.5611	0.0000	58.3834	1028.8931	0
PROP STM MH9 (STM)	1.3982	0.3355	0.0246	3.4138	0.0000	4.8120	414.9838	0
STM7080 (STM)	0.6029	0.0178	0.0106	6.5128	0.0000	7.1158	3375.4142	0
DI2 (STM)	1.5899	0.2129	0.0280	0.6523	0.0000	2.2422	746.5917	0
ID*477	1.1603	0.0285	0.0204	19.4024	0.0000	709.6632	4064.7127	0
HW-1 (STM)	-1.5923	-0.0625	0.0280	1.5923	0.0000	-0.0000	2544.9646	0
J27 (STM)	-6.5434	-0.1934	0.1151	6.5875	0.0000	0.0440	3379.3003	0
DI1 (STM)	-41.3902	-2.7977	0.7281	0.7343	0.0000	-40.6559	1479.0939	0
DI3 (STM)	-35.6240	-7.6816	0.6267	0.5852	0.0000	-35.0389	463.4670	0
DI4 (STM)	-22.3395	-5.1423	0.3930	0.7006	0.0000	-21.6390	434.0764	0
STM MH1A (STM)	0.4223	0.0124	0.0074	7.0591	0.0000	7.4814	3390.3538	0

The total continuity error was -77.320 cubic meters
The remaining total volume was 566.34 cubic meters

```
Your mean node continuity error was   Excellent
Your worst node continuity error was  Excellent

  *=====================================================*
  |  Table E19 - Junction Inflow & Outflow Listing    |
  |              Units are either ft^3 or m^3         |
  |              depending on the units in your model.|
  *=====================================================*
```

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inlow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Inflow from 2D Layer	Outflow from Node	Evaporation from Node	Basin Infil.
StartNullStruct1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1695.9056	0.0712	0.0000	0.00
PROP STM MH5 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	307.3660	0.0000	0.0000	0.0000	0.00
PROP STM MH6 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	230.4139	0.0000	0.0000	0.0000	0.00
PROP STM MH3 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	302.2587	0.0000	0.0000	0.0000	0.00
PROP STM MH7 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	284.4125	0.0000	0.0000	0.0000	0.00
PROP STM CBMH8 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	338.4909	0.0000	0.0000	0.0000	0.00
DI2 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	374.3995	0.0000	0.0000	0.0000	0.00
ID*477	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	689.1004	0.0000	0.00
HW-1 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	845.3320	18.8819	2538.6165	0.0000	0.00
J27 (STM)	0.0000	0.0000	0.0000	0.0000	11.2825	0.0000	0.0000	1695.2017	0.0000	0.00
DI1 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	742.3638	42.5868	88.9066	0.0000	0.00
DI3 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	217.5475	36.0169	42.7033	0.0000	0.00
DI4 (STM)	0.0000	0.0000	0.0000	0.0000	0.0000	212.4110	24.7237	37.1167	0.0000	0.00

```
  *=====================================================*
  | Table E20 - Junction Flooding and Volume Listing.   |
  |             The maximum volume is the total volume  |
  |             in the node including the volume in the |
  |             flooded storage area. This is the max   |
  |             volume at any time. The volume in the   |
  |             flooded storage area is the total volume|
  |             above the ground elevation, where the   |
  |             flooded pond storage area starts.       |
  | The fourth column is instantaneous, the fifth is the|
  | sum of the flooded volume over the entire simulation|
  | Units are either ft^3 or m^3 depending on the units.|
  *=====================================================*
```

Junction Name	Surcharged Time (min)	Flooded Time(min)	Out of 1D-System (Flooded Volume)	Maximum Volume	Passed to 2D cell OR Volume Stored in allowed Flood Pond of 1D-System
StartNullStruct1	2.043E+03	1.599E+03	7.119E-02	1.76	7.119E-02
PROP STM MH1 (STM)	1.590E+03	0.000	0.000	1.53	0.000
PROP STM CBMH4 (STM)	1.561E+03	0.000	0.000	0.959	0.000
PROP STM MH5 (STM)	1.570E+03	0.000	0.000	0.965	0.000
PROP STM MH2 (STM)	1.561E+03	0.000	0.000	1.43	0.000
PROP STM MH6 (STM)	470.	0.000	0.000	1.16	0.000
PROP STM MH3 (STM)	1.567E+03	0.000	0.000	1.08	0.000
PROP STM MH7 (STM)	1.565E+03	0.000	0.000	1.02	0.000
PROP STM CBMH8 (STM)	1.561E+03	0.000	0.000	0.955	0.000
PROP STM MH9 (STM)	1.563E+03	0.000	0.000	0.800	0.000
STM7080 (STM)	1.563E+03	0.000	0.000	1.70	0.000
DI2 (STM)	1.586E+03	0.000	0.000	0.817	0.000
ID*477	1.593E+03	259.	689.	1.68	0.000
HW-1 (STM)	1.594E+03	833.	2.539E+03	1.73	2.539E+03
J27 (STM)	1.563E+03	0.000	0.000	2.21	0.000
DI1 (STM)	1.577E+03	1.569E+03	88.9	0.889	88.9
DI3 (STM)	1.573E+03	1.572E+03	42.7	0.732	42.7
DI4 (STM)	1.580E+03	1.578E+03	37.1	0.852	37.1
STM MH1A (STM)	1.564E+03	1.562E+03	0.000	1.72	7.99

```
  *==================================*
  | Simulation Specific Information  |
  *==================================*
  Number of Input Conduits..........        21 Number of Simulated Conduits......        23
  Number of Natural Channels........         0 Number of Junctions...............        19
  Number of Storage Junctions.......         0 Number of Weirs...................         0
  Number of Orifices................         1 Number of Pumps...................         0
  Number of Free Outfalls...........         1 Number of Tide Gate Outfalls......         0


  *==========================================================*
  | Average % Change in Junction or Conduit is defined as:  |
  | Conduit  % Change ==> 100.0 ( Q(n+1) - Q(n) ) / Qfull   |
  | Junction % Change ==> 100.0 ( Y(n+1) - Y(n) ) / Yfull   |
  *==========================================================*

  The Conduit with the largest average change was..                503.2 with     0.001 percent
  The Junction with the largest average change was.  PROP STM MH7 (STM) with     0.040 percent
  The Conduit with the largest sinuosity was.......  Pipe - (611) (STM) with    68.307


  *==================================================================*
  | Table E21. Continuity balance at the end of the simulation       |
  |            Junction Inflow, Outflow or Street Flooding           |
  | Error = Inflow  + Initial Volume - Outflow - Final   Volume      |
  *==================================================================*
```

Junction	Inflow Volume, m^3	Average Inflow, cms
StartNullStruct1	1695.9056	0.0131
PROP STM MH5 (STM)	307.3868	0.0024
PROP STM MH6 (STM)	230.4297	0.0018
PROP STM MH3 (STM)	302.2790	0.0023
PROP STM MH7 (STM)	284.4314	0.0022
PROP STM CBMH8 (STM)	338.5133	0.0026
DI2 (STM)	374.4168	0.0029
ID*477	0.0019	0.0000
HW-1 (STM)	864.2484	0.0067
J27 (STM)	11.2826	0.0001
DI1 (STM)	784.9690	0.0061
DI3 (STM)	253.5726	0.0020
DI4 (STM)	237.1423	0.0018
StartNullStruct1	-0.0712	-0.0000
ID*477	-689.1004	-0.0053
HW-1 (STM)	-2538.6165	-0.0196
J27 (STM)	-1695.2017	-0.0131
DI1 (STM)	-88.9066	-0.0007
DI3 (STM)	-42.7033	-0.0003
DI4 (STM)	-37.1167	-0.0003

Junction	Outflow Volume m^3	Average Outflow, cms
StartNullStruct1	0.0712	0.0000
ID*477	689.1004	0.0053
HW-1 (STM)	2538.6165	0.0196
J27 (STM)	1695.2017	0.0131
DI1 (STM)	88.9066	0.0007
DI3 (STM)	42.7033	0.0003
DI4 (STM)	37.1167	0.0003

```
  *=====================================================*
  | Initial system volume        =        0.0000 Cu M  |
  | Total system inflow volume   =     5684.3933 Cu M  |
  | Inflow + Initial volume      =     5684.3933 Cu M  |
  *=====================================================*
  | Total system outflow         =     5091.7165 Cu M  |
  | Volume left (Final volume)   =      566.3356 Cu M  |
  | Evaporation                  =        0.0000 Cu M  |
  | Basin Infiltration           =        0.0000 Cu M  |
  | Outflow + Final Volume       =     5658.0521 Cu M  |
  *=====================================================*

  *==============================================*
  | Total Model Continuity Error                 |
```

```
| Error in Continuity, Percent =         0.4634 |
| Error in Continuity, m^3     =        26.3413 |
| + Error means a continuity loss, - a gain    |
*==============================================*


##################################################
# Table E22. Numerical Model judgement section    #
##################################################

Overall error was (minimum of Table E18 & E21)              0.4634 percent
Worst nodal error was in node DI1 (STM)            with    -2.7977 percent
Of the total inflow this loss was                           0.7281 percent
Your overall continuity error was                  Excellent
                                                  Excellent Efficiency
Efficiency of the simulation                       1.15
Most Number of Non Convergences at one Node        0.
Total Number Non Convergences at all Nodes         0.
Total Number of Nodes with Non Convergences        0.


#######################################################
# Table E23. New Basin Design Information               #
#            Maximum Hydraulic Grade Line,              #
#            Out Conduit Sizes and Maximum Flow         #
#######################################################

A) Resize d/s Pipes based on given HGL
B) Resize Basin based on given HGL
C) Resize d/s Pipes and Basin based on HGL and max discharge
D) Resize d/s pipes based on given max discharge

        Basin Name    Type    Max.HGL        Conduit         Depth   Width   Barrels   Max.Flow
                                (m)                             (m)     (m)                (m^3/s)
-------------------- ------  --------- -------------------- ------- ------- --------- ---------

===> Hydraulic model simulation ended normally.
===> XP-SWMM Simulation ended normally.
===> Your input file was named  : P:\2018\18249\SWMM and REPORT\XPSWMM-REV7\XPSWMM - UST\1D\18249 xpswmm-rev-0-UST_UST\18249 xpswmm-rev-0-UST_UST.DAT
===> Your output file was named : P:\2018\18249\SWMM and REPORT\XPSWMM-REV7\XPSWMM - UST\1D\18249 xpswmm-rev-0-UST_UST\18249 xpswmm-rev-0-UST_UST.out

*==============================================================*
|         XPSWMM/XPSTORM Simulation Date and Time Summary      |
*==============================================================*
| Starting Date... January     3, 2020  Time...  15:18:51.695  |
|   Ending Date... January     3, 2020  Time...  15:39:50.305  |
|  Elapsed Time...   38.73542 minutes or   2324.12500 seconds  |
*==============================================================*
```

Contech CDS Oil-Grit Separator Design Calculations, CETV Certification

CDS 2-Year Chicago Storm Event TSS Removal Efficiency Computations

Project: Dillion Drive, Windsor

Given:	Area	=	**2.28**	ha	C	=	**0.8**
	2-year peak flow	=	**361.9**	L/s			
Note:	TSS assumed equally dispersed throughout the hydrograph						

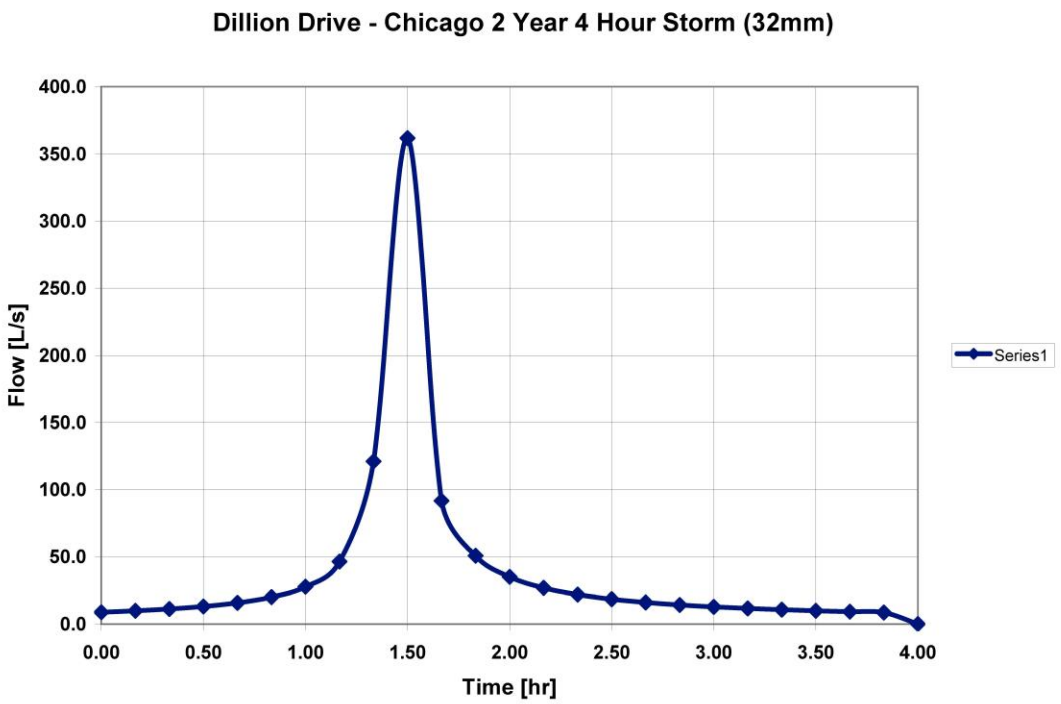
CDS FLOW	L/s range 0 - 14	L/s range 14 - 28	L/s range 28 -56	L/s range 56 - 113	L/s range 113 - 170	L/s range 170 - 283	L/s range 283 - 425	L/s range 425 - 538	L/s range > 538	Total
Volume (m^3)	69	98	91	112	50	121	0	0	0	542
Percent of Total	12.7	18.1	16.7	20.8	9.3	22.4	0.0	0.0	0.0	100.0

CDS Model	PMSU 5645-10	
CDS Capacity	283	L/s

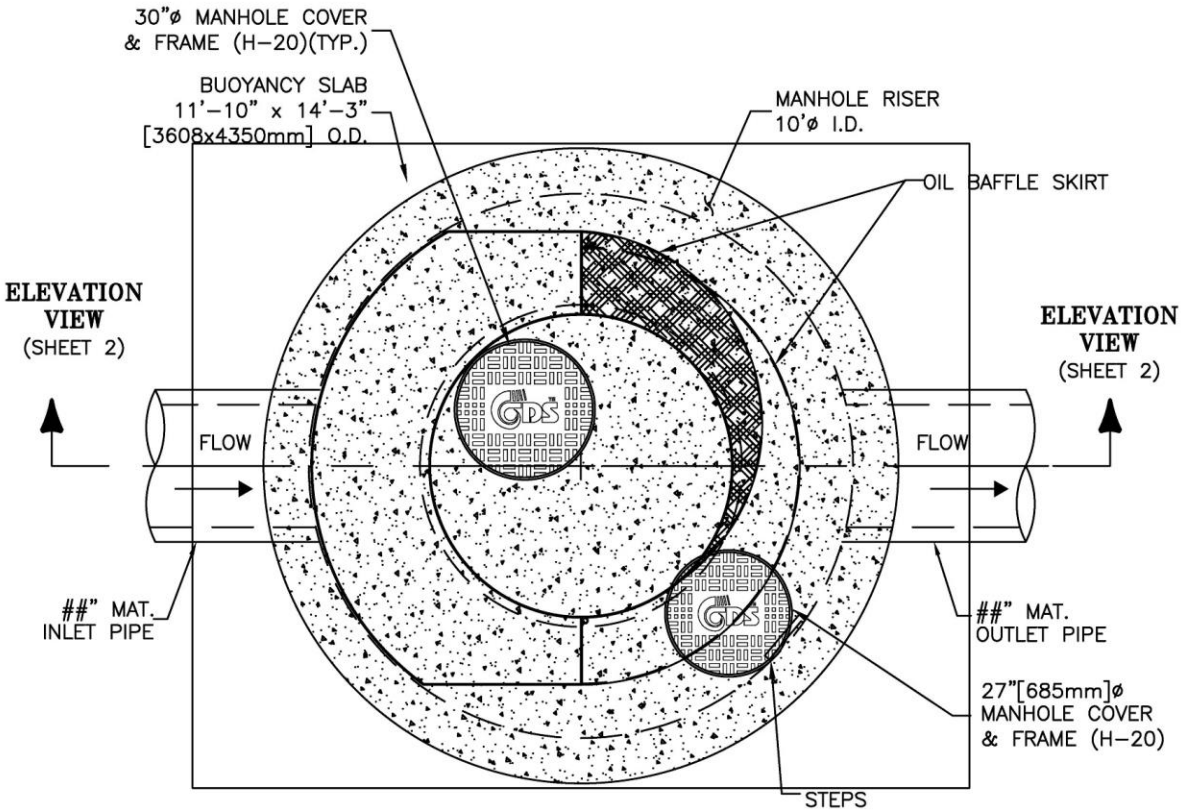
Net TSS removal % for given hydrograph = **81.0** %

Hydrograph 2 Year Chicago Event

Time (hr)	Chicago Hydrograph Flow (L/s)	Increment Flow Through CDS (L/s)	Average Increment Flow Through CDS (L/s)	Increment Flow Bypassing CDS (L/s)	Average Increment Flow Bypassing CDS (L/s)	CDS Operating Ratio	Increment Volume Through CDS (m^3)	Cumulative Volume Through CDS (m^3)	CDS TSS Removal Efficiency (Fine Distribution) (%)	Percent of TSS Removed From Flow Through CDS (%)	Increment Volume Bypassing CDS (m^3)	Cumulative Volume Bypassing CDS (m^3)	Percent of Total TSS Removed for all flow (%)	Cumulative Percent TSS Removed (%)
0.00	8.8	8.8	8.8	0.0	0.0	0.03	7.9	7.9	98.0	1.43	0.0	0.0	1.3	1.3
0.17	9.8	9.8	9.3	0.0	0.0	0.03	5.6	13.5	97.9	1.01	0.0	0.0	0.9	2.2
0.33	11.2	11.2	10.5	0.0	0.0	0.04	6.3	19.8	97.7	1.14	0.0	0.0	1.0	3.3
0.50	13.0	13.0	12.1	0.0	0.0	0.05	7.3	27.0	97.5	1.31	0.0	0.0	1.2	4.5
0.67	15.7	15.7	14.4	0.0	0.0	0.06	8.6	35.7	97.3	1.55	0.0	0.0	1.4	5.9
0.83	20.0	20.0	17.8	0.0	0.0	0.07	10.7	46.4	96.8	1.91	0.0	0.0	1.8	7.7
1.00	27.7	27.7	23.8	0.0	0.0	0.10	14.3	60.7	96.1	2.54	0.0	0.0	2.3	10.0
1.17	46.4	46.4	37.1	0.0	0.0	0.16	22.2	82.9	94.2	3.87	0.0	0.0	3.6	13.6
1.33	121.0	121.0	83.7	0.0	0.0	0.43	50.2	133.1	86.6	8.03	0.0	0.0	7.4	20.9
1.50	361.8	283.2	202.1	78.6	39.3	1.00	121.3	254.4	70.2	15.71	23.6	23.6	14.5	35.4
1.67	91.7	91.7	187.4	0.0	39.3	0.32	112.4	366.8	89.6	18.60	23.6	47.2	17.1	52.5
1.83	50.7	50.7	71.2	0.0	0.0	0.18	42.7	409.6	93.7	7.39	0.0	47.2	6.8	59.3
2.00	35.0	35.0	42.9	0.0	0.0	0.12	25.7	435.3	95.3	4.53	0.0	47.2	4.2	63.5
2.17	26.9	26.9	30.9	0.0	0.0	0.09	18.6	453.8	96.1	3.29	0.0	47.2	3.0	66.5
2.33	21.8	21.8	24.3	0.0	0.0	0.08	14.6	468.4	96.6	2.61	0.0	47.2	2.4	68.9
2.50	18.4	18.4	20.1	0.0	0.0	0.07	12.1	480.5	97.0	2.16	0.0	47.2	2.0	70.9
2.67	16.0	16.0	17.2	0.0	0.0	0.06	10.3	490.9	97.2	1.86	0.0	47.2	1.7	72.6
2.83	14.2	14.2	15.1	0.0	0.0	0.05	9.1	499.9	97.4	1.63	0.0	47.2	1.5	74.1
3.00	12.7	12.7	13.5	0.0	0.0	0.04	8.1	508.0	97.6	1.45	0.0	47.2	1.3	75.4
3.17	11.6	11.6	12.2	0.0	0.0	0.04	7.3	515.3	97.7	1.32	0.0	47.2	1.2	76.6
3.33	10.6	10.6	11.1	0.0	0.0	0.04	6.7	522.0	97.8	1.2	0.0	47.2	1.1	77.7
3.50	9.8	9.8	10.2	0.0	0.0	0.03	6.1	528.1	97.9	1.11	0.0	47.2	1.0	78.8
3.67	9.2	9.2	9.5	0.0	0.0	0.03	5.7	533.8	97.9	1.03	0.0	47.2	0.9	79.7
3.83	8.6	8.6	8.9	0.0	0.0	0.03	5.3	539.1	98.0	0.96	0.0	47.2	0.9	80.6
4.00	0.0	0.0	4.3	0.0	0.0	0.00	2.6	541.7	98.9	0.47	0.0	47.2	0.4	81.0
TOTALS							**541.7**			**88.09**	**47.2**		**81.0**	


Dillion Drive - Chicago 2 Year 4 Hour Storm (32mm)
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Flow [L/s]
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
Time [hr]
Series1

PLAN VIEW

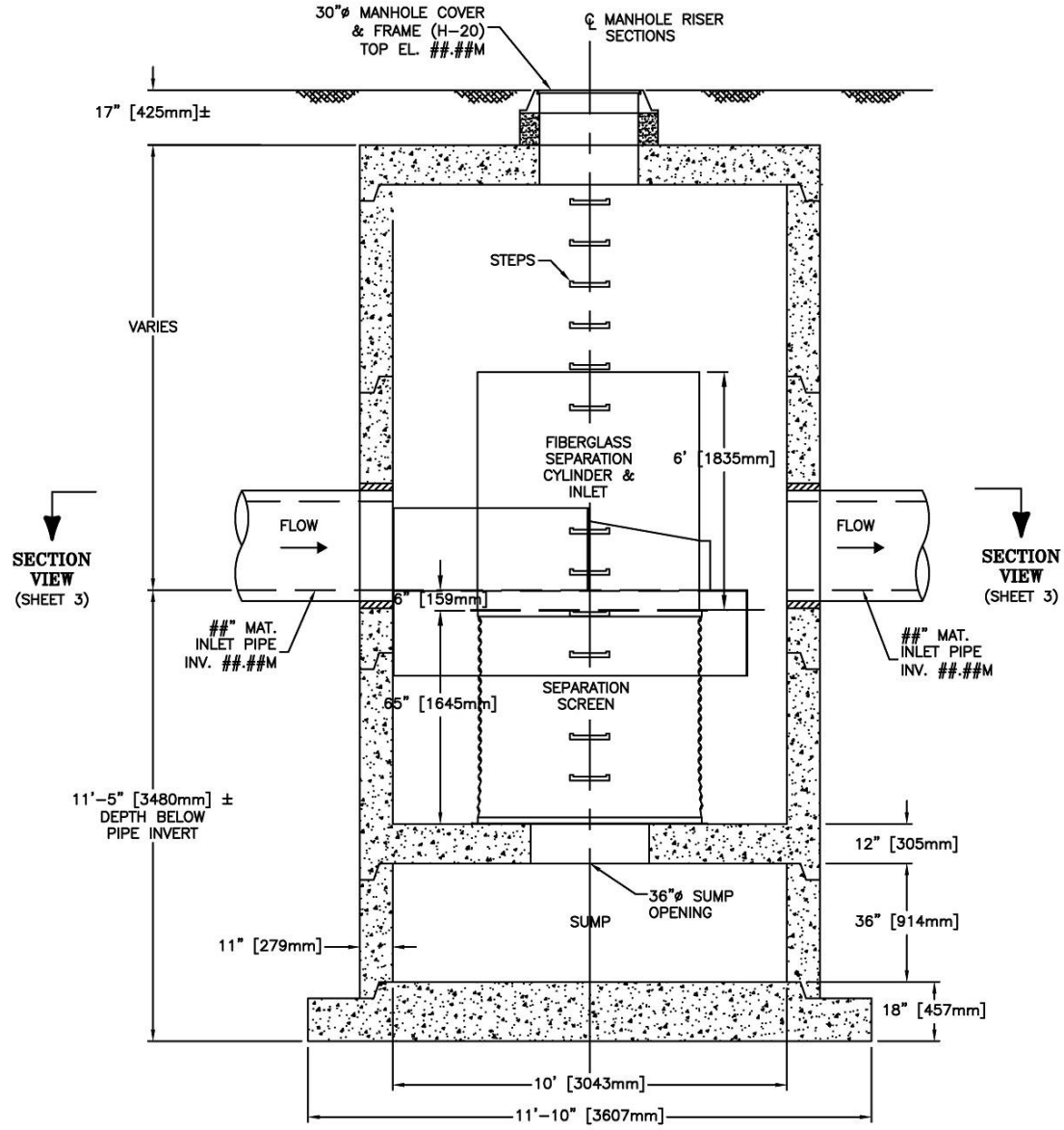


CDS MODEL PMSU56_45m
STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB#	XX-##-###	SCALE 1" = 3'
		DATE	##/##/##	SHEET
		DRAWN	INITIALS	1
		APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

ELEVATION VIEW



CDS MODEL PMSU56_45m
STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 4'
		DATE ##/##/##	SHEET
		DRAWN INITIALS	2
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

CANADIAN ENVIRONMENTAL TECHNOLOGY VERIFICATION

Enhancing the Credibility of Environmental Technologies

TECHNOLOGY VERIFIED: CDS Hydrodynamic Separator®

Performance Claim

Capture test[a]:

During the sediment capture test, the Contech CDS OGS device with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removed 74, 70, 63, 53, 45, 42, 32 and 23 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, 1400 and 1893 L/min/m^2, respectively.

Scour test[a]:

During the scour test, the Contech CDS OGS device with preloaded test sediment reaching 50% of the manufacturer's recommended maximum sediment storage depth, generated corrected effluent concentrations of 1.8, 6.5, 8.2, 11.2, and 309.3 mg/L during a test run[1] with approximately 5 minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Contech CDS OGS device with surrogate low-density polyethylene beads preloaded within the oil collection skirt area, representing floating liquid to a volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.9, 98.6, 99.5, and 99.7 percent of loaded beads by volume during a test run[b] with 5 minutes duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

---

[a] *The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)*

[b] *See variance #1 in "Variances from testing procedure" section*

John D. Wiebe, PhD
Executive Chairman

VERIFIED* PERFORMANCE: MARCH 2017

License Number: ETV 2017-02

Issued to: CONTECH Engineered Solutions LLC

Expiration Date: March 31, 2020

GLOBE PERFORMANCE SOLUTIONS

Canada

* This verification conforms to the Canadian ETV Program's General Verification Protocol and the ISO 14034:2016.
Please refer to Technology Fact Sheet for additional information on the verification of this performance claim.

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CANADIAN ETV VERIFIED

CDS Hydrodynamic Separator®

Technology Fact Sheet for CONTECH Engineered Solutions LLC

Technology description and application

The CDS® is a Stormwater treatment device designed to remove pollutants, including sediment, trash and hydrocarbons from Stormwater runoff. The CDS is typically comprised of a manhole that houses flow and screening controls that use a combination of swirl concentration and continuous deflective separation.

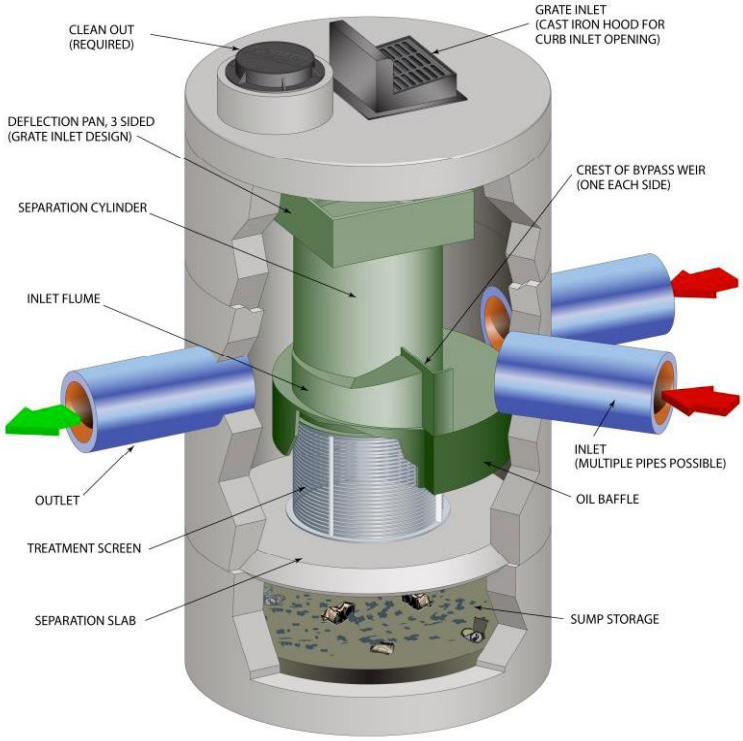

Figure 1. Graphic of typical inline CDS unit and core components.

When stormwater runoff enters the CDS unit's diversion chamber, the diversion pan guides the flow into the unit's separation chamber. The water and associated gross pollutants contained within the separation cylinder are kept in continuous circular motion by the energy generated from the incoming flow. This has the effect of a continuous deflective separation of the pollutants and their eventual deposition into the sump storage below. A perforated screen plate allows the filtered water to pass through to a volute return system and thence to the outlet pipe. The oil and other light liquids are retained within the oil baffle. Figure 1 shows a schematic representation of a typical CDS unit including critical components.

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Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Contech CDS-4 OGS device, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program requirements. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test[a]:

During the sediment capture test, the Contech CDS OGS device with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removed 74, 70, 63, 53, 45, 42, 32 and 23 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, 1400 and 1893 L/min/m^2, respectively.

Scour test[a]:

During the scour test, the Contech CDS OGS device with preloaded test sediment reaching 50% of the manufacturer's recommended maximum sediment storage depth, generated corrected effluent concentrations of 1.8, 6.5, 8.2, 11.2, and 309.3 mg/L during a test run[b] with approximately 5 minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Contech CDS OGS device with surrogate low-density polyethylene beads preloaded within the oil collection skirt area, representing floating liquid to a volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.9, 98.6, 99.5, and 99.7 percent of loaded beads by volume during a test run[b] with 5 minutes duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Performance results

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition.

[a] The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

[b] See variance #1 in "Variances from testing procedure" section below.

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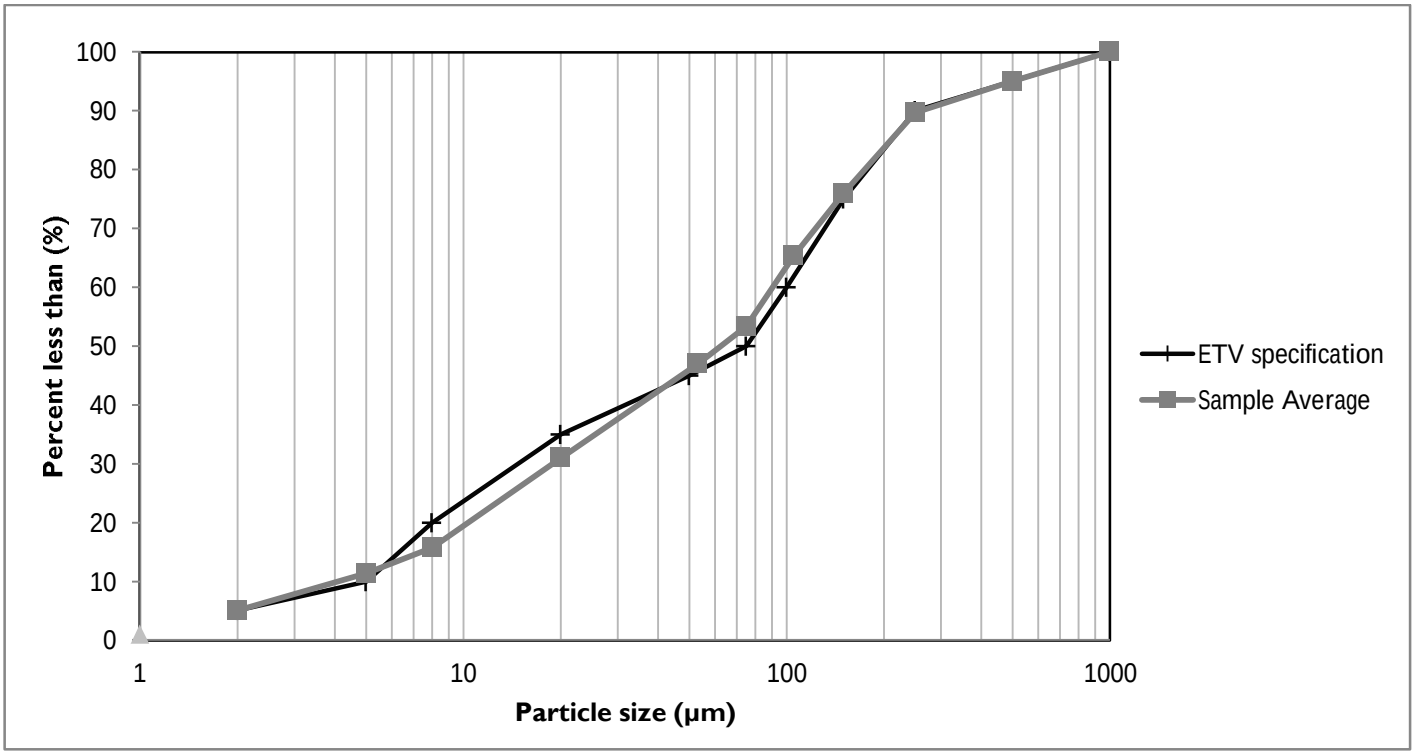

Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at eight surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1).

In some instances, the calculated removal efficiencies were above 100% for certain particle size fractions (marked with asterisks in Table 1). These discrepancies are not entirely avoidable and may be attributed to errors relating to the blending of sediment, collection of representative samples, and laboratory analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" in Table 1 are based on measurements of the total injected and retained sediment mass, and are therefore not subject to sampling or PSD analysis errors.

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Table 1. Removal efficiencies (%) at specified surface loading rates.

Particle size fraction (µm)	Surface loading rate (L/min/m²)							
	40	80	200	400	600	1000	1400	1893
>500	100	100*	66	79	97	100*	84	77
250 - 500	100*	100*	85	95	100*	91	100*	75
150 - 250	99	100*	100*	97	100	75	68	37
105 - 150	100	100*	100*	74	47	45	30	27
75 - 105	90	91	100*	61	33	36	26	18
53 - 75	71	27	54	100	42	44	15	16
20 - 53	65	51	20	8	10	8	5	4
8 - 20	28	22	9	7	1	1	2	1
5 – 8	30	9	0	8	2	0	1	0
<5	11	8	16	2	6	5	2	2
All particle sizes by mass balance	**73.5**	**70.3**	**63.4**	**52.6**	**45.1**	**41.5**	**32.4**	**23.0**

* Removal efficiencies were calculated to be above 100%. Calculated values typically ranged between 101 and 175% (average 126%). Higher values were observed for the >500 µm and 150-250 µm size fractions during the 80 L/min/m² test run. See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the retained sediment at each of the tested surface loading rates. As expected, the capture efficiency for fine particles was generally found to decrease as surface loading rates increased.

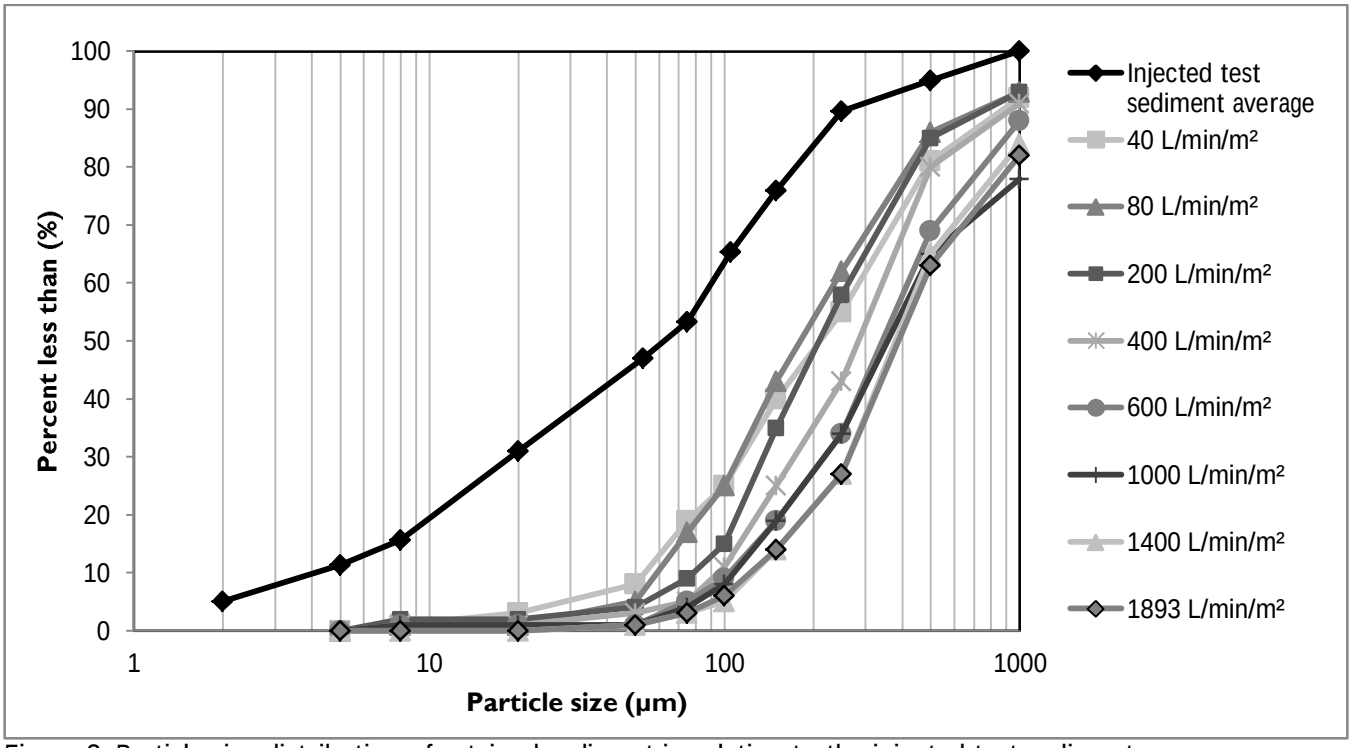

Figure 3. Particle size distribution of retained sediment in relation to the injected test sediment average.

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Table 2 shows the results of the sediment scour and re-suspension test. This test involved preloading 10.2 cm of fresh test sediment into the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Sediment was also pre-loaded to the same depth on the separation slab (see Figure 1) since sediment was observed to have been deposited in this area during the sediment capture test. Clean water was run through the device at five surface loading rates over a 36 minute period. The test was stopped and started after the second flow rate in order to change flow meters. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water and the smallest 5% of particles captured during the 40 L/min/m² sediment capture test, as per the method described in Bulletin # CETV 2016-09-0001.

Table 2. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m²)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L)[ϟ]	Average (mg/L)
1	200	1.03	0.5	1.0	1.8
		2.03		1.6	
		3.03		1.8	
		4.03		1.8	
		5.03		2.6	
2	800	6.23	2.0	5.0	6.5
		7.23		6.7	
		8.23		9.4	
		9.23		5.4	
		10.23		5.9	
3	1400	11.43[‡]	2.0	3.1	8.2
		12.43		11.0	
		13.43		14.6	
		14.43		7.1	
		15.43		5.2	
4	2000	17.20	3.2	7.3	11.2
		18.20		22.8	
		19.20		6.9	
		20.20		6.8	
		21.20		12.1	
5	2600	22.40	8.5	248.5	309.3
		23.40		83.0	
		24.40		438.9	
		25.40		338.7	
		26.40		437.5	

[ϟ] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the smallest 5% of sediment particles (i.e. d5) removed during the 40 L/min/m² capture test, minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.
[‡] See variance #1 in "Variances from testing procedure" section below.

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The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 3. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m^2) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m^2) over a 38 minute period. As with the sediment scour test, flow was stopped and started after the second flow rate to change flow meters. Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 3. Light liquid re-entrainment test results.

Target Flow (L/min/m^2)	Time Stamp	Collected Volume (L)	Collected Mass (g)	Percent re-entrained by volume	Percent retained by volume
200	10:48:42	27 pellets	0.8	0.01	99.99
800	10:55:09	0.07	41	0.12	99.88
1400	11:06:59	0.8	439	1.37	98.63
2000	11:13:00	0.31	177	0.53	99.47
2600	11:19:00	0.18	98	0.31	99.69
Interim Collection Net		0.025	14.2	0.04	99.96
Total Loaded		58.3	33398	--	--
Total Re-entrained		1.385	770	--	--
Percent Re-entrained and retained		--	--	2.38	97.62

Variances from testing Procedure

The following minor deviations from the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014) have been noted:

1. It was necessary to change flow meters during the scour and light liquid re-entrainment test, as the required flows exceeded the minimum and/or maximum range of any single meter. After the loading rate of 800 L/min/m^2, the flow was gradually shut down and re-initiated through the larger meter immediately after closing the valve controlling flows to the small meter. The transition time of 1-minute for each target flow was followed, resulting in an elapsed time of 3 minutes to reach the next target flow of 1400 L/min/m^2. This procedure was approved by CETV prior to testing, in recognition that most particles susceptible to scour at low flows would not be in the sump at higher flows. Similarly, re-entrainment of the oil beads was not expected to be significantly affected by the flow meter change.

2. As part of the capture test, evaluation of the 40 L/min/m^2 surface loading rate was split into 3 parts due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit. At the end of the first and second parts of the test, the flow rates were gradually shutdown to prevent capture of particles that would have been washed out under normal circumstances. The amended procedure was reviewed and approved by the verifier prior to testing.

3. Inflow concentrations during the 40 L/min/m^2 surface loading rate varied from 162 mg/L to 246 mg/L, which is wider than specified ±25 mg/L range in the Procedure.

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Verification

The verification was completed by Toronto and Region Conservation Authority, using the Canadian ETV Program's General Verification Protocol (March, 2000) and taking into account ISO 14034:2016. Data and information provided by Contech Engineered Solutions to support the performance claim included the following: Performance test report prepared by Alden Research Laboratory, Inc, and dated February 2015; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is Canadian ETV?

Canadian Environmental Technology Verification (ETV) is delivered by GLOBE Performance Solutions under a license agreement from Environment Canada. Canadian ETV is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

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www.etvcanada.ca

Limitation of verification

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Printed: March 20, 2017 Expires: March 31, 2020

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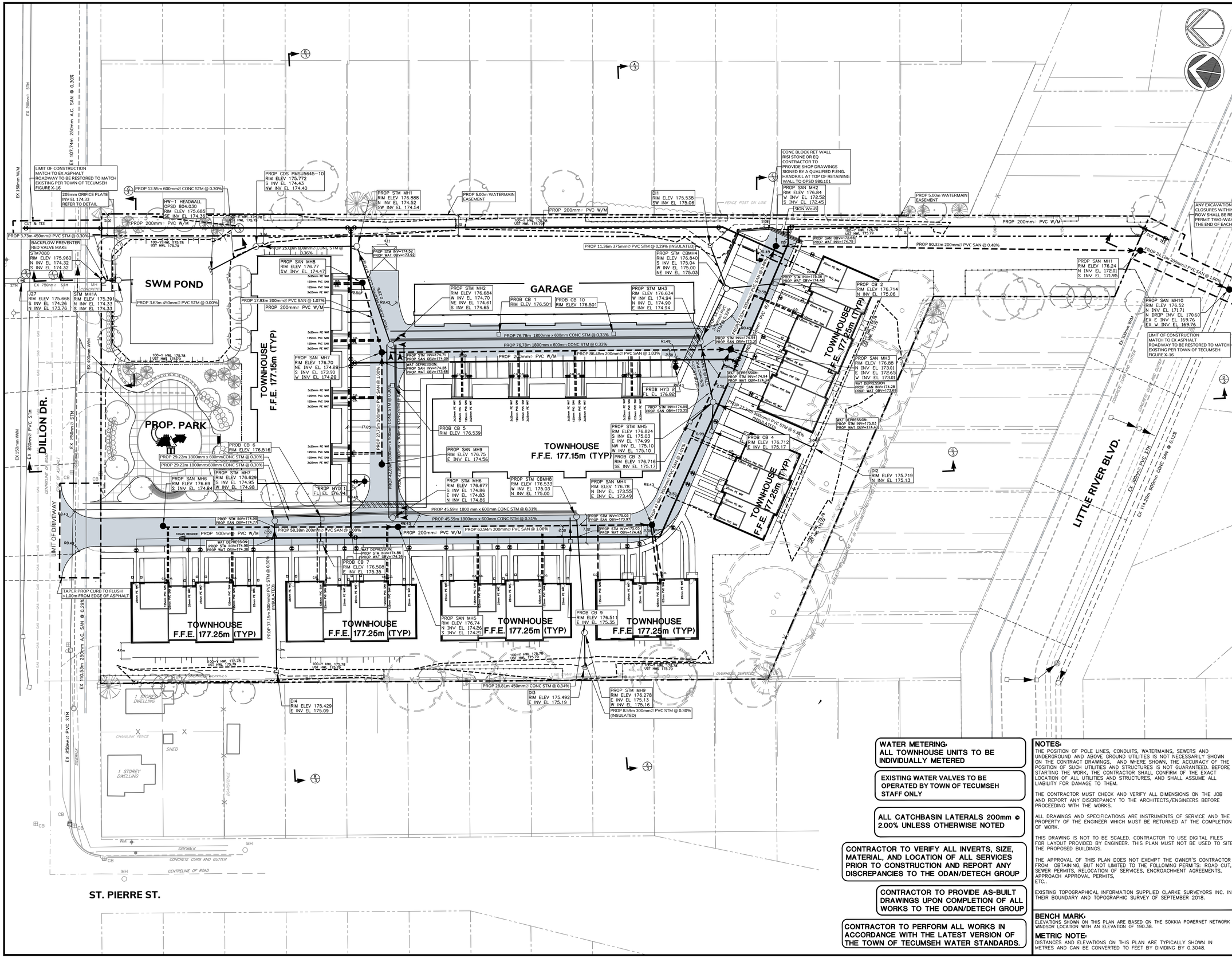
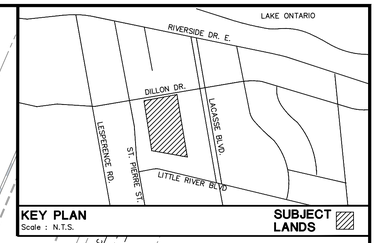
APPENDIX E - PLANS

Site Servicing Plan Drawings (FULL SET)





KEY PLAN Scale : N.T.S.

SUBJECT LANDS

SERVICING LEGEND:

- DENOTES EXISTING STORM MANHOLE
- DENOTES PROPOSED STORM MANHOLE
- DENOTES EXISTING CATCH BASIN
- DENOTES PROPOSED CATCHBASIN
- DENOTES PROPOSED STORMCEPTOR
- DENOTES PROPOSED INLET CONTROL DEVICE (ICD)
- DENOTES EXISTING STORM SEWER
- DENOTES PROPOSED STORM SEWER
- DENOTES EXISTING SANITARY MANHOLE
- DENOTES PROPOSED SANITARY MANHOLE
- DENOTES PROPOSED SANITARY SEWER
- DENOTES EXISTING SANITARY SEWER
- DENOTES PROPOSED HYDRANT
- DENOTES EXISTING HYDRANT
- DENOTES PROPOSED WATER VALVE & BOX
- DENOTES EXISTING WATER VALVE & BOX
- DENOTES PROPOSED WATER METER
- DENOTES EXISTING WATER MAIN
- DENOTES PROPOSED WATER MAIN
- DENOTES PROPOSED F/D CONNECTION
- DENOTES PROPOSED CAP FOR SANITARY, STORM, AND/OR WATER AS NOTED
- DENOTES PROPOSED ENTRANCE LOCATION
- DENOTES PROPOSED LIMIT OF CONSTRUCTION
- DENOTES PROPOSED HEAVY DUTY ASPHALT AREA

NO.	REVISIONS	DATE	BY
2.	AS PER CITY COMMENTS	JAN 06/20	DB
1.	ISSUED FOR SPA SUBMISSION	JUNE 26/19	DB

SCALE(S): 1:400

0 10 20 40

DRAWING TITLE:

SERVICING PLAN

PROJECT:

PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT

LOTS 304–314, PRINCE COURT, R.PLAN 1183
TOWN OF TECUMSEH

CLIENT:

BRIDAY INC.

WATER METERING:
ALL TOWNHOUSE UNITS TO BE INDIVIDUALLY METERED

EXISTING WATER VALVES TO BE OPERATED BY TOWN OF TECUMSEH STAFF ONLY

ALL CATCHBASIN LATERALS 200mm @ 2.00% UNLESS OTHERWISE NOTED

CONTRACTOR TO VERIFY ALL INVERTS, SIZE, MATERIAL, AND LOCATION OF ALL SERVICES PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE ODAN/DETECH GROUP

CONTRACTOR TO PROVIDE AS-BUILT DRAWINGS UPON COMPLETION OF ALL WORKS TO THE ODAN/DETECH GROUP

CONTRACTOR TO PERFORM ALL WORKS IN ACCORDANCE WITH THE LATEST VERSION OF THE TOWN OF TECUMSEH WATER STANDARDS.

NOTES:

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND UNDERGROUND AND ABOVE GROUND UTILITIES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING THE WORK, THE CONTRACTOR SHALL CONFIRM OF THE EXACT LOCATION OF ALL UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

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EXISTING TOPOGRAPHICAL INFORMATION SUPPLIED CLARKE SURVEYORS INC. IN THEIR BOUNDARY AND TOPOGRAPHIC SURVEY OF SEPTEMBER 2018.

BENCH MARK:

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METRIC NOTE:

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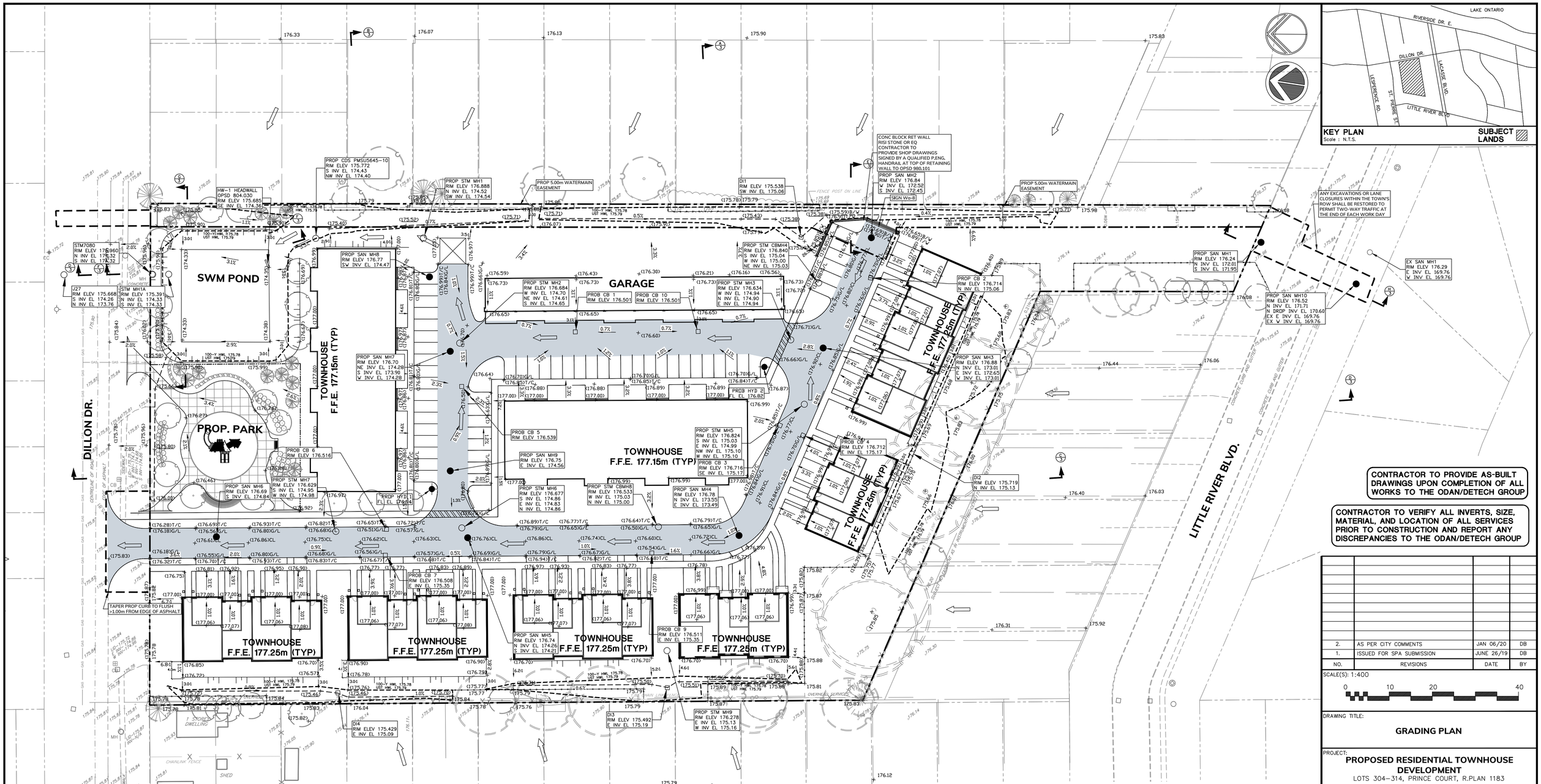
ODAN·DETECH CONSULTING ENGINEERS

The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

REGISTERED PROFESSIONAL ENGINEER
AN 06/20
I. KRPAN
PROVINCE OF ONTARIO

ENGINEER

DESIGNED BY:	PROJECT No.:
DB	18249
DRAWN BY: DB	
CHECKED BY: JK	DATE: JUN 2019
APPROVED BY: JK	DRAWING No.: 1 OF 4



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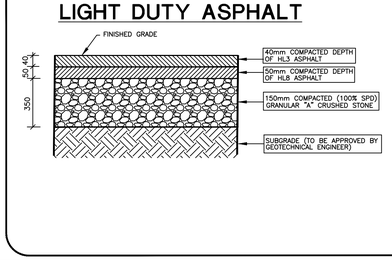
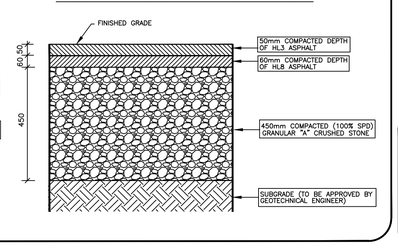
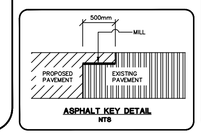
CONTRACTOR TO VERIFY ALL INVERTS, SIZE, MATERIAL, AND LOCATION OF ALL SERVICES PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE ODAN/DETECH GROUP

LIGHT DUTY ASPHALT



HEAVY DUTY ASPHALT





ASPHALT KEY DETAIL
NTS

GRADING LEGEND:

- DENOTES EXISTING STORM MANHOLE
- DENOTES PROPOSED STORM MANHOLE
- DENOTES EXISTING CATCH BASIN
- DENOTES PROPOSED CATCHBASIN
- DENOTES PROPOSED STORMCEPTOR
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- DENOTES PROPOSED HYDRANT
- DENOTES EXISTING HYDRANT
- DENOTES PROPOSED WATER VALVE & BOX
- DENOTES EXISTING WATER VALVE & BOX
- DENOTES PROPOSED WATER METER
- DENOTES PROPOSED SIAMESE CONNECTION
- 123.45 100.00 DENOTES EXISTING SPOT ELEVATION
- + (100.00) DENOTES PROPOSED ELEVATION
- + (100.00)T/C DENOTES PROPOSED TOP OF CURB ELEVATION
- + (100.00)G/L DENOTES PROPOSED GUTTER LINE ELEVATION
- + (100.00) HP DENOTES PROPOSED HIGH POINT
- + (100.00) DENOTES PROPOSED SWALE INVERT ELEVATION
- + (100.00) DENOTES PROPOSED ELEVATION BY OTHERS
- DENOTES PROPOSED FLOW ARROW AND SLOPE
- DENOTES PROPOSED FLOW ARROW
- DENOTES EMERGENCY OVERLAND FLOW
- DENOTES PROPOSED SLOPE (3:1 OR HIGHER)
- 195.50 DENOTES EXISTING CONTOUR
- DENOTES PROPOSED SILT FENCE
- DENOTES PROPOSED ENTRANCE LOCATION
- DENOTES EXTENT OF MAX. PONDING (0.30m) 100 YEAR STORM.
- DENOTES PROPOSED LIMIT OF CONSTRUCTION

NOTES:

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METRIC NOTE:

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NO.	REVISIONS	DATE	BY
2.	AS PER CITY COMMENTS	JAN 06/20	DB
1.	ISSUED FOR SPA SUBMISSION	JUNE 26/19	DB

SCALE(S): 1:400

0 10 20 40

DRAWING TITLE:

GRADING PLAN

PROJECT:

PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT

LOTS 304–314, PRINCE COURT, R.PLAN 1183
TOWN OF TECUMSEH

CLIENT:

BRIDAY INC.

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PROVINCE OF ONTARIO

ENGINEER

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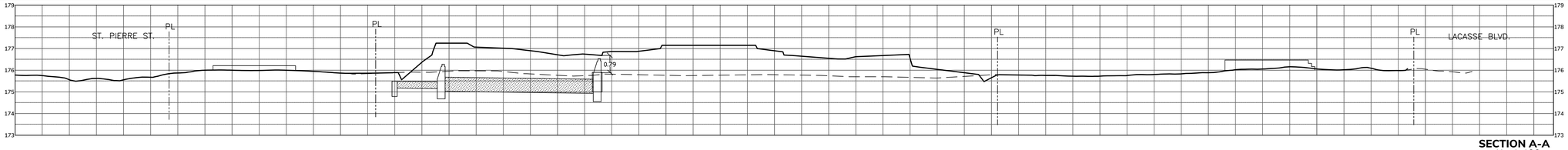
DB	18249
DRAWN BY: DB	
CHECKED BY: JK	DATE: JUN 2019
APPROVED BY: JK	DRAWING No.: 2 OF 4



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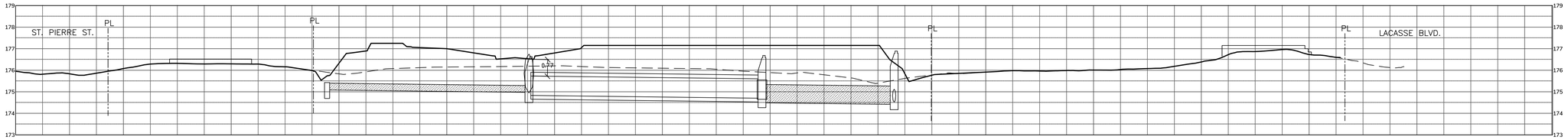

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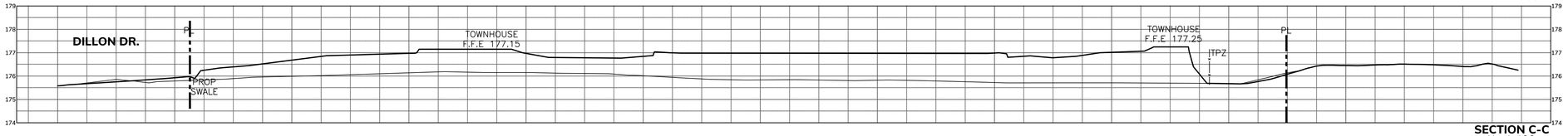

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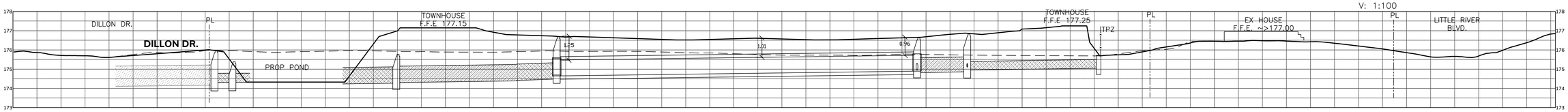

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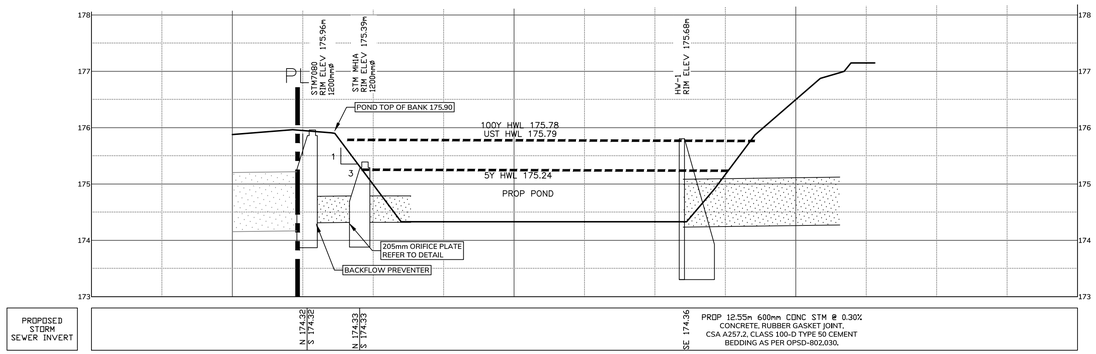

SECTION F-F
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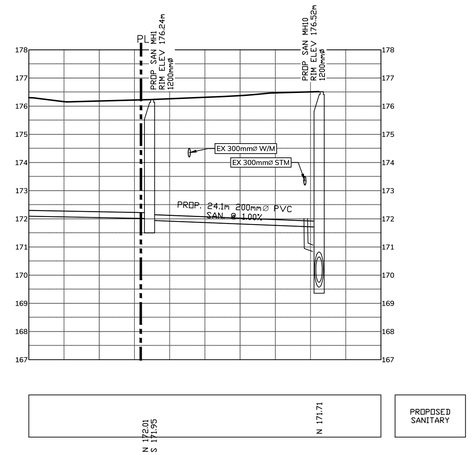

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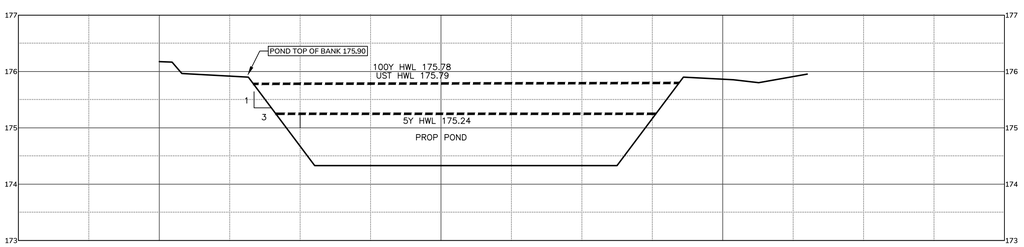

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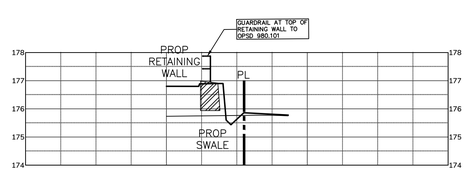

SECTION E-E
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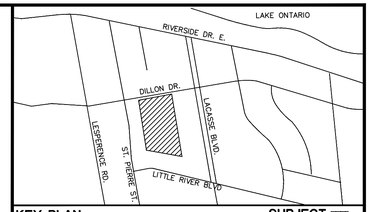


KEY PLAN
Scale : N.T.S.

SUBJECT LANDS

NOTES:

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND UNDERGROUND AND ABOVE GROUND UTILITIES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING THE WORK, THE CONTRACTOR SHALL CONFIRM OF THE EXACT LOCATION OF ALL UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCY TO THE ARCHITECTS/ENGINEERS BEFORE PROCEEDING WITH THE WORKS.

ALL DRAWINGS AND SPECIFICATIONS ARE INSTRUMENTS OF SERVICE AND THE PROPERTY OF THE ENGINEER WHICH MUST BE RETURNED AT THE COMPLETION OF WORK.

THIS DRAWING IS NOT TO BE SCALED. CONTRACTOR TO USE DIGITAL FILES FOR LAYOUT PROVIDED BY ENGINEER. THIS PLAN MUST NOT BE USED TO SITE THE PROPOSED BUILDINGS.

THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S CONTRACTOR FROM OBTAINING, BUT NOT LIMITED TO THE FOLLOWING PERMITS: ROAD CUT, SEWER PERMITS, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH APPROVAL PERMITS, ETC..

EXISTING TOPOGRAPHICAL INFORMATION SUPPLIED CLARKE SURVEYORS INC. IN THEIR BOUNDARY AND TOPOGRAPHIC SURVEY OF SEPTEMBER 2018.

BENCH MARK:

ELEVATIONS SHOWN ON THIS PLAN ARE BASED ON THE SOKKIA POWERNET NETWORK WINDSOR LOCATION WITH AN ELEVATION OF 190.38.

METRIC NOTE:

DISTANCES AND ELEVATIONS ON THIS PLAN ARE TYPICALLY SHOWN IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NO.	REVISIONS	DATE	BY
2.	AS PER CITY COMMENTS	JAN 06/20	DB
1.	ISSUED FOR SPA SUBMISSION	JUNE 26/19	DB

SCALE(S):

DRAWING TITLE:

SECTIONS

PROJECT:

PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT
LOTS 304–314, PRINCE COURT, R.PLAN 1183
TOWN OF TECUMSEH

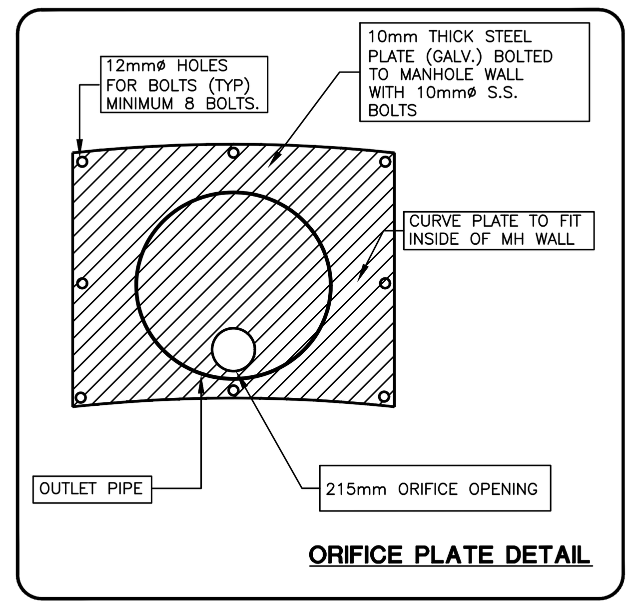
CLIENT:

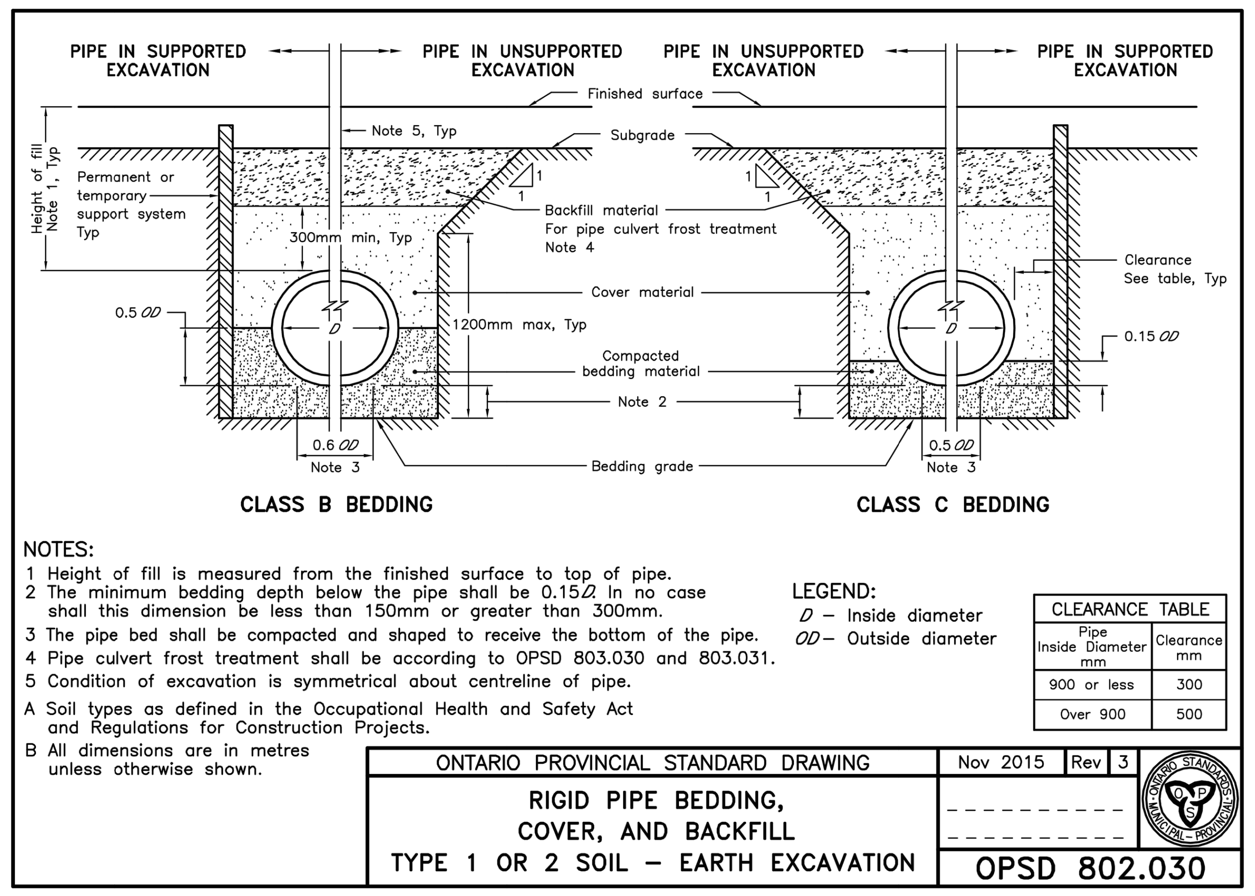
BRIDAY INC.

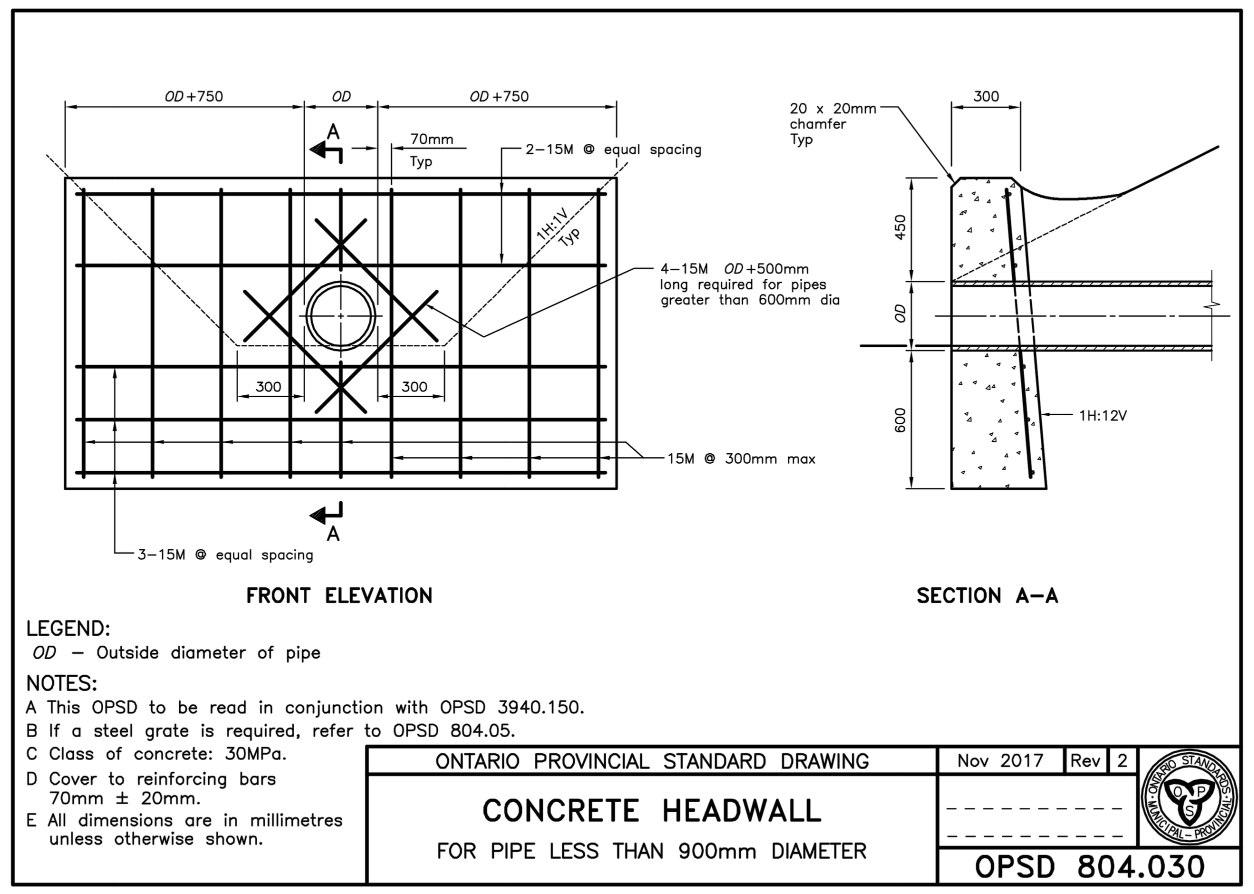
ODAN·DETECH CONSULTING ENGINEERS
The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

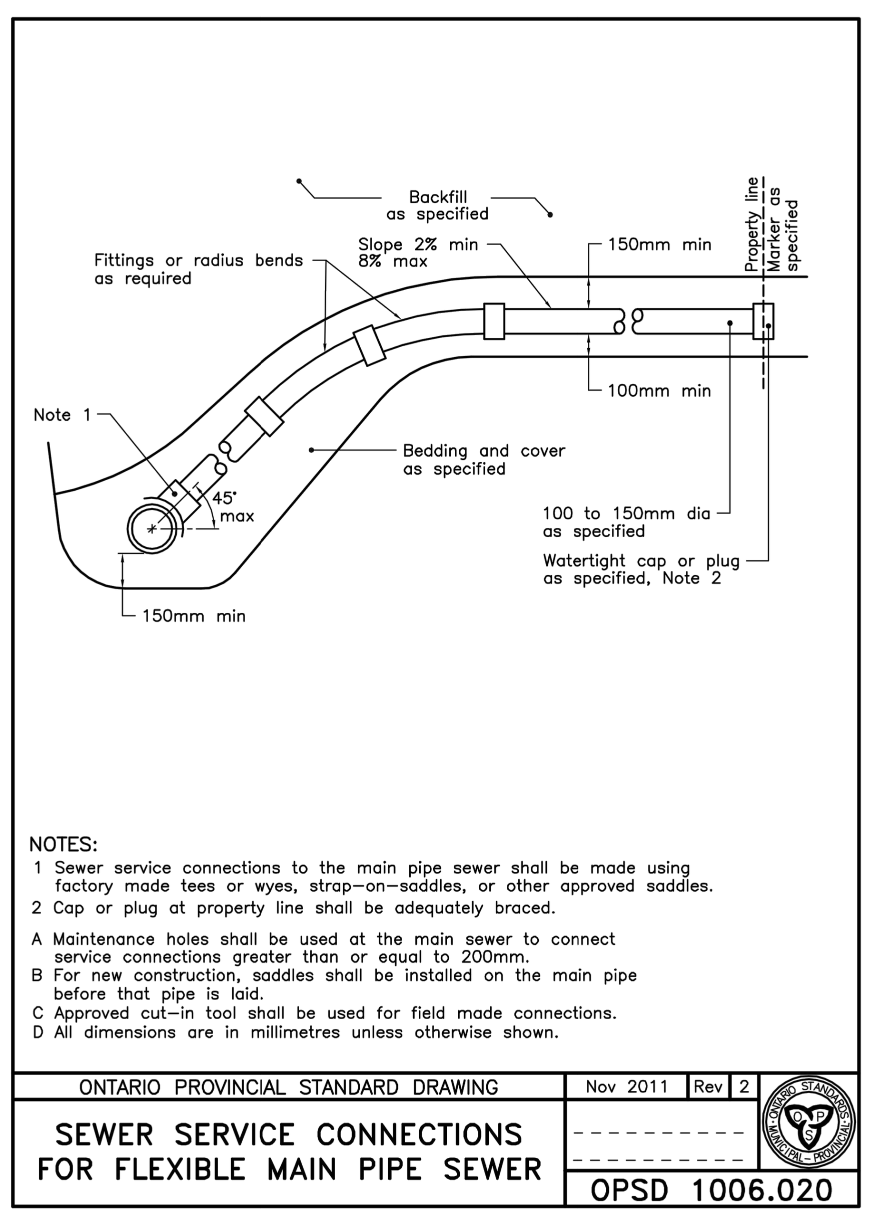
REGISTERED PROFESSIONAL ENGINEER
JAN 06/20
I. KRPAN
PROVINCE OF ONTARIO
ENGINEER

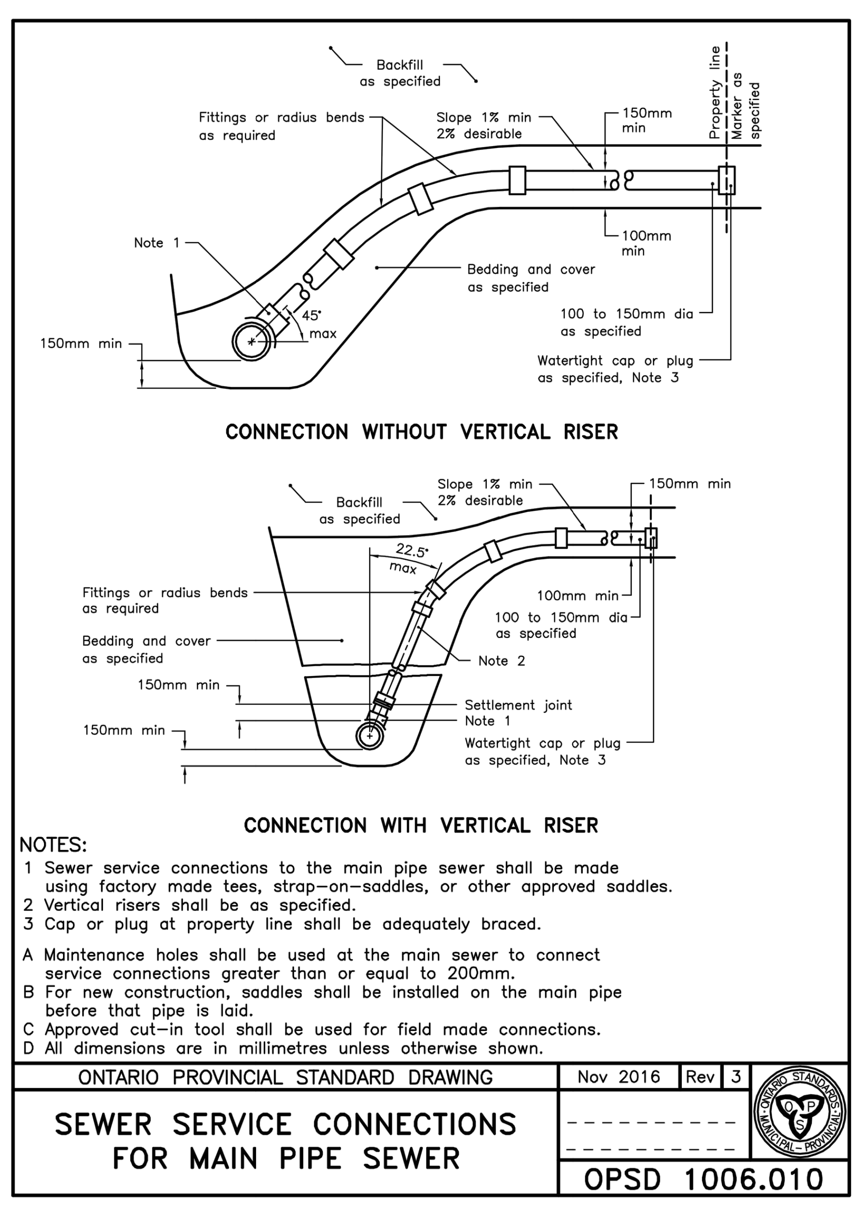
DESIGNED BY:	PROJECT No.:
DB	18249
DRAWN BY: DB	
CHECKED BY: JK	DATE: JUN 2019
APPROVED BY: JK	DRAWING No.: 3 OF 4

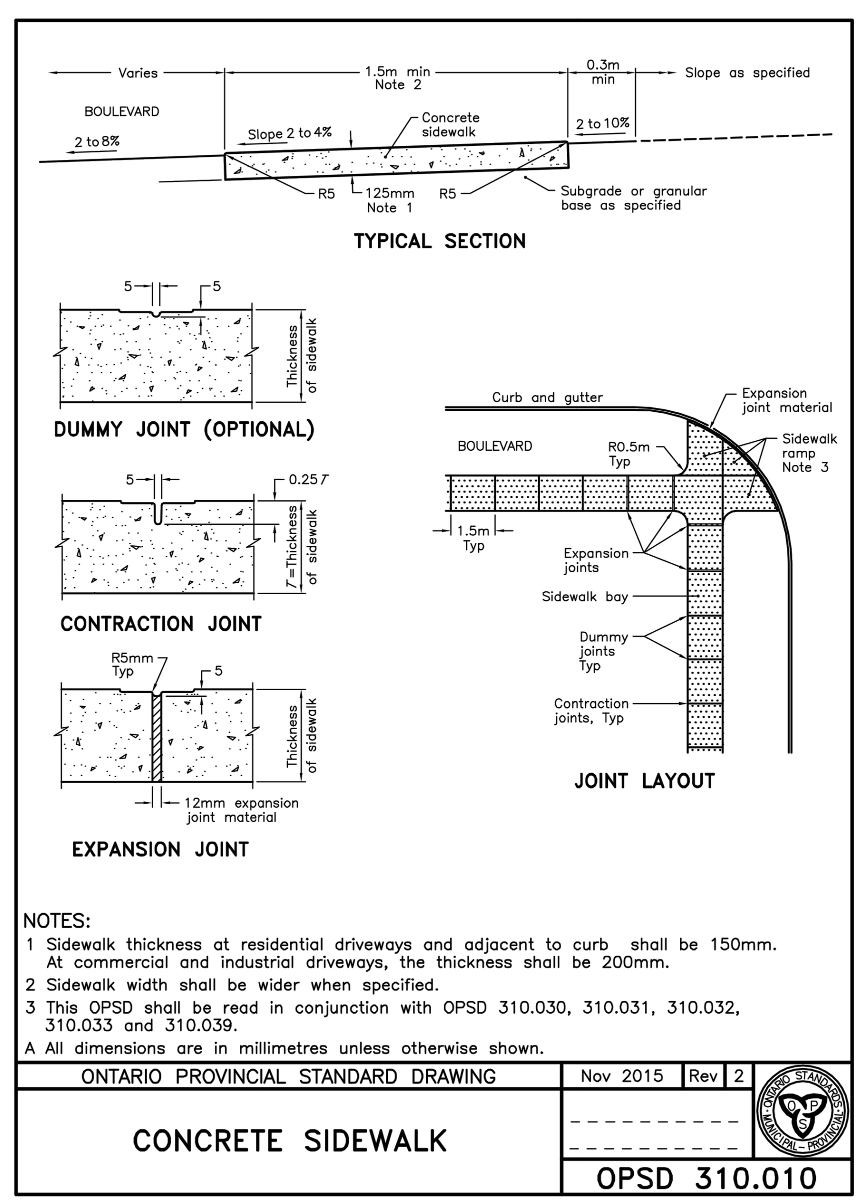












GENERAL NOTES

1). DRAWINGS ARE NOT TO BE SCALED.
2). DO NOT SITE BUILDINGS WITH THIS DRAWING.
3). ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE SITE PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER BEFORE PROCEEDING.
4). UNLESS OTHERWISE NOTED ON THE DRAWINGS THE STANDARD TOWN, REGION/COUNTY, MTO AND OPSD AND OPSS ARE TO CONSTITUTE PART OF THIS CONTRACT AND SITE PLAN DRAWINGS.
5). REFER TO TOWN STANDARDS AND SPECIFICATIONS FOR LIST OF APPROVED MANUFACTURERS AND MATERIALS.
6). EXISTING STRUCTURES ARE NOT TO BE DISTURBED, NOR ENCROACHMENT ON ADJACENT PROPERTIES UNLESS INSTRUCTED BY THE ENGINEER.
7). THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNERS CONTRACTOR FROM OBTAINING AND PAYING FOR, BUT NOT LIMITED TO THE FOLLOWING PERMITS, ROAD CUTS, SEWER PERMITS, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH APPROVAL PERMITS, ETC. ALL RESTORATION AS PER TOWN STANDARDS.
8). PRIOR TO CONSTRUCTION, THE ENGINEER IS TO BE NOTIFIED BY THE OWNER AND THE CONTRACTOR AS TO THE EXTENT OF THE CONSTRUCTION LIMITS THEY PROPOSE. THE TOWN IS TO BE NOTIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
9). THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE SITE PLAN, LANDSCAPE PLAN, SITE ELECTRICAL PLANS, AND ANY OTHER PLANS OR DRAWINGS WHICH DEPICT WORKS THAT ARE PROPOSED FOR THIS SITE.
10). THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING THE SUPPLY, INSTALLATION AND REMOVAL OF ALL NECESSARY SIGNAGE, DELINEATORS, MARKERS AND BARRIERS. ALL SIGNS, ETC. SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS FOR THE TOWN AND ONTARIO TRAFFIC MANUAL BOOK 7, 2001.
11). THE CONTRACTOR SHALL ENDEAVOR TO PREVENT MUD TRACKING ONTO EXISTING RIGHT–OF–WAYS AND SHALL PROVIDE FOR CLEANUP AT HIS OWN EXPENSE AS DIRECTED BY THE TOWN. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE TO CONTROL DUST ON THE PROJECT AND HE SHALL PROVIDE AT HIS OWN EXPENSE, CONTROLLING MEASURES AS DIRECTED BY THE TOWN.
12). THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES TO BE VERIFIED IN THE FIELD.
13). THE CONTRACTOR SHALL RECTIFY ALL DISTURBED AREAS TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE TOWN.
14). BLASTING WILL NOT BE ALLOWED UNLESS AUTHORIZED BY THE TOWN.
15). ANY UTILITY RELOCATIONS DUE TO THIS DEVELOPMENT TO BE UNDERTAKEN AT THE EXPENSE OF THE OWNER/DEVELOPER.
16). ALL DRAWINGS AND SPECIFICATIONS ARE INSTRUMENTS OF SERVICE AND THE PROPERTY OF THE ENGINEER WHICH MUST BE RETURNED AT THE COMPLETION OF WORK.
17). DRIVEWAYS SHALL BE SETBACK A MINIMUM CLEARANCE OF 1.0 m. FROM ALL ABOVEGROUND SERVICES OR OTHER OBSTRUCTIONS.
18). ALL CONSTRUCTION WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
19). CONSTRUCTION ACCESS SHALL BE CONSTRUCTED WITH A MIN. OF 450mm THICK CRUSHED STONE BASE FROM MUNICIPAL CURB OR EDGE OF PAVEMENT TO THE PROPERTY LINE TO THE SATISFACTION OF THE TOWN. LOCATION SHALL BE AS PER THE TOWN.
20). MINIMUM CLEARANCE OF 1.0m FROM ALL ABOVE GROUND SERVICES AND UTILITIES.
21). OUTSIDE LIGHTING TO BE DIRECTED DOWNWARD AS WELL AS INWARD AND DESIGNED TO MAINTAIN ZERO CUTOFF LIGHT DISTRIBUTION AT THE PROPERTY LINE.
22). ALL WORKS WITHIN TOWN RIGHT–OF–WAY TO BE PERFORMED BY TOWN FORCES OR AN APPROVED CONTRACTOR AS PER TOWN ACCEPTANCE, UNLESS OTHERWISE DIRECTED BY THIS ENGINEER.
24). ALL EXISTING SEWERS ARE TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION INCLUDING SEWER INVERTS, MATERIAL TYPE, AND SIZE. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.
25). ALL RELOCATION, RECONSTRUCTION AND RESTORATION TO BE PERFORMED TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.
26). THE TOWN OF TECUMSEH SHALL BE PROVIDED A MINIMUM OF 24HRS NOTICE PRIOR TO CONNECTING OR ABANDONMENT OF EXISTING INFRASTRUCTURE, AND MUST BE PRESENT ON–SITE DURING THOSE OPERATIONS.

GRADING

1). THE GRADING PLAN IS TO BE READ WITH THE SITE SERVICES DRAWING AND THE SITE PLAN. FOR BUILDING DETAILS REFER TO THE LATEST REVISION OF THE SITE PLAN AS PER THE ARCHITECT.
2). CONTRACTOR TO RESTORE ALL DISTURBED AREAS (I.E. PUBLIC R.O.W., ADJACENT LANDS) WHICH HAVE BEEN DISTURBED DURING CONSTRUCTION TO PREVIOUS OR BETTER CONDITION.
3). ALL DRIVEWAY AND GRADING MATERIAL AND CONSTRUCTION METHODS MUST CONFORM TO CURRENT TOWN STANDARDS AND SPECIFICATIONS.
4). ALL FILL WITHIN THE SITE TO BE COMPACTED TO A MIN. OF 100% STD. PROCTOR DENSITY. THE SUITABILITY OF ALL FILL MATERIALS ARE TO BE CONFIRMED BY A RECOGNIZED SOILS CONSULTANT TO THE DIRECTOR OF ENGINEERING PRIOR TO INSTALLATION OF ANY ROAD BASE MATERIALS. ALL FILL SHALL BE ENGINEERED FILL.
5). LANDSCAPE SHALL NOT ENCROACH ON BOULEVARD NOR SHALL BOULEVARD GRADES BE ALTERED, FROM THAT SHOWN ON GRADING PLAN.
6). SILT FENCE(S) TO BE INSTALLED AND MAINTAINED TO PREVENT SILT FLOWING ONTO ADJACENT LANDS SILTATION CONTROL METHODS SUCH AS ENVIROFENCE OR APPROVED EQUAL SHALL BE ERECTED PRIOR TO ANY GRADING OR CONSTRUCTION AND SHALL BE MAINTAINED IN GOOD REPAIR THROUGHOUT THE CONSTRUCTION AND GRADING PHASES. THE LOCATION AND ERECTION OF THE SILTATION CONTROL METHODS TO BE APPROVED BY THE TOWN. REFER TO SILT CONTROL DETAIL.
7). ANY CHANGES IN GRADES OR CATCH BASINS REQUIRE THE APPROVAL OF THE ODAN/DETECH GROUP INC.
8). ALL SODDING OF SIDE SLOPES (DITCHES) SHALL BE AS PER OPSD–218.01.
9). ALL LANDSCAPING TO BE INSTALLED AS SOON AS POSSIBLE OR PRIOR TO THE END OF THE FIRST GROWING SEASON. LANDSCAPING TO BE MAINTAINED UNTIL IT IS ESTABLISHED.
10). ALL CONNECTIONS WITH PAVED PORTIONS OF EXISTING ROADS TO BE BACKFILLED WITH GRANULAR 'A' MATERIAL OR LATEST TOWN SPECIFICATIONS AND COMPACTED TO 100 % SPD.
11). CONSTRUCTION ACCESS SHALL BE CONSTRUCTED WITH A MIN. OF 450mm THICK CRUSHED STONE BASE FROM MUNICIPAL CURB OR EDGE OF PAVEMENT TO THE PROPERTY LINE TO THE SATISFACTION OF THE TOWN.
12). ALL CURBS ARE TO BE 150mm ABOVE THE PROPOSED GUTTER LINE (G/L) UNLESS NOTED OTHERWISE.
13). PAVEMENT GRADE (MIN. 0.3%, MAX. 7%).
14). DRAINAGE SWALES WITH GRADES (MIN. 0.5%, MAX. 7%).
15). SLOPES IN LANDSCAPE AREAS AND ON BERMS SHALL NOT EXCEED 3 HORIZONTAL TO 1 VERTICAL.
16). TOPSOIL IN LANDSCAPED AREAS TO BE 150mm THICK, EXCEPT IN BOULEVARDS WHERE TOPSOIL SHALL BE 300mm THICK.

CURBING/SIDEWALKS/ASPHALT

1). ALL PROPOSED INTERNAL CURBING TO BE BARRIER TYPE AS PER OPSD–600.040 ALL TOPS OF CURBS TO BE 150mm ABOVE PROPOSED GUTTER LINE, UNLESS OTHERWISE NOTED.
2). PROPOSED CURB AND GUTTER ON TRAVELED ROADWAY AS PER CURRENT OPSD–600.040
3). ALL REQUIRED CURB CUTTING AT ENTRANCE AND CURB DEPRESSIONS AT SIDEWALK CROSSINGS SHALL BE INSTALLED TO THE SATISFACTION OF THE TOWN AND AS PER OPSD–600.040
4). CURB CUTS WITHIN THE PUBLIC R.O.W. TO BE PERFORMED TO THE SATISFACTION OF THE TOWN.
5). ALL PROPOSED ROAD CUTS TO BE PERFORMED AND RESTORED TO THE SATISFACTION OF THE TOWN , AND IN ACCORDANCE WITH TOWN STANDARDS & SPECIFICATIONS.
6). CONCRETE SIDEWALK WITHIN PUBLIC R.O.W. AS PER OPSD–310.010. ALL RAMPS TO BE 8% MAX. SLOPE TO 2% MIN. SLOPE, AND HAVE TACTILE SURFACE STRIPS AS PER DETAIL ON DWG 18. ALL SIDEWALKS SHALL BE 30MPa WITH 7% AIR ENTRAINMENT. ALL CONCRETE SIDEWALKS TO BE MINIMUM 150mm THICK AT RESIDENTIAL DRIVEWAYS.
7). ALL CONCRETE CURB FROM EXISTING ROAD CURB TO STREET LINE SHALL BE AS PER TOWN STD. ALL CONCRETE CURB HEIGHTS SHALL BE 150mm UNLESS OTHERWISE NOTED. DRIVEWAY CURB TO BE DISCONTINUOUS AT SIDEWALK AND TAPERED BACK 450mm MINIMUM WHERE SIDEWALK CONTINUES THROUGH THE ENTRANCE AS PER OPSD–350.01.
8). APPROPRIATE CONSTRUCTION DETAILS SHOULD BE PROVIDED FOR RETAINING WALLS HIGHER THAN 1.0m. DETAILS SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER UPON APPROVAL. HANDRAIL IS REQUIRED WHEN HEIGHT EXCEEDS 0.60m AND SHALL BE AS PER OPSD–980.101.
9). ALL CURBS ARE TO BE 150mm ABOVE THE PROPOSED GUTTER LINE (G/L) UNLESS NOTED OTHERWISE.
10). DRIVEWAY ENTRANCE SHALL BE CONSTRUCTED WITH CONCRETE FROM THE BACK OF THE MUNICIPAL CURB OR EDGE OF PAVEMENT TO THE PROPERTY LINE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS OR CURRENT TOWN STD.:

MIN 150mm, 30MPa CONCRETE WITH 5–7% AIR ON
MIN 150mm GRANULAR "A" COMPACTED TO 100% SPD.

11). ALL CONCRETE TOE WALLS SHALL BE AS PER OPSD–4066.01, TYPE "A", 30MPa, 7% AIR.
12). ALL DEAD END BARRICADES SHALL BE AS PER OPSD–906.01.
13). ALL TEMPORARY STEEL BEAM GUIDE RAILS SHALL BE AS PER OPSS–1504.
14). ALL SECTIONAL PRE–CAST CONCRETE CURBING AS PER OPSD–603.02.

RESTORATION OF DRIVEWAYS & ROADS

1). ANY CUTS INTO DRIVEWAYS, ROADS, ETC...(ANY PAVED AREA(CONCRETE OR ASPHALT)), SHALL BE RESTORED TO TOWN STANDARDS OR IN LIEU OF TOWN STANDARDS REFER TO RESTORATION DETAIL.

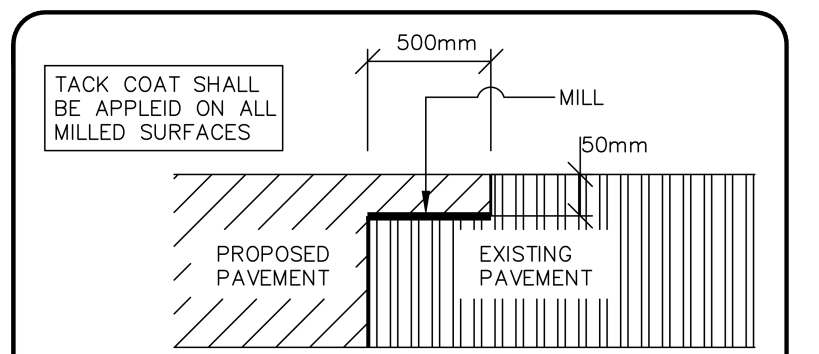
UTILITY / SERVICE ISOLATION

1). ALL SERVICES AND/OR UTILITIES LOCATED ON CONCRETE SIDEWALKS OR CURBS TO BE ISOLATED FROM THE SIDEWALK OR CURB AS PER OPSD–310.040.

UTILITY SUPPORTS AND TRENCHES

1). ALL SERVICES, UTILITIES AND CATCH BASIN LEADS SHALL BE SUPPORTED AS PER OPSS–491

2). ALL UTILITIES SHALL BE LOCATED, SUPPORTED AND PROTECTED TO THE SATISFACTION OF THE UTILITY COMPANY DURING THE CONSTRUCTION PERIOD.



ASPHALT KEY DETAIL
N.T.S.

SERVICING NOTES

STORM SEWERS

1). ALL STORM SEWERS 375mmø AND SMALLER TO BE PVC DR35 IN ACCORDANCE WITH CSA–B182.2, ASTM F794, ASTM D1784 OR LATEST REVISIONS. 450mmø AND LARGER TO BE CONCRETE IN ACCORDANCE WITH CSA A257.2, CLASS 65D OR LATEST REVISIONS. UNLESS OTHERWISE NOTED.
2). ALL CATCH BASIN LEADS TO BE A MINIMUM OF 200mmø PVC DR35 IN ACCORDANCE WITH CSA–B182.2, ASTM F794, ASTM D1784 OR LATEST REVISIONS.
3). BEDDING AND COVER FOR PVC SEWERS (FLEXIBLE PIPE) AS PER OPSD 802.010, GRANULAR "A" COMPACTED TO 100% SPD.
4). BEDDING AND COVER FOR CONCRETE SEWERS (RIGID PIPE) AS PER OPSD 802.030, CLASS B, GRANULAR 'A', COMPACTED TO 100% SPD. UNLESS OTHERWISE SPECIFIED.
5). ALL STORM SERVICES TO BUILDINGS SHALL BE AT A MINIMUM SLOPE OF 1.0%
6). STORM MANHOLES SHALL BE AS PER OPSD–701.010, 701.011, 701.012, 701.013 AS SPECIFIED. FRAME & COVER AS PER OPSD–401.01.
7). ALL CATCH BASIN MANHOLES AS PER OPSD 701.010. FRAME AND GRATE AS PER OPSD 400.02.
8). ALL MANHOLE AND CATCH BASIN ADJUSTMENTS SHALL BE 'IPEX LIFESAVER RINGS', AND BLUE SKIN WRAPPED AROUND ADJUSTMENT RINGS AND TOP CONE.
9). ALL CATCH BASINS SHALL BE INSTALLED IN ACCORDANCE WITH OPSD 705.010, INCLUDE GOSS TRAP AS REQUIRED BY TOWN. ALL CATCH BASIN FRAMES AND COVERS AS PER OPSD 400.02.
10). ALL DOUBLE CATCH BASINS SHALL BE INSTALLED IN ACCORDANCE WITH OPSD–705.020, INCLUDE GOSS TRAP AS REQUIRED BY TOWN. ALL CATCH BASIN FRAMES AND COVERS AS PER OPSD 400.02.
11). ALL DITCH INLET CATCH BASINS SHALL BE AS PER OPSD–705.030, WITH RIP–RAP TREATMENT AS PER OPSD–810.02, TYPE "B" WITH GEOTEXTILE (MIRAFI P–140N).
12). ALL CATCH BASIN CONNECTIONS SHALL BE AS PER OPSD–708.01 (RIGID PIPE) AND OPSD–708.03 (FLEXIBLE PIPE).
13). ALL CATCH BASINS CONSTRUCTED IN FILL AREAS TO BE SUPPORTED IN 14MPa. CONCRETE.
14). ALL SEWER SERVICE CONNECTIONS FOR RIGID PIPE SHALL BE AS PER OPSD–1006.01.
15). ALL SEWER SERVICE CONNECTIONS FOR FLEXIBLE PIPE SHALL BE AS PER OPSD–1006.02.
16). ALL CONCRETE OUTLETS AS PER OPSD 605.04 WITH ASPHALT SPILLWAY AND RIP–RAP.
17). ALL PAVEMENT REINSTATEMENT SHALL BE AS PER OPSD–509.010, FOR UTILITY CUTS, BACKFILL AS PER TOWN STD.
18). ALL TESTING OF STORM SERVICES TO BE IN ACCORDANCE WITH ONTARIO PROVINCIAL STANDARD SPECIFICATIONS.
19). CONTRACTOR SHALL PROVIDE COLOUR VIDEO OF STORM SEWER AND STORM SERVICES UPON COMPLETION TO THE ENGINEER AND TOWN.
20). IPEX ORIFICE PLATES/PLUGS BY IPEX INC. AS SHOWN, REFER TO MANUFACTURERS DETAILS.
21). REAR YARD & CATCH BASIN LEADS SHALL NOT BE CONNECTED TO MANHOLES.
22). CLEAN OUTS ARE REQUIRED AT PROPERTY LINE FOR ALL REAR YARD LEADS.
23). ALL STORM SEWERS 150mmø AND LESS ARE TO BE PVC–SDR 28 IN ACCORDANCE WITH CSA–B182.2, ASTM D–2779 AND ASTM D–3034 OR LATEST REVISIONS, RUBBER GASKET.

SANITARY

1). ALL SANITARY SEWERS 200mmø AND GREATER ARE TO BE PVC–SDR 35 IN ACCORDANCE WITH CSA–B182.2, ASTM D–2779 AND ASTM D–3034 OR LATEST REVISIONS, RUBBER GASKET.
2). ALL SANITARY SEWERS 150mmø AND LESS ARE TO BE PVC–SDR 28 IN ACCORDANCE WITH CSA–B182.2, ASTM D–2779 AND ASTM D–3034 OR LATEST REVISIONS, RUBBER GASKET.
3). BEDDING AND COVER FOR PVC SANITARY SEWERS AS PER OPSD 802.010, GRANULAR "A" COMPACTED TO 100% SPD.
4). ALL SANITARY SERVICES TO BUILDINGS SHALL BE AT A MINIMUM SLOPE OF 1.0%
5). SANITARY MANHOLES SHALL BE AS PER OPSD–701.010, 701.011, 701.012, 701.013 AS SPECIFIED. BENCHING TO OBVERT OF PIPE AS PER OPSD–701.021. FRAME & COVER AS PER OPSD–401.01.
6). ALL MANHOLE DROP STRUCTURES SHALL BE AS PER OPSD–1003.031, INTERNAL DROP STRUCTURES.
7). ALL MANHOLE ADJUSTMENTS SHALL BE 'IPEX LIFESAVER RINGS', AND BLUE SKIN WRAPPED AROUND ADJUSTMENT RINGS AND TOP CONE. MAXIMUM OF THREE (3) UNITS AND 300mm HIGH, WHERE EXCEED CAST–IN–PLACE OR PRE–CAST RISER SECTIONS SHALL BE PROVIDED.
8). PROVIDE WATER TIGHT COVERS FOR SANITARY MANHOLES LOCATED IN PONDING AREAS.
9). ALL SEWER SERVICE CONNECTIONS FOR FLEXIBLE PIPE SHALL BE AS PER OPSD–1006.02.
10). ALL PAVEMENT REINSTATEMENT SHALL BE AS PER OPSD–509.010, FOR UTILITY CUTS, BACKFILL AS PER TOWN STD.
11). ALL TESTING OF SANITARY SERVICES TO BE IN ACCORDANCE WITH ONTARIO PROVINCIAL STANDARD SPECIFICATIONS.
12). CONTRACTOR SHALL PROVIDE COLOUR VIDEO OF SANITARY SEWER AND SANITARY SERVICES UPON COMPLETION TO THE ENGINEER AND TOWN.
13). SANITARY SERVICES SHALL NOT BE CONNECTED TO MANHOLES.
14). CLEAN OUTS ARE REQUIRED AT PROPERTY LINE FOR EACH SANITARY SERVICE.
14). SEWAGE EJECTOR PUMPS ARE REQUIRED FOR EVERY LOT.
15). THE SANITARY SEWER CONNECTION FOR EACH LOT IN THE DEVELOPMENT IS TO BE INSTALLED ABOVE THE HYDRAULIC GRADE LINE OF THE SANITARY SEWER TO REDUCE THE POSSIBILITY OF BASEMENT FLOODING AND AS SUCH, ANY BELOW GRADE SANITARY DRAINAGE BRANCH INSTALLED BELOW THE LEVEL OF THE SANITARY BUILDING SEWER WILL REQUIRE AN EJECTOR PUMP SYSTEM INSTALLED IN CONFORMANCE WITH THE ONTARIO BUILDING CODE TO LIFT THE SANITARY EFFLUENT TO THE LEVEL OF THE SANITARY BUILDING SEWER.

WATER

1). ALL WATER DISTRIBUTION STANDARDS SHALL CONFORM TO THE TOWN OF TECUMSEH STANDARDS LATEST VERSION.
2). WATERMAIN PIPE TO BE PVC–DR 18 CL 150 CONFORMING TO CSA B137.1, 2 & 3, INCLUDING TRACER WIRE BETWEEN HYDRANTS OR OTHER CONDUCTING APPURTENANCES AS PER TOWN STANDARDS. ALL WATERMAIN AND SERVICES SHALL HAVE A MINIMUM COVER OF 1.5m. WATERMAINS AND SERVICES WITH LESS THAN 1.5m COVER MUST BE INSULATED.
3). ALL WATER MAIN JOINTS TO BE APPROVED PUSH–ON. MECHANICAL OR FLANGE TYPE JOINTS AS REQUIRED FOR 1000 kPa RATED PRESSURE. CORROSION PROTECTION FOR ALL FITTINGS, VALVES AND HYDRANTS DENSO PASTE & DENSO TAPES.
4). ALL DOMESTIC WATER SERVICES SHALL BE 25mmø POLYETHYLENE SERIES 160 POTABLE. PE206. CERTIFIED TO CSA B137.1 AND INSTALLED WITH TRACER WIRE. AS PER TEC 2.0.
5). BEDDING AND COVER AS PER TEC 5
6). WATER MAINS SHALL HAVE A MINIMUM VERTICAL SEPARATION OF 0.50m BELOW AND 0.50m ABOVE AND A HORIZONTAL SEPARATION OF 2.5m BETWEEN ANY SEWER OR MANHOLE.
7). WATERMAIN TO BE INSTALLED UNDER PRIVATE STORM SERVICES WHEN SERVICE IS LESS THAN 1.2m DEEP.
8). CONTRACTOR TO CONFIRM THE SIZE AND MATERIAL TYPE OF EXISTING WATER SERVICE AND WATER MAIN PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER.
9). EXISTING WATER MAIN SHALL BE DEFLECTED BELOW PROPOSED GRADES TO MEET 1.5m COVER AS PER TOWN STANDARDS AND SPECIFICATIONS. REPLACE WATER MAIN IF NECESSARY.
10). EXISTING WATER MAIN OBVERTS TO BE CONFIRMED ON SITE AT THE TIME OF CONSTRUCTION.
11). ALL CURB STOPS TO BE INSTALLED AS PER TOWN STD TEC 4.
12). ALL HYDRANTS SHALL BE INSTALLED AS PER TEC 2, WITH CATHODIC PROTECTION AS PER TOWN STD TABLE 2.4. ALL HYDRANTS SHALL CONFORM TO AWWA SPECIFICATIONS C502–64. THE HYDRANTS SHALL OPEN LEFT AND THEY SHALL HAVE 2 NOZZLES AND 1 STORZ CONNECTION.
13). ALL THRUST BLOCKING SHALL BE AS OPSD–1103.02 (VERTICAL).
14). FROST COLLARS ARE TO BE PROVIDED ON CURB STOPS AND VALVE BOXES WHEN LOCATED WITHIN THE LIMITS OF THE DRIVEWAY.
15). ALL WATER MAIN BLOW–OFF ASSEMBLIES SHALL BE AS PER TOWN STD TEC 3
16). ALL PAVEMENT REINSTATEMENT SHALL BE AS PER OPSD–509.010, FOR UTILITY CUTS, BACKFILL AS PER TOWN STD.
17). FLUSHING, SWABBING, AND TESTING OF WATER MAIN AS PER ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
18). ALL TAPPING SLEEVES TO BE STAINLESS STEEL SIMILAR TO MUELLER TYPE, COMPLETE WITH VALVE.
19). ALL FITTINGS SUSCEPTIBLE TO CORROSION SHALL BE PROTECTED WITH DENSO PASTE OR DENSO PRIMING SOLUTION (FOR COLD TEMPERATURE APPLICATION), DENSO PROFILING MASTIC OR DENSO BLANKETS, AND DENSO LT TAPE.
20). WATERMAIN DETAILS CAN BE FOUND ON DRAWING 1
21). ALL PROPOSED WATERMAIN/SERVICE CONNECTION MATERIALS TO BE IN ACCORDANCE WITH THE LATEST VERSION OF THE TOWN OF TECUMSEH WATER STANDARDS.
22). A LICENSED WATER OPERATOR FROM THE TOWN OF TECUMSEH MUST BE ON SITE AT ALL TIMES WHEN WATERMAIN/SERVICE CONNECTION WORK IS PERFORMED.
23). CONTRACTOR TO PROVIDE THIRD PARTY TO PERFORM A LIVE TAPOF THE EXISTING WATERMAINAND WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE TOWN OF TECUMSEH STANDARDS AND SPECIFICATION.
24). ALL FLUSHING/BACTERIA/PRESSURE TESTING TO BE COMPLETED BY TOWN OF TECUMSEH.
25). ALL MATERIALS INSTALLED UNDERGROUND THAT MAY CORRODE MUST BE WRAPPED WITH DENSO PASTE/FILLER/WRAP.
26). PROVIDE MINIMUM OF TWO BUSINESS DAYS NOTICE TO THE WATER DEPARTMENT BEFORE ANY WATER WORK BEGINS.
27). A WATER PERMIT IS REQUIRED WITH FINAL WATER DRAWINGS (THAT HAVE BEEN APPROVED BY THE WATER DEPARTMENT).
28). A WATER INSPECTION FEE INVOICED TO THE CONTRACTOR WILL BE SENT AT THE END OF THE PROJECT ($10 PER METER OF WATERMAIN INSTALLED/INSPECTED).
29). CONTRACTOR TO PERFORM ALL WORKS IN ACCORDANCE WITH THE LATEST VERSION OF THE TOWN OF TECUMSEH WATER STANDARDS
30). ALL PROPOSED WATERMAIN/SERVICE CONNECTION MATERIALS TO BE IN ACCORDANCE WITH THE LATEST VERSION OF THE TOWN OF TECUMSEH WATER STANDARDS.
31). A LICENSED WATER OPERATOR FROM THE TOWN OF TECUMSEH MUST BE ONSITE AT ALL TIMES WHEN WATERMAIN/SERVICE CONNECTION WORK IS PERFORMED.
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37) A WATER INSPECTION FEE INVOICED TO THE CONTRACTOR WILL BE SENT AT THE END OF THE PROJECT ($10 PER METRE OF WATERMAIN INSTALLED/INSPECTED).

NOTES:

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND UNDERGROUND AND ABOVE GROUND UTILITIES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING THE WORK, THE CONTRACTOR SHALL CONFIRM OF THE EXACT LOCATION OF ALL UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCY TO THE ARCHITECTS/ENGINEERS BEFORE PROCEEDING WITH THE WORKS.

ALL DRAWINGS AND SPECIFICATIONS ARE INSTRUMENTS OF SERVICE AND THE PROPERTY OF THE ENGINEER WHICH MUST BE RETURNED AT THE COMPLETION OF WORK.

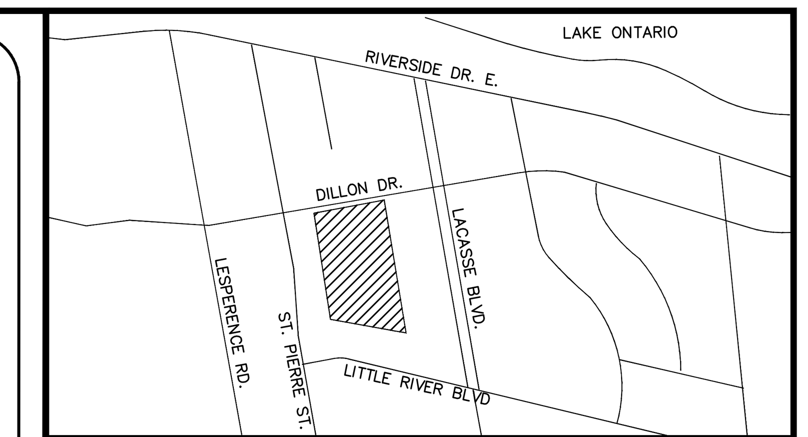
THIS DRAWING IS NOT TO BE SCALED. CONTRACTOR TO USE DIGITAL FILES FOR LAYOUT PROVIDED BY ENGINEER. THIS PLAN MUST NOT BE USED TO SITE THE PROPOSED BUILDINGS.

THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S CONTRACTOR FROM OBTAINING, BUT NOT LIMITED TO THE FOLLOWING PERMITS: ROAD CUT, SEWER PERMITS, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH APPROVAL PERMITS, ETC..

EXISTING TOPOGRAPHICAL INFORMATION SUPPLIED CLARKE SURVEYORS INC. IN THEIR BOUNDARY AND TOPOGRAPHIC SURVEY OF SEPTEMBER 2018.

BENCH MARK:
ELEVATIONS SHOWN ON THIS PLAN ARE BASED ON THE SOKKIA POWERNET NETWORK WINDSOR LOCATION WITH AN ELEVATION OF 190.38.

METRIC NOTE:
DISTANCES AND ELEVATIONS ON THIS PLAN ARE TYPICALLY SHOWN IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.



KEY PLAN Scale : N.T.S. — **SUBJECT LANDS**

NO.	REVISIONS	DATE	BY
2.	AS PER CITY COMMENTS	JAN 06/20	DB
1.	ISSUED FOR SPA SUBMISSION	JUNE 26/19	DB

SCALE(S):

DRAWING TITLE:
NOTES & DETAILS

PROJECT:
PROPOSED RESIDENTIAL TOWNHOUSE DEVELOPMENT
LOTS 304–314, PRINCE COURT, R.PLAN 1183
TOWN OF TECUMSEH

CLIENT:
BRIDAY INC.

ODAN·DETECH CONSULTING ENGINEERS
The Odan/Detech Group Inc. P: (905) 632-3811 F: (905) 632-3363
5230 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5K2

REGISTERED PROFESSIONAL ENGINEER — JAN 06/20 — I. KRPAN — PROVINCE OF ONTARIO
ENGINEER

DESIGNED BY: DB	PROJECT No.: 18249
DRAWN BY: DB	
CHECKED BY: JK	DATE: JUN 2019
APPROVED BY: JK	DRAWING No.: 4 OF 4

ODAN·DETECH
CONSULTING ENGINEERS

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BURLINGTON, ONTARIO, L7L 5K2
www.odandetech.com

January 6th, 2020

The Corporation of the Town of Tecumseh
917 Lesperance Rd.
Tecumseh, ON
N8N 1W9

Attn: Mr. John Henderson, P.Eng.

Re: Victoria on the Lake (Briday Inc.)
Technical Submission Review
Our PN 18249

Dear Sir,

The following addresses the comments provided in your letter of August 22nd, 2019 which provided comments on our submission materials dated June 26th, 2019.

Note that a garage structure is proposed on the east side of the site in the location where the Cultec Recharger stormwater storage unit was previously proposed. Given that the Cultec unit is no longer feasible to install, the stormwater storage volume lost has been compensated-for by marginally increasing the SWM pond southerly, and by providing box culverts from STM MH3-MH2, MH6-MH2, CBMH8-MH6 and MH7-MH6. Refer to revised drawings and report, attached.

Please contact the undersigned with any questions.

Best Regards,

Daniel Bancroft
The Odan/Detech Group

Cc Casey Kulchycki, Zelinka Priamo

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
Design Brief REV 01 (Odan Detech - June 26 2019)		
A.	Sanitary Waste Water Disposal • Section 3A references the sanitary sewer assessment completed by Dillon Consulting ltd. (Dillon). As noted, some of the assumptions (Le. number of units, connection location to the existing municipal sanitary sewer) have been modified under the current development proposal. It is further noted that the original assumptions are conservative based on the current development proposal. This conclusion is reasonable, however, once the ultimate development proposal is finalized, the Town will require that the original Dillon assessment be updated so the supporting information matches the final site design.	Noted – original Dillon assessment to be updated on finalization of site design.
B.	Water Distribution • All watermain/service connection works are to be completed in accordance with the Town's "Water Distribution System Standards & Material Specifications". This information is available through the following link: https://www.tecumseh.ca/en/living-here/resources/Documents/Water-DistributionSystem-Standards-and-Material-Sprecifications-VERSION-14.pdf.	Town criteria noted and reviewed. Additional information was provided in the email from John Henderson (Town of Tecumseh) in the enclosed email of September 9, 2019 stating that the townhouses may be metered with individual meters for each unit, or else one meter for each townhouse block. Given this, it is proposed that each townhouse unit will be individually metered as that is the most feasible solution for townhouses of this construction (ie, no common element component). This is stated on Report page 4 and a note provided on the Servicing Plan.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
C.	**Stormwater Management** Please refer to the Windsor/Essex Region Stormwater Management Standards Manual (Manual). This Manual is available through the following link: https:Llwww.tecumseh.ca!en!livinghere! resources!Documents!Windsor-Essex-Region-Stormwater-Management-Standards-ManualDecember-6-2018.pdf.	Noted and referred-to.
A	Page 7 - As per ERCA's August 22, 2019 e-mail, the minimum lowest opening elevation for this development is to be no lower than the greater of: o 176.7 metres G.S.c. (this is based on 176.4 + 0.3 metres of freeboard) o 0.3 metres above the on-site 1:100 year storage elevation The current proposed grading is significantly higher than the minimum elevations which is increasing the grade differential between the proposed development and the existing adjacent properties. Please review.	We note that the lowest building elevations are to be >=176.70, whereas we have proposed FFE 177.00; 0.30m higher than the minimum. This is only a marginal additional freeboard, and is required to maintain minimum cover ontop of the site's storm sewers, at the following critical locations: The cover from rim to obvert at STM MH8, for example, is 1.1m; if the site were lowered 0.30m there would be insufficient cover. Further, where there is a box culvert from STM MH4-MH2 and MH6-MH2, there is only approx. 1.0m cover ontop of the culvert (notwithstanding that a non-standard 1800mm x 600mm culvert is proposed). If the site were lowered, therefore, there would be insufficient cover. Note that the box culverts are proposed to replace the volume lost from the Cultec Recharger, which was located where the garage is now proposed.
B	Page 8 - The Urban Stress Test event is required to be simulated in the model with runoff maintained on-site. Please refer to Section 3.7.8.3 of the Manual.	The urban stress-test storm (100-Y + 43mm 24-H) has been run, considering backwater effect as given by Dillon Consulting. Results from the XPSWMM Analysis are provided in Section 3. C. of the revised report. Max. ponding elevation shown on revised Grading Plan.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
C	Page 9 - Table 1-The Curve Number (CN) method is no longer regionally accepted to be used to simulate infiltration. Please use either Horton's or Green-Ampt in the XPSWMM model. Typical input parameters based on soil types are provided within Table 3.7.7.3 and Table 3.7.7.5 of the Manual.	The Green-Ampt method is used accordingly. The discussion in page 8 and the Infiltration input parameters are provided Table 1 (Page 10) accordingly. Note the 100-Y runoff volume increased relative to the prior modelling using CN method, therefore the storm pond and box culverts have been upsized to provide additional storage volume such that the 100-Y and UST Storms do not spill off-site.
D	Page 10 - Post-Development Storm Catchment Plan. Please identify in the report how the delineation and input parameters for the adjacent rear yard areas were determined.	The 1st paragraph on page 8, under the heading *Post-Development Target Flow*, has been added to discuss this. The Post-Development Storm Catchment Plan has also been revised to clarify.
E	Page 14 - Please confirm that the backflow preventer has been represented in the model.	The backflow preventer has been reflected in the XPSWMM Model. The second bullet-point on page 15 is revised accordingly.
F	Page 16 - Please identify the dynamic ponding depths within the parking lot and roadways during the 1:100 year storm event. How was the surface ponding within the parking lot/roadways modelled?	There will be no ponding on parking or laneway surfaces in the 1:100-year storm event – the catchbasins have been designed to receive the flows from the respective catchment areas uncontrolled, with no surface ponding. A discussion is provided under the new heading *Site Parking & Private Laneway Catchbasin Hydraulic Design*, on pages 9.
G	Page 18 - Figure 5 - Based on the 100 year ponding depths, it is identified that no ponding is occurring within the roadways. Please confirm and identify how this is being achieved as it is anticipated that there may be some minor dynamic ponding during a portion of the event.	There will be no surface ponding on the sites internal roadways in the 100-year storm. The 100-Y HGL is below the rim elevation of all roadway catchbasins, and the catchbasins have been designed to receive the 100-year storm flows uncontrolled, as discussed under the new heading *Parking & Private Laneway Catchbasin Hydraulic Design*, on page 9.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
H	Figures 6 through 13 - Link139 is represented by a 50mm diameter conduit at a slope of 0% in all the storm sewer profiles. Please review.	It is necessary for the inlet and outlet from the pond to be connected by a conduit such that the HGL plots (Figures 7-18) can be generated continuously from the upstream reaches, to the outlet downstream of the pond. The HGL plots of the whole site could not be generated if there was not a conduit crossing the pond (even if that conduit has no hydraulic function), hence the noted pipe.
I	Page 27 - Please confirm with the supplier that the Water Quality Control device selected is verified by the CETV program, as per the requirements of the Manual.	The proposed Contech CDS OGS is CETV certified – the CETC Certification is provided in Appendix D as referred-to in Section 4.
XPSWMM Modelling		
J	How was the underground chamber system and pond modelled? Based on the input report, only one storage junction appears to have been used in the model.	A discussion on how stormwater storage volume was modelled is provided under the heading *Stormwater Storage Volume Modelling* pages 8-9. As the comment notes: The underground Cultec chamber system was previously modelled as a storage node at STM MH4 (the upstream inlet to the chambers). Given, as discussed elsewhere, that the Cultec is no longer proposed, that storage node has been removed from the model. The storage volume in the pond was modelled using 1D-2D dynamic modelling where the pond's inlet structure (HW-1) and outlet structure/outlet orifice pipe (StartNullStruct0) were linked to the surface/TIN of the site, which comprised the pond's geometry (sides, bottom, etc.). The storage volume provided in the pond is thereby modelled by the volume provided in the dynamic 1D-2D link.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
K	For review purposes, please provide the output reports for both the Chicago 1:100 year 4 hour event and Urban Stress test with labels in the PDF for each output. The current outputs are difficult to follow on where the simulations outputs begin and for which storm events.	The XPSWMM Outputs are accordingly provided in Appendix D and labels have been added.
L	Outflow hydrographs for the Chicago 5 and 100 year 4 hour storm events from the site were provided to Dillon on July 31st 2019 via email for review. It was identified that the maximum flow during the 1:5 and 1:100 year event exceeded the 100 L/s release rate noted in the design brief. The outflow hydrographs also show approximately 270 L/s of backflow through the system (Le. negative flow in the outflow hydrograph) under both the 5 and 100 year storm events. Based on the design, a backflow preventer is to be installed at the outlet to reduce these negative flows. Please clarify if the backflow preventer is not represented in the model and these negative flows are caused by municipal runoff entering the development's storm system. Please review and provide updated outflow hydrographs accordingly.	The outflow hydrograph in the 100-year and Urban Stress Test storms in the storm connection from STM MH1A to STM7080 (which has a backflow preventer at it's inlet), is provided as Figures 19 & 20 (pages 33-34) in the revised report. The hydrograph shows that there is no backwater in the outlet, and that the maximum 1:100-Y outflow is 89 L/s, which is in compliance with the allowable release rate criteria, considering the unavoidably uncontrolled flow from Catchment L, as per Table 2. Re: backwater flows: In the first iteration of the model, the backflow preventer was only modelled in the orifice tube from StartNullStruct0 to STM MH1A (not the downstream segment). The HGL in the downstream pipe was higher than the rim of STM MH1A (as was evident in Fig. 11, 12 & 13 in the prior report), thus water flowed upstream and was relieved by the STM MH1A rim. This condition has been eliminated in the revised model and as per Figures 19 and 20. The outlet from STM MH1A has also been modelled as a backflow preventer in coordination with the below comment on the Servicing Plan, requesting the backflow preventer be on the STM MH1A outlet (not inlet) for maintenance.
Watemr Quality Device Sizing		

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
N	As noted above, please confirm that the WQU chosen is verified by the CETV program.	The proposed Contech CDS unit is CETV-certified. The CETV Certification is provided in Appendix D, as referenced on page 35.
O	The impervious value for the WQU sizing is not consistent with the impervious values identified for the proposed site. Please review and revise accordingly. Note that the development does not need to account for treatment of adjacent rear yards, just the site itself.	A C-value of 0.8 is used for sizing the OGS (as shown in the CDS sizing report in Appendix D). This is appropriate for townhouses developments as per the Windsor/Essex Region SWM Manual. Note that the OGS Specification has changed since the previous revision given the C-value and design storm criteria – as follows.
P	Treatment Capacity flow is to be taken from the simulation of the Water Quality Storm Event (32mm event) identified in Appendix B of the Manual. Please revise accordingly.	The reference 32mm event is provided in the OGS Sizing report in Appendix D. Note that the OGS spec has changed since the previous revision given the quality design criteria.
Plan Set A 18249 *(Odan-Detech-June 26,2019) Stormwater Management Comments*		
Q	As noted above, the current proposed grading is significantly above the existing grades and minimum ERCA flood proofing requirements.	Note that the proposed building grades are 0.30m above the ERCA flood proofing elevations (as per above response C. a) (177.00 vs. 176.70). Also as discussed in the above response, the site storm sewers presently have only approximately 1.1-1.3m cover, therefore if the site were to be lowered 0.30m as requested, there would be insufficient cover on the storm pipes (even with the storm pipes sloping up at only 0.3% from the downstream outlet). The building grades must therefore remain as proposed.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
R	Drawing 1&2 -100 year WSEL's fluctuate from 175.65m - 175.76 m within the perimeter swales. The 1:100 year WSEl is identified as 175.75 in the design brief. Please clarify.	The 1:100-Y HWL's in each of the ditches is identified as the max water elevation at each of the ditches (DI1, DI2, DI3, DI4) in Figures 11, 12, 13 & 14, respectively. The 1:100-Y HWL is shown as varied (from 175.68-175.73) given the dynamic hydraulic model results, and is plotted on the Plans accordingly. A bullet-point in the ***Conclusions and Discussion*** heading on page 17 is revised accordingly.
S	Drawing 1-It is anticipated that CB's In low points throughout the site would ultimately be inlet controlled by the grate and/or inlet pipe to the storm sewer system. This would restrict flows into the storm system during larger events and on-site surface storage would occur, even though the 1:100 year WSEL in the pond is below the RIM elevations. Please provide the temporary storage depths during both the 1:100 year and urban stress test climate change event.	There will be no ponding on parking or laneway surfaces in the 1:100-year storm event – the catchbasins have been designed to receive the flows from the respective catchment areas uncontrolled, with no surface ponding. A discussion is provided in the report under the new heading *Parking & Private Laneway Catchbasin Hydraulic Design*, on page 9.
T	Drawing 1, 2 & 3 - Please include the Urban Stress Test WSEl for the site in the respective drawings.	The Urban Stress Test (UST) WSEl has been run accordingly. The HGL results are provided in Figures 15-18, and the WSEl's are provided on the drawings accordingly.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
U	Drawing 2 - Proposed grades at the entrance to the site identify an overland flow route north onto Dillon Drive. Is this for events that exceed the design storms? Please note that all overland flow from the site must be contained within the development up to and including the 1:100 year and urban stress test climate change event.	A small portion of the site (Catchment Area 'L') necessarily drains north onto Dillon Drive, yes, because of the grading condition between the proposed site and the existing street's topography. This grading condition is necessary to allow the grading of the driveway connection to Dillon Drive to work relative to the grading within the site otherwise. That is, the existing grade at Dillon Drive (to which the driveway must match) is 175.83, whereas the minimum building grade is 177.00, therefore the site is necessarily graded up approximately 1.2m from 175.83 to facilitate this. Note that the 1:100-Year allowable release rate criteria is still complied-with, as shown in Report Table 2 (page 15). That is – the site is marginally over-controlled to compensate for the uncontrolled runoff from Catchment Area 'L'.
Plan Set A 18249 (Odan-Detech - June 26, 2019) 1. Servicing Plan		
V	Headwall on inlet pipe into detention pond is listed as OPSD 804.030; however, the headwall/inlet is depicted on the plan as an OPSD 804.040. Please confirm/clarify.	The headwall on the Servicing Plan is revised to depict OPSD 804.030 accordingly.
W	List the type of backflow preventer to be installed on the pond outlet sewer.	Backflow Preventer spec provided accordingly.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
X	The orifice plate should be placed on outlet pipe from MH 1A to permit cleaning of debris/clogs in the orifice.	Revised accordingly.
Y	Due to the relocation of the orifice plate, the backflow preventer should be installed on sewer inlet into MH STM7080.	Revised accordingly.
Z	Provide details/information on the proposed oil/grit separator upstream of pond inlet.	Details and information (standard drawing etc.) are provided in Appendix D of the report.
Aa	Identify on the plans where the proposed watermain will require deflection to avoid conflict with storm and sanitary sewers. Also include the proposed separation distance at each crossing.	Watermain-sewer crossings are labelled accordingly.
Ab	STM MH 4 should be reviewed to confirm the required diameter to accept the five (5) sewer inlets/outlet. Indicate required MH diameters on the plans for any MH over 1200 mm in size.	Revised accordingly.
Ac	The existing curbs on little River Boulevard should be depicted on the plans.	Existing curbs on Little River Blvd shown accordingly.
Ad	A new manhole is required where the proposed 200 mm diameter sanitary sewer connects into the existing little River Boulevard sanitary sewer.	Revised accordingly.
Ae	Per the Town of Tecumseh Figure SP-I, the SAN MH 1 sampling manhole is to be placed within the Little River Boulevard right-of-way.	Revised accordingly.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
Af	The 100 mm diameter watermain on the access drive shall be increased to 150 mm diameter (minimum) and extended northerly to connect into the existing 150 mm Dillon Drive watermain.	The site's internal watermains are already looped to Dillon Drive at the northeast corner (via the easement running north-south along the site's east PL as per the Town's request), therefore it would be redundant to loop the internal watermains to Dillon Drive a second time at the site's access driveway. The design therefore remains as proposed – staff are requested to withdraw this comment.
Ag	The following comments pertain to the watermain and sanitary sewer connections within Dillon Drive and little River Boulevard: o Existing water valves to be operated by Town of Tecumseh staff only. O Traffic Control Plans (TCP) are to be submitted by the Contractor and approved by the Town of Tecumseh in advance of any work within the Dillon Drive or little River Boulevard rights-of-way. O Identify the removals/repairs required within the right-of-way to install the utility crossings. O Roadway to be restored to match existing per the Town of Tecumseh Figure X-16. O Any excavations or lane closures within the Town's rights-of-way shall be restored to permit twoway traffic at the end of each work day.	• Note re Existing Water valve provided accordingly. • TCP will be submitted by the Contractor in future accordingly. • The extent of removals/reinstatement in the ROW is shown accordingly. Proposed services in the ROW (Sanitary and Water) shall be installed well below the elevation of utilities, therefore there is no concern of conflicts. • Note Re Fig. X-16 provided accordingly. • Note re restoration provided accordingly
2. Grading Plan		
Ah	No slope is provided on the bottom of the stormwater management pond to permit proper drainage to pond outlet pipe.	Slope provided accordingly.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
Ai	The plan identifies that minor ponding during the 100 year storm event will occur on 12479 Dillon Drive. No ponding is permitted to spill over onto adjacent parcels up to and including the 100 year and climate change event.	By the additional storage volume provided, there is no more surface ponding on adjacent properties in the 100-Y or UST Storms. Refer to revised ponding limits.
Aj	Identify the major storm event overland flow route(s) from adjacent lands on the plan.	The major overland flow route arrows from adjacent properties shown accordingly.
Ak	Overland flow routes are depicted on the plans with arrows. It appears that the road in the vicinity of STM MH9 may spill westerly over the curb before it will spill northerly on the entrance road. Please review all overland flow routes.	Correct – the road in the vicinity of STM MH9 spills westerly into the ditch (by DI3), not northearly/northeasterly. The major overland flow routes have been revised accordingly.
Al	Entrance curbs within Dillon Drive to be tapered to zero height a minimum of 1 m from the edge of asphalt on Dillon Drive.	Revised accordingly.
Am	As noted on Sheet 4, the retaining wall at southeast corner of site is to be designed and sealed by a Professional Engineer licensed in the Province of Ontario. Due to the grade differential, a railing will be required. The retaining wall and/or curbing shall be positioned such that vehicles cannot damage railing.	A note is provided accordingly re: the design of the wall to be stamped by a P.Eng. A railing is proposed as per the revised Grading Plan. The railing wall is ontop of the curb, therefore there is no risk of it's damage from vehicles backing up etc.
An	Retaining wall design should not impact the Town's ability to access/maintain the watermain in the future. Sufficient clearance between the retaining wall and watermain must be provided to permit excavation of the watermain and the design of the retaining wall should take into account the potential for a watermain break at that location.	The watermain design has been revised such that it crosses perpendicularly to the retaining wall, to ease future maintenance relative to the prior design.

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
Ao	Provide details of how the watermain will be protected under the retaining wall. Provide additional water valve within parking area so the section of watermain crossing the retaining wall can be isolated.	Additional valves provided accordingly. The watermain is well beneath the retaining wall's footings and is not at risk of structural damage from the wall.
Ap	Provide details for the proposed pavement section(s) for the development.	Pavement detail provided accordingly.
Aq	Dimension the pavement/aisle widths and curb radii.	Dimensioned accordingly.
Ar	Show limits of concrete driveway entrance.	Labelled accordingly.
3. Sections		
As	Provide minimum distance from retaining wall face to property line to permit swale installation and maintenance.	Distance provided accordingly on plans.
At	Show handrail on retaining wall.	Handrail added to Retaining Wall section accordingly.
4. Notes and Details		

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
Au	Provide minimum granular/asphalt thicknesses over Cultec system.	Minimum granular/asphalt thickness is the same as the rest of the parking areas.
Av	Grading Note 14 identifies that all site swales shall be graded from 1-7%. Sheet 2 identifies swales less than 1% slope.	Grading Note 14 revised accordingly. Unfortunately the swales must be less than 1% slope because they are to match grade at the existing adjacent properties (which drain into the subject site swales) and the topography of the adjacent lots is sloping at less than 1% at the matching property lines, therefore the swales consequently are less than 1%.
Aw	Asphalt Note 10 identifies that driveway entrance base shall be 100 mm Granular "A". Minimum Granular "A" base is 150 mm.	Note 10 revised accordingly.
Ax	Water Note 20 refers to "Contract Drawing 10", which was not supplied for review.	Note 20 revised accordingly.
Ay	Typical watermain/service connection notes that should be included on the plans are as follows: o Contractor to perform all works in accordance with the latest version of the Town of Tecumseh Water Standards.	Added as watermain notes 29-37
Az	All proposed watermain/service connection materials to be in accordance with the latest version of the Town of Tecumseh Water Standards.	Added as watermain notes 29-37
Ba	A licensed Water Operator from the Town of Tecumseh must be onsite at all times when watermain/service connection work is performed.	Added as watermain notes 29-37

Comment Number	Concerns/Comments	Consultant's Response (How was this comment addressed?)
Bb	Contractor to provide third party to perform a live Tap of the existing watermain and work shall be carried out in accordance with the Town of Tecumseh standards and specification.	Added as watermain notes 29-37
Bc	All flushing /bacteria/pressure testing to be completed by Town of Tecumseh.	Added as watermain notes 29-37
Bd	All materials installed underground that may corrode must be wrapped with Denso paste/filler/wrap.	Added as watermain notes 29-37
Be	Provide a minimum of 2 business days notice to the Water Department before any water work begins.	Added as watermain notes 29-37
Bf	A Water Permit is required with final water drawings (that have been approved by the Water Department).	Added as watermain notes 29-37
Bg	A water inspection fee invoiced to the contractor will be sent at the end of the project ($10 per metre of watermain installed/inspected).	Added as watermain notes 29-37

Responses to Town of Tecumseh Technical Submission Review
Victoria on the Lake (Briday Inc.)
Our PN 18249
Date: January 6th, 2020

Email Correspondence from Town Staff

From: John Henderson [mailto:jhenderson@tecumseh.ca]
Sent: Monday, September 09, 2019 11:49 AM
To: 'daniel@odandetech.com' <daniel@odandetech.com>
Cc: Phil Bartnik <pbartnik@tecumseh.ca>; Denis Berthiaume <dberthiaume@tecumseh.ca>; Brian Hillman <bhillman@tecumseh.ca>; Chad Jeffery <cjeffery@tecumseh.ca>; Enrico De Cecco <edececco@tecumseh.ca>
Subject: Victoria on the Lake - Tecumseh Water Metering

Hi Daniel,

I have reviewed your metering question with Denis Berthiaume (Manager Water and Wastewater). As per our conversation last week, the Town is not looking for mainline meters. Depending on the owner's preference, the following metering options are available:

- Each townhouse unit has its own meter (63 meters +/-).
- Each townhouse block is serviced with a larger service connection that is metered and an individual service for each unit is provided after the meter. The owner would then have to determine how each unit in the block is billed since the Town billing would be for the block meter.

In addition, it was also discussed that we anticipate the development watermains will be under the control of the Town, therefore, the watermain and connections (to the curb stops) will need to be in easements.

If you have any questions, please do not hesitate to contact me.

Regards,

John Henderson, P.Eng.
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