Stantec

Memo

To:	Jason Canady, Wade Elliott, Kyrrha Sevco	From:	Adam Odell, Andrew Johnson - Stantec
	City of Grants Pass	Reviewed:	Dick Talley, Andrew Nishihara - Stantec
File:	Replacement WTP Stormwater Summary	Date:	February 12, 2021

Reference: Replacement WTP Stormwater Summary

Overview

The City of Grants Pass (City) will be developing approximately 7.71 acres of industrial property located at 695 SE J St. The purpose of this stormwater report is to document the calculations used to evaluate the existing site features and provide a long term stormwater site plan which can be further integrated into the construction of a Replacement Water Treatment Plant (RWTP). The existing site will be cleaned, grubbed, soil stockpiles removed, and generally prepared for the new development. A stormwater basin, which will also act as an emergency water overflow basin, will be constructed and the excavated material will be used within the site boundary. The site clean-up project will result in a zero (or neutral) cut fill balance.

Once constructed, the RWTP will be allowed to discharge all stormwater to the new stormwater pond. The pond will be sized in such a way that offsite stormwater discharge from the property will mimic pre-developed site conditions (natural meadow).

The new grading plan (prior to RWTP construction) will build up the center of the site. All runoff in the north half of the site is routed to the proposed stormwater basin. Portions of the site along the east, south, and west boundary will discharge minimal runoff that will follow existing flow patterns. There is very little existing site stormwater infrastructure, and what does exist, does not appear to function, or has no known outlet. The new stormwater basin will be constructed with an outlet structure consisting of two field inlets and a 72” manhole with a baffle wall and orifice. The manhole will drain to a 12” storm drain routed along the south side of SE J St. and terminate into the existing 60” Corrugated Metal Pipe (CMP) culvert adjacent to the intersection of SE J St and SE Mill St.

Three stormwater conditions were analyzed as part of the design:

- A pre-developed condition which assumed a natural meadow prior to any of the current developments. The pre-development peak flow shall be greater than the developed peak flow per the City of Grants Pass draft Stormwater Management Manual.
- The second was the intermediate stormwater condition once the site cleanup and grading has been finalized. For this condition, the surface of the site was assumed to be gravel, with new grading directing flow to the proposed pond for a large portion of the site. Flowrates produced during the interim condition will be higher than full buildout, as it is assumed grass, bio-swales and various landscaping features will be incorporated into the RWTP construction which will reduce the hydrograph and allow for some infiltration. The interim condition total runoff leaving the site will be less than the pre-developed condition.
- The third condition is full build-out of the new water treatment plant. An area of 3.24 acres was reserved for the treatment plant processes and will be designed to route runoff to the detention basin. The attached stormwater figures provide a representation of each design condition.

Finally, new treatment facilities typically have overflow basins integrated into the design which are used in case of an emergency, such as a pump failing to turn off, or an instantaneous valve closure. Stantec has assumed a minimum volume of 1,000,000 gallons of storage capacity would be required for this event. In the end, this is the defining criteria for sizing the basin.

Methodology and Calculations

For all design conditions, the 25-year 24-hour storm was used per the requirements of the draft Stormwater Management Manual. The 24-hour precipitation for this storm frequency in Grants Pass is 5 inches. The peak flow rate, design flowrate, and total runoff values were calculated using the Santa Barbara Urban Hydrograph Method (SBUH). The calculations for the volume of storage required were completed using the level pool routing method. To reduce the hydrograph and meet the City's stormwater guidelines, the outlet from the proposed stormwater pond was assumed to have an orifice plate with a 2-inch diameter opening. The entire site is assumed to have hydrologic soil group D characteristics per the NRCS Web Soil Survey.

Pre-Developed Conditions (see Figure 1):

The pre-developed flow was split into two basins, east and west, based on the existing topography of the site. The assumed site condition prior to any development is a natural meadow with slopes between 0.4% and 0.7%. Information for the two basins is summarized in **Table 1** and **Table 2**.

Table 1. West Basin

Curve Number	78
Basin Area	4.11 acres
Basin Slopes	0.0044 – 0.0067 ft/ft
T_c	45.0 min
Peak Flow	2.89 cfs

Table 2. East Basin

Curve Number	78
Basin Area	3.60 acres
Basin Slopes	0.0043 – 0.0071 ft/ft
T_c	67.5 min
Peak Flow	1.93 cfs

Intermediate Conditions (see Figure 2):

The intermediate flow condition is designed to route most of the runoff from the site into the new storm system. The majority of the site will shed water into the proposed stormwater basin, flowing into the outlet structure, and finally into the storm system along SE J St. The entirety of the site in the intermediate condition is assumed to be gravel. Information about the basins under this condition is presented in **Tables 3** through **5**.

Table 3. Intermediate North Basin (flows to stormwater detention basin)

Curve Number	91
Basin Area	5.69 acres
Basin Slopes	0.01 ft/ft
T_c	6.7 min
Peak Flow	14.55 cfs

Table 4.Intermediate South Basin (runoff)

Curve Number	91
Basin Area	2.02 acres
Basin Slopes	0.004-0.1 ft/ft
T_c	9.7 min
Peak Flow	4.63 cfs

Table 5. Intermediate Detention Basin – size required to meet the pre-developed site

Primary Detention Basin (North)	
Maximum Pond Area	52,143 ft^2 (1.20 acres)
Design Storage	75,287 ft^3 (563,147 gal)
Maximum Outflow (to storm sewer system)	0.13 cfs

The outflow was designed to meet the predeveloped site runoff into the City's storm system during a storm event using a 2-inch diameter orifice plate in a 12" storm drain. The inflow values for detention basin sizing are the runoff values calculated for the north basin.

Full Build-out Conditions (see Figure 3):

The full build-out condition is assumed to have the same grading as the intermediate build-out condition. For the full build-out condition, a 3.24-acre area is reserved for the process areas of the RWTP. This area is assumed to be entirely impervious concrete pavement. The remaining area of the site not including the stormwater basin is assumed to be 50% impervious asphalt pavement and 50% grass. The increase in peak flow runoff into the proposed stormwater detention basin is a result of an increase in basin area and an increase in curve number due to the reserved area for the replacement water treatment plant process area assumed to be impervious concrete pavement. Information about the basins under this condition is presented in **Tables 6** through **8**.

Table 6. Build-out North Basin (flows to primary stormwater detention basin)

Curve Number	94
Basin Area	6.40 acres
Basin Slopes	0.01 ft/ft
T_c	8.4 min
Peak Flow	15.70 cfs

Table 7. Build-out South Basin (runoff)

Curve Number	89
Basin Area	1.32 acres
Basin Slopes	0.004-0.1 ft/ft
T_c	33.1 min
Peak Flow	1.60 cfs

Table 8. Build-out Detention Basin – size required to meet the pre-developed site

Primary Detention Basin (North)	
Maximum Pond Area	52,143 ft^2 (1.20 acres)
Design Storage	91,726 ft^3 (686,110 gal)
Maximum Outflow (to storm sewer system)	0.15 cfs

Connection to Existing Storm System

The new stormwater facilities at the RWTP are connected to the existing City stormwater system via a new 12-inch reinforced concrete pipe routed along the south side of SE J St. The new storm drain consists of ~825 LF of pipe with an average slope of 0.25%. The new 12-inch storm drain connects to an existing 60-inch CMP culvert adjacent to the intersection of SE J St and SE Mill St. The 12-inch storm drain will be connected to the CMP culvert with an insert-a-tee with the invert of the 12-inch storm drain at the springline of the CMP culvert.

Conclusion

Table 9 provides the total runoff for each development condition. For the intermediate and full-build out conditions, the design runoff value is the flow into the city's storm system from the detention basin release rate plus the sheet flow runoff of the south side of the site. Both the intermediate and full build-out conditions have reduced peak flow runoff values which satisfy the City's stormwater design requirements.

A two-inch diameter orifice was determined to be sufficient for the primary detention basin because it limits the flow to the City's storm system during a 25-year storm event, where areas of the existing system may be at capacity. The pond is designed to retain as much stormwater on-site as possible during a storm event, and since the controlling design factor for the stormwater pond is an emergency overflow event, the stormwater pond is capable of retaining a 24-hour, 25-year storm on-site.

Table 9. Total Runoff Per Development Condition

Development Condition	North Runoff (cfs)	South Runoff (cfs)	West Runoff (cfs)	East Runoff (cfs)	Total Peak Flow Runoff (cfs)
Pre-development	-	-	2.89	1.93	4.82
Intermediate	0.13	4.63	-	-	4.76
Full Build-out	0.15	1.60	-	-	1.75

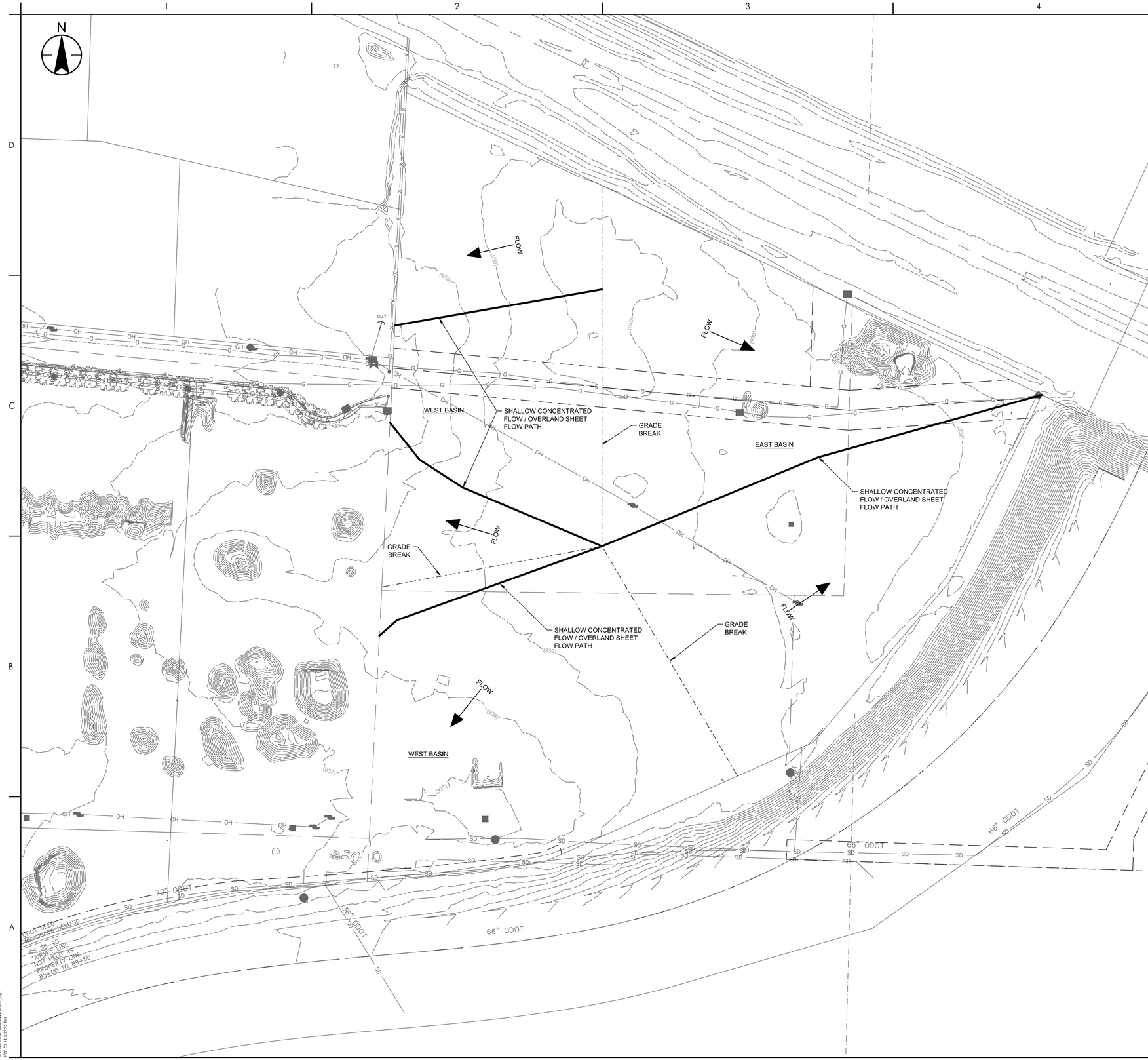
The design storage volume for the primary detention basin is 91,726 cubic feet, or 686,110 gallons. The detention basin is also designed to retain the design overflow event for the full build-out condition of the plant. The design overflow event of the plant is 1,000,000 gallons and is the controlling factor in the design criteria of the overflow pond.

Attachments:

Stormwater Figures 1 to 3

EXPIRES: 12/31/2022

Nishihara, Andrew Digitally signed by Nishihara, Andrew Date: 2021.03.04 10:48:37 -08'00'



GENERAL SHEET NOTES

1. CURRENT SITE IS A COMBINATION OF PAVEMENT AND GRAVEL SURFACES. FOR PRE-DEVELOPED CONDITIONS THE SITE WAS ASSUMED TO BE MEADOW, WITH HYDROLOGIC SOIL GROUP D (CN = 78).
2. TO SIMPLIFY CALCULATIONS, THE TWO BASINS SHOWN WITH RUNOFF WEST COMBINED TO COUNT AS ONE BASIN.

HYDROLOGIC INFO - WEST BASIN

DESIGN STORM FREQUENCY	25-YEAR
24-HOUR PRECIPITATION	5 IN
CURVE NUMBER	78
BASIN AREA	4.11 ACRES
BASIN SLOPES	0.0044 - 0.0067 FT/FT
Tc	45.0 MIN
PEAK FLOW	2.89 CFS

HYDROLOGIC INFO - EAST BASIN

DESIGN STORM FREQUENCY	25-YEAR
24-HOUR PRECIPITATION	5 IN
CURVE NUMBER	78
BASIN AREA	3.60 ACRES
BASIN SLOPES	0.0043 - 0.0071 FT/FT
Tc	67.5 MIN
PEAK FLOW	1.93 CFS

Stantec
Stantec Consulting Services, Inc.
601 SW Second Avenue, 14th Floor
Portland, Oregon 97204
Tel: +1.503.220.5433
www.stantec.com

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Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR CONSTRUCTION	AMN		2012.02.12

Permit/Seal

Client/Project
City of Grants Pass
REPLACEMENT WATER TREATMENT PLANT SITE CLEANUP DESIGN
Grants Pass, Oregon

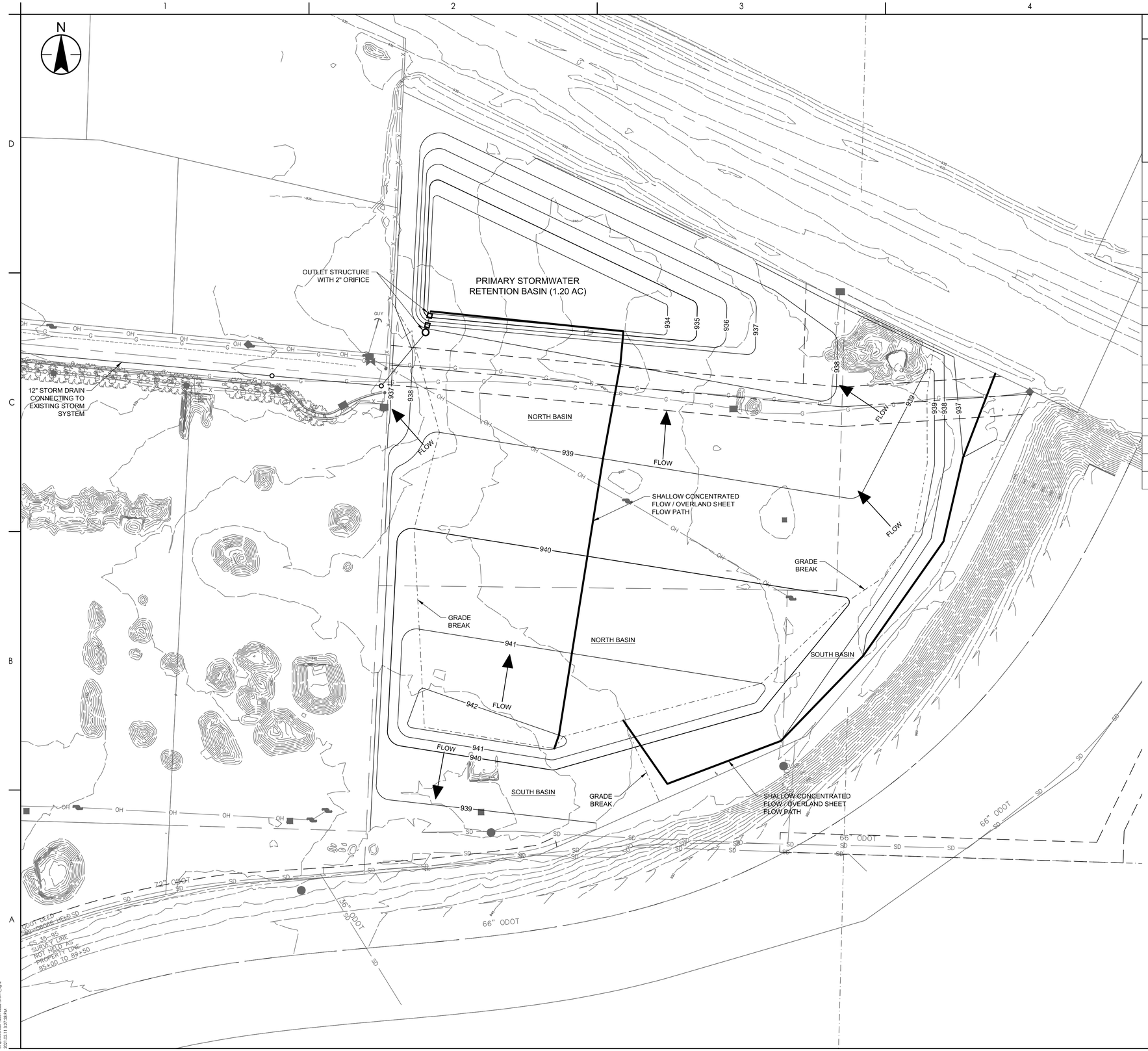
Project No.: 2002300067
File Name: STORM_FIG 1
Scale: 1" = 50'

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD
			2012.02.12

Title
STORMWATER PLAN
EXISTING CONDITIONS

Revision:
Drawing No.
FIG 1

ORIGINAL SHEET - ANSI D



GENERAL SHEET NOTES

1. INTERMEDIATE SITE CONDITIONS ASSUMED TO GRAVEL WITH HYDROLOGIC SOIL GROUP D (CN = 91).
2. PRIMARY RETENTION BASIN:
   - DESIGN STORAGE: 75,287 FT^3
   - MAXIMUM OUTFLOW (TO STORM SYSTEM): 0.13 CFS

HYDROLOGIC INFO - NORTH BASIN

DESIGN STORM FREQUENCY	25-YEAR
24-HOUR PRECIPITATION	5 IN
CURVE NUMBER	91
BASIN AREA	5.69 ACRES
BASIN SLOPES	.01 FT/FT
Tc	6.7 MIN
PEAK FLOW	14.55 CFS

HYDROLOGIC INFO - SOUTH BASIN

DESIGN STORM FREQUENCY	25-YEAR
24-HOUR PRECIPITATION	5 IN
CURVE NUMBER	91
BASIN AREA	2.02 ACRES
BASIN SLOPES	0.004-0.10 FT/FT
Tc	9.7 MIN
PEAK FLOW	4.63 CFS

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Client/Project
City of Grants Pass

REPLACEMENT WATER TREATMENT PLANT SITE CLEANUP DESIGN
Grants Pass, Oregon

Project No.: 2002300067
File Name: STORM_FIG 2
Scale: 1" = 50'

Dwn.	Dsgn.	Chkd.	2012.02.12 YYYY.MM.DD

Title
STORMWATER PLAN
INTERMEDIATE CONDITIONS

Revision:
Drawing No.
FIG 2

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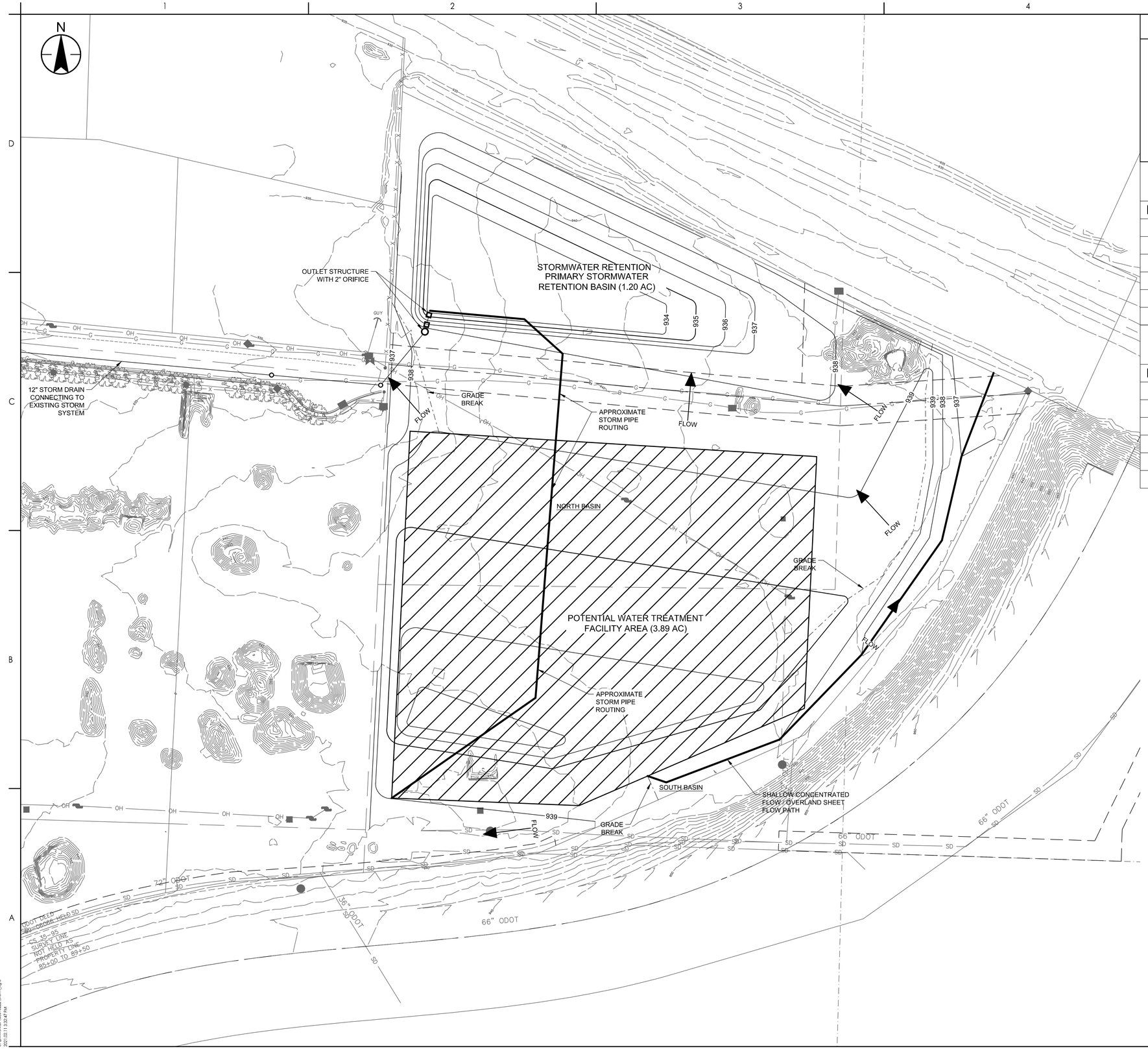

GENERAL SHEET NOTES

1. POTENTIAL WATER TREATMENT PLANT AREA ASSUMED TO BE CONCRETE IMPERVIOUS SURFACE. ALL AREA OF POTENTIAL WATER TREATMENT PLANT IS ASSUMED TO DRAIN TO THE STORMWATER RETENTION BASIN.
2. THE FINAL CONDITION OF THE SITE, EXCEPT FOR THE STORMWATER RETENTION BASIN AND WTF AREA, IS ASSUMED TO BE 50% ASPHALT PAVEMENT AND 50% GRASS.
3. PRIMARY RETENTION BASIN
   - DESIGN STORAGE: 91,726 FT^3
   - MAXIMUM OUTFLOW (TO SEWER SYSTEM): 0.15 CFS

HYDROLOGIC INFO - NORTH BASIN

DESIGN STORM FREQUENCY	25-YEAR
24-HOUR PRECIPITATION	5 IN
CURVE NUMBER	94
BASIN AREA	6.40 ACRES
BASIN SLOPES	0.01FT/FT
Tc	8.4 MIN
PEAK FLOW	15.70 CFS

HYDROLOGIC INFO - SOUTH BASIN

DESIGN STORM FREQUENCY	25-YEAR
24-HOUR PRECIPITATION	5 IN
CURVE NUMBER	89
BASIN AREA	1.32 ACRES
BASIN SLOPES	0.004-0.1 FT/FT
Tc	33.1 MIN
PEAK FLOW	1.60 CFS

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REPLACEMENT WATER TREATMENT PLANT SITE CLEANUP DESIGN
Grants Pass, Oregon

Project No.: 2002300067
File Name: STORM_FIG 3
Scale: 1" = 50'

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Title
STORMWATER PLAN
FULL BUILD OUT
CONDITIONS

Revision:
Drawing No.
FIG 3

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