

SWLID REPORT

**NEILMED
WAREHOUSE**

**685 AVIATION
BOULEVARD
SANTA ROSA, CA**

APN's: 059-340-056

B&R JOB #4542.03

DECEMBER 20, 2019



Prepared By:

Brelje & Race Consulting Engineers

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www.brce.com

Project Name: _____

Date: _____



Storm Water Low Impact Development Submittal Coversheet

To be submitted with all SW LID submittals

1. **Submittal Information:**

Submittal Date: _____

Initial SW LIDS

Final SW LIDS

Design Manual Used for design:

2005 Standard Urban Storm Water Mitigation Plan

2011 Storm Water Low Impact Development Technical Design Manual

2017 Storm Water Low Impact Development Technical Design Manual

2. **Applicant Information:**

Applicant Name (Owner or Developer): _____

Mailing Address: _____

City/State/Zip: _____

Phone/Email/Fax: _____

Project Name: _____

Date: _____



Storm Water Low Impact Development Submittal Coversheet

To be submitted with all SW LID submittals

3. Project Information:

Project Name:

Site Address:

City/State/Zip:

APN (s):

Permit # (s):

Subdivision

Grading Permit

Building Permit

Design Review

Use Permit

Hillside Development

Encroachment

Time Extension

Other:

Project Name: _____

Date: _____



Storm Water Low Impact Development Submittal Coversheet

To be submitted with all SW LID submittals

4. Design Information:

Narrative:

Project Description

Description of proposed project type, size, location, and any specific uses or features.

Description of any sensitive features (creeks, wetlands, trees, etc.) and whether they are going to be preserved, removed or altered.

Description of the existing site.

Description of how this project triggers these requirements (impervious area, CALGreen, 401 Permit, etc.).

Describe any "on-site offset" used.

Pollution Prevention and Runoff Reduction Measures

Description of all proposed pollution prevention measures (street sweeping, covered trash enclosures, indoor uses, etc).

Description of all Runoff Reduction Measures (Interceptor Trees, Impervious Area Disconnection, and/or Alternative Driveway Design).

Type of BMPs Proposed

Description of the types of BMPs selected including priority group that each is in.

Description of level of treatment and volume capture achieved for each BMP.

Maintenance

Description of maintenance for each type of BMP.

Description of funding mechanism.

Designation of Responsible Party.

Project Name: _____

Date: _____



Storm Water Low Impact Development Submittal Coversheet

To be submitted with all SW LID submittals

Exhibits:

Proposed SW LID Exhibit:

Exhibit should include: street names, property lines, storm drainage system, waterways, title block, scale and north arrow.

Tributary areas shown for all inlets (including off-site drainage areas).

C value for each tributary area.

Soil Type of existing site.

New or replaced impervious area shown.

All inlets and BMP, shown (including unique identifier).

All interceptor trees shown.

All proposed BMPs shown including dimensions.

Existing Condition Exhibit

Exhibit should include: street names, property lines, proposed storm drainage system, waterways, title block, scale, and north arrow.

Soil Type of existing site.

Proposed tributary areas shown for all proposed inlets (including offsite drainage areas). Existing impervious areas.

Existing impervious area.

BMP Details:

Detail for each type of BMP selected- provide a preliminary 8.5"x11" detail for each BMP type or include on submitted drawings. These can be taken straight from the Fact Sheets if no significant changes are proposed.

On Plans:

Show all applicable elements of the selected BMPs on the appropriate plan sheets.

Calculations:

Calculations, for each inlet, and summary sheet using the Storm Water Calculator found at www.srcity.org/stormwaterLID

Supplemental or supporting calculation if applicable.

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Appendices

- Appendix A: Composite Curve Number Calculations**
- Appendix B: Final Post Construction Detail of BMP (drawing)**
- Appendix C: Maintenance - Checklists**
- Appendix D: Maintenance - Operations & Maintenance Manuals**

Attachments

- Existing Conditions Exhibit**
- Site Plan**
- Grading Plan**
- Utility Plan**
- Post Construction BMP Plan**

1. PROJECT DESCRIPTION

The Neilmed Warehouse site is situated in northwest Santa Rosa, within the existing Airport Business Park. The site main entrance occurs via an access driveway immediately east of the lot directed to Aviation Boulevard. The existing undeveloped site is a grass covered property of 1.53 acres. The site topography generally slopes from the southeast to the northwest.

The existing storm drainage system is located along the western limits of the site, and was constructed as a part of the Airport Boulevard Business Park development. Storm water runoff from the subject property generally sheet flows to the northwestern portion of the site where it outflows through drainage inlets and catch basins to an existing storm drain manhole. The manhole is connected to a 54" storm drainage pipe that conducts the drainage to the north to Airport Creek.

The proposed structures and features on the site will consist of a 2 story building, asphalt paving, sidewalks and walkways, a truck loading dock, site lighting, covered trash enclosure, landscaping, underground utilities, storm water management facilities, LID features and related improvements. The proposed buildings consist of the main storage warehouse, loading dock, equipment room and office space. The southerly portion of the site consists in an already developed paved parking area and drive isle, therefore, the proposed improvements will disturb a total area of approximately 1.36 acres. The project construction activities will include earthwork, grading, paving, concrete flatwork, building construction and installation of underground utilities (including water, sewer, storm drainage, electrical and irrigational facilities).

Onsite stormwater runoff will be captured by a variety of methods, including trench drain, bio swales and drop inlets. Storm drain improvements will convey the storm water to the existing storm drain system at the western limits of the site, which drains to Airport creek to the north through the existing 54" storm drain.

The existing soil type according to the USDA soil survey is as follows:

Description	Hydrologic Group Rating
Huichica loam, ponded, 0-5% slope	D

A soils map is included as Item 9 of this report.

There are no existing sensitive features such as creeks or wetlands on this site that we are aware of, and the project does not propose work in any off-site areas that are environmentally sensitive.

This 1.53 Ac (66,647 sf) site will be developed to accommodate the aforementioned building with its associated parking lots, driveways, trash enclosure and walkways. The County of Sonoma zoning of the property is MP (Industrial Park District). The proposed facility is a 2 story warehouse and is comprised primarily of storage and office space. The building footprint will be approximately 29,533 sf. Site improvements will provide access to the building exits along southern and eastern sides of the building and provide a total of 38 automobile parking spaces.

As mentioned previously, storm water run-on to this site is negligible as the adjacent lots are fully developed and do not direct drainage onto this site. The proposed building's roof area is divided into tributary areas of relatively equal size that are sloped to gutters and roof drains. The storm drainage collected from the building and drainage from the parking lot will be discharged into bioretention swales to capture the runoff generated by 1" of rain over a 24-hour period and allow for infiltration, before larger flows enter the onsite drainage system. Drainage from the truck loading dock will be treated by a Flogard catch basin insert filter (see Appendix D) prior to entering drainage system.

Since the project will create more than 10,000 sq. ft. of impervious surface, it is subject to the requirements of the County of Sonoma's MS4 storm water permit.

2. POLLUTION PREVENTION MEASURES

The project design has incorporated pollution source controls intended to prevent pollutants from entering the storm drain system. These source controls include:

- Minimizing irrigation overspray and runoff from site;
- Utilizing minimal amounts of pesticides;
- Proper maintenance and cleaning of landscaped areas;
- Using the minimum parking stall and driveway widths practical;
- Sweeping parking lots and driveways on a regular basis;
- Gross pollutant control (trash capture);
- Covering trash enclosures;
- Disconnecting of roof rain water leaders where practical and discharge outlets into landscaped areas to encourage infiltration and treatment;
- Clearly mark storm drain inlets with the words “No Dumping. Drains to Creek”;
- Direct storm water by sheet flow through landscaped areas prior to entering storm drain.

3. TYPES OF BMP'S SELECTED

The Low Impact Development Technical Design Manual encourages the use of Low Impact Development (LID) techniques to both retain and treat runoff water from impervious surfaces. The projects site hydrology has been divided to sub-areas which include all tributary impervious and landscaped areas. The LID strategies and BMPs proposed for use on this project includes preservation of existing trees, vegetated swale with bioretention, tree pod bioretention structures and underground stormwater retention/infiltration basins and filter inserts. See text below for more details on proposed LID strategies and BMPs.

Interceptor Trees -Preservation of Existing Trees

Preserving existing established tree canopies has been shown to reduce the amount of runoff that comes off a developed project. Existing tree canopies intercept storm water before it contacts the ground and retain a significant volume of captured water on their leaves and branches allowing for evapotranspiration and providing runoff reduction benefits.

Vegetated Swale with Bioretention

Bioretention areas are to be designed in general accordance with the detail provided on this report (see Appendix B). Bioretention areas will consist of excavated areas backfilled with permeable granular material. Treatment of storm water runoff will be achieved in the top surface of the vegetated swale with runoff continuously entering the length of the vegetated swale and flowing vertically through the upper 18" layer of structural soil. The retention volume will be located beneath the treatment layer in an area 2.5 to 4 feet in depth. The permeable material will maximize storm water runoff retention and storm water infiltration. A porosity of 40% was used for the permeable material per the Porosity of Structural Backfill Technical Sheet (see Appendix D). Continuous 10 mil plastic barriers will block seepage from migrating into the subgrade under adjacent pavement by lining the sides of the trench. The bottom of the trench will remain unlined to promote infiltration.

4. LEVEL OF TREATMENT, DESIGN GOAL & CONCLUSIONS

Per 2017 Storm Water Low Impact Development Technical Design Manual, for a site of over 1.0 Ac., with tributary area consisting of new impervious area only, design requirement is 100% Volume Capture/Hydromodification Control, in other words, the capture and retention of runoff generated by 1" of rain over a 24-hour period. This proposed storm water system will collect site runoff from roofs, walkways, other impervious surfaces and landscaped areas and will convey the storm water to specifically designed vegetated bioswales or filter media. Once the 100% volume is captured, all additional storm water will be diverted to the proposed storm drainage system and directed to the various points of connection for the site.

5. MAINTENANCE FUNDING

The routine inspection and upkeep of this facility will be provided by the property ownership. Maintenance personnel under contract to the property owners will be responsible for routine clean-up and maintenance of the parking lots, driveways, sidewalks, plazas, and landscaped areas. They will also be responsible for incidental maintenance of the BMPs on an as required basis, such as driveway and parking lot sweeping, maintenance and care of landscaping and removal of trash and debris from the gross pollutant filter of the truck dock inlet.

Long-term funding for inspection, maintenance and repair of the BMP's shall be budgeted and carried out by the property owner, or its assigned successor(s).

VEGETATED SWALE – COMMON MAINTENANCE

CONCERNS:

Maintenance objectives include maintaining units by removal of obstructions and trash.

- Conduct inspection monthly during the rainy season. If ponded water is observed, grading will be required to restore positive drainage.
- Mow and irrigate during dry weather to the extent necessary to keep vegetation alive. Where 6-inch high grasses are used, the grass height shall be at least 3 inches after mowing. Where mowed grasses are shown, the grass height shall be mowed when the height exceeds 3 inches.
- Remove any accumulated obstructions and/or trash.

BIORETENTION AREAS – COMMON MAINTENANCE CONCERNS:

The primary maintenance requirement for bioretention area is the regular inspection and repair or replacement of the treatment measure's components. Generally, the level of effort is similar to the routine, periodic maintenance of any landscaped area.

- Conduct monthly inspections as follows:
 - Inspect retention area for obstructions and trash
 - Inspect retention area for ponded water. If ponded water does not drain within five days, remove surface soils and replace. If mosquito larvae are observed, contact the Sonoma Mosquito & Vector Control District at 707 285-2200.
 - Inspect inlets for channels, exposure of soils, or other evidence of erosion. Clear any obstructions and remove any accumulation of sediment.
- Conduct a biannual (twice yearly) evaluation of the health of any plants, and remove and replace any dead or diseased vegetation.
- Treat diseased vegetation, as needed, using preventative and low-toxic measures to the extent possible, and replace any dead plants.
- The use of pesticides and quick-release synthetic fertilizers shall be minimized, and the principles of integrated pest management (IPM) followed. Check with the local jurisdiction for any local policies regarding the use of pesticides and fertilizers.
- Maintain vegetation and the irrigation system. Prune and weed as needed to keep the retention area neat and orderly in appearance.
- Inspect and if needed, replace mulch before the wet season begins. Mulch should be replaced when erosion is evident or when the retention area begins to look unattractive. The entire area may need mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas.



BMP Selection Table

APPENDIX B

Project Name: Neilmed Warehouse

	Best Management Practice (BMP)	Detail Sheet	Detail Title	Can be used with:			Slope Constraints Achieved	Treatment Volume	Runoff Capture	Runoff Reduction Measure	BMP in priority selected?		Unique Identifier of BMP per plan	Explanation of selection	Other notes
				High Ground	Water Contamination	Slope					Yes	No			
Universal BMP to be considered on all projects.	Living Roof	N/A	N/A	X	X	X	X	X							
	Rainwater Harvesting	N/A	N/A	X	X	X		X							
Runoff Reduction Measures	Interceptor Trees	N/A	N/A	X	X	X			X						
	Bovine Terrace	RRM-01	Bovine Terrace	X					X						
	Vegetated Buffer Strip	RRM-02	Vegetated Buffer Strip						X						
	Impervious Area Disconnection	N/A	N/A	X	X	X			X	X				Disconnected roof drains in series with bioswales	
Priority 1 to be installed with no underdrains or liners. Must drain all standing water within 72 hours.	Bioretention	P1-02	Roadside Bioretention - no C & G					X	X						
	Vegetated Swale with Bioretention	P1-06	Swale with Bioretention					X	X	X					
	Constructed Wetlands	N/A	N/A					X	X						
Priority 2 BMPs: with subsurface drains installed above the capture volume.	Bioretention	P2-02	Roadside Bioretention - Flush Design Roadside					X	X						
		P2-03	Roadside Bioretention-Contiguous SW					X	X						
		P2-04	Roadside Bioretention Curb Opening					X	X						
		P2-05	Roadside Bioretention- No C & G					X	X						
	Constructed Wetlands	N/A	N/A					X	X						

Date _____

Page ____ of ____

6. BMP SELECTION TABLES



BMP Selection Table

APPENDIX B

Best Management Practice (BMP)	Detail Sheet	Detail Title	Can be used with High Ground Water Contamination	Slope Constraints	Achieves Treatment	Volume Capture	Runoff Reduction Measure	BMP in priority selected?	Yes	No	Unique identifier of BMP per plan	Explanation of selection	Other notes
Priority 3 BMPs- installed with subdrains and/or impermeable liner. Does not achieve volume capture and must be used as part of a treatment train.	Bioretention	P3-02 Roadside Bioretention - Flush Design Roadside	X	X	X	X							
		P3-03 Roadside Bioretention-Contiguous SW	X	X	X	X							
		P3-04 Roadside Bioretention-Curb Opening	X	X	X	X							
	Flow Through Planters	P3-05 Flow Through Planters	X	X	X	X							
	Vegetated Swale	P3-06 With Bioretention	X	X	X	X	X						
		P3-07 Vegetated Swale	X	X	X	X							
Priority 4 BMPs- does not achieve volume capture and must be used as part of a	Tree Filter Unit		X	X	X	X							
	Modular Bioretention		X	X	X	X							
Priority 5 BMPs- does not achieve volume capture and must be used as part of a treatment train.	Chambered Separator Units		X	X	X	X							
	Centrifugal Separator Units		X	X	X	X							
	Trash Excluders		X	X	X	X							
	Filter Inserts		X	X	X	X		X					Inlet filter on truck dock
Priority 6 BMPs see the "Offset Program" chapter for details.	Offset Program					N/A	N/A	N/A					
Other	Detention		X										

7. LID DETERMINATION WORKSHEET

FOR OFFICE USE ONLY:

Does this project require permanent storm water BMP's?

☐ Y ☐ N

Date Submitted: _____



Print Form

File No:	Quadrant
Related Files:	
Set:	
Department Use Only	

2017 Storm Water LID Determination Worksheet

PURPOSE AND APPLICABILITY: This determination worksheet is intended to satisfy the specific requirements of "ORDER NO. R1-2015-0030, NPDES NO. CA0025054 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS." Additional design requirements imposed by Governing Agencies, such as local grading ordinances, CAL Green, CEQA, 401 permitting, and hydraulic design for flood control still apply as appropriate. Additionally, coverage under another regulation may trigger the requirement to design in accordance with the Storm Water LID Technical Design Manual.

Part 1: Project Information

Neilmed Warehouse

Project Name

685 Aviation Boulevard

Project Site Address

Santa Rosa, CA 95403

Project City/State/Zip

Permit Number(s) - (if applicable)

Brelje & Race Consulting Civil Engineers

Designer Name

Santa Rosa, CA 95403

Designer City/State/Zip

Alisha and Natasha Properties, LLC

Applicant (owner or developer) Name

601 Aviation Blvd

Applicant Mailing Address

Santa Rosa, CA 95403

Applicant City/State/Zip

Applicant Phone/Email/Fax

475 Aviation Blvd, Santa Rosa, CA 95403

Designer Mailing Address

(707) 576-1322, www.brce.com

Designer Phone/Email

Type of Application/Project:

☐ Subdivision
 ☒ Grading Permit
 ☐ Building Permit
 ☐ Hillside Development
☐ Design Review
 ☐ Use Permit
 ☐ Encroachment
 ☐ Time Extensions
 ☐ Other : _____

PART 2: Project Exemptions

- Is this a project that creates or replaces *less than* 10,000 square feet of impervious surface¹, including all project phases and off-site improvements?

☐ Yes ☒ No

¹ Impervious surface replacement, such as the reconstruction of parking lots or excavation to roadway subgrades, is not a routine maintenance activity. Reconstruction is defined as work that replaces surfaces down to the subgrade. Overlays, resurfacing, trenching and patching are defined as maintenance activities per section VI.D.2.b.

2017 Storm Water LID Determination Worksheet

Project Name

Neilmed Warehouse

2. Is this project a routine maintenance activity² that is being conducted to maintain original line and grade, hydraulic capacity, and original purpose of facility such as resurfacing existing roads and parking lots?

☐ Yes ☒ No

3. Is this project a stand alone pedestrian pathway, trail or off-street bike lane?

☐ Yes ☒ No

4. Did you answer "YES" to any of the questions in Part 2?

☐ **YES:** This project will *not* need to incorporate permanent Storm Water BMP's as required by the NPDES MS4 Permit. **Please complete the "Exemption Signature Section" on Page 4.**

☒ **NO:** Please complete the remainder of this worksheet.

Part 3: Project Triggers

Projects that Trigger Requirements:

Please answer the following questions to determine whether this project requires permanent Storm Water BMP's and the submittal of a SW LIDs as required by the NPDES MS4 Permit order No. R1-2015-0030.

1. Does this project create or replace a combined total of 10,000 square feet or more of impervious surface¹ including all project phases and off-site improvements?

☒ Yes ☐ No

2. Does this project create or replace a combined total or 10,000 square feet or more of impervious streets, roads, highways, or freeway construction or reconstruction³? ☐ Yes ☒ No

3. Does this project create or replace a combined total of 1.0 acre or more of impervious surface¹ including all project phases and off-site improvements? ☒ Yes ☐ No

4. Did you answer "YES" to any of the above questions in Part 3?

☒ **YES:** This project will need to incorporate permanent Storm Water BMP's as required by the NPDES MS4 Permit. **Please complete remainder of worksheet and sign the "Acknowledgement Signature Section" on Page 4.**

☐ **NO:** This project will *not* need to incorporate permanent Storm Water BMP's as required by the NPDES MS4 permit. **Please complete the "Exemption Signature Section" on Page 4.**

1 Impervious surface replacement, such as the reconstruction of parking lots or excavation to roadway subgrades, is not a routine maintenance activity. Reconstruction is defined as work that replaces surfaces down to the subgrade. Overlays, resurfacing, trenching and patching are defined as maintenance activities per section VI.D.2.b.

2 "Routine Maintenance Activity" includes activities such as overlays and/or resurfacing of existing roads or parking lots as well as trenching and patching activities and reroofing activities per section VI.D.2.b.

3 "Reconstruction" is defined as work that extends into the subgrade of a pavement per section VI.D.2.b.

2017 Storm Water LID Determination Worksheet

Project Name

Neilmed Warehouse

Part 4: Project Description

1. Total Project area: 52344

☒ square feet
☐ acres

2. Existing land use(s): (check all that apply)

☒ Commercial ☐ Industrial ☐ Residential ☐ Public ☐ Other

Description of buildings, significant site features (creeks, wetlands, heritage trees), etc.:

1.53 acres vacant parcel with main access to Aviation Blvd through existing driveway to the east side of the site. Part of the property (.16 ac) is composed by a previously paved surface that includes parking easements in favor to the parcel south of the lot. The parcel is surrounded by fully developed commercial properties.

3. Existing impervious surface area: 7333

☒ square feet
☐ acres

4. Proposed Land Use(s): (check all that apply)

☒ Commercial ☐ Industrial ☐ Residential ☐ Public ☐ Other

Description of buildings, significant site features (creeks, wetlands, heritage trees), etc.:

The proposed facility is a 2 story warehouse and is comprised primarily of storage and office space. The size of the building will be approximately 29,533 sf. Site improvements will provide access to the southern and eastern sides of the building and will provide a total of 53 automobile parking spaces.

5. Existing impervious surface area: 52344

☒ square feet
☐ acres

2017 Storm Water LID Determination Worksheet

Project Name

Neilmed Warehouse

Acknowledgment Signature Section:

As the property owner or developer, I understand that this project is required to implement permanent Storm Water Best Management Practices and provide a Storm Water Low Impact Development Submittal (SW LIDS) as required by the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permit Order No. R1-2015-0030. *Any unknown responses must be resolved to determine if the project is subject to these requirements.

Applicant Signature

Date

Exemption Signature Section:

As the property owner or developer, I understand that this project as currently designed does not require permanent Storm Water BMP's nor the submittal of a Storm Water Low Impact Development Submittal (SW LIDS) as required by the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permit*. I understand that redesign may require submittal of a new Determination Worksheet and may require permanent Storm Water BMP's.

Applicant Signature

Date

* This determination worksheet is intended to satisfy the specific requirements of "ORDER NO. R1-2015-0030, NPDES NO. CA0025054 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM THE MUNICIPAL SEPARATE STORM SEWER SYSTEMS." Additional design requirements imposed by Governing Agencies, such as local grading ordinances, CAL Green, CEQA, 401 permitting, and hydraulic design for flood control still apply as appropriate. Additionally, coverage under another regulation may trigger the requirement to design in accordance with the Storm Water LID Technical Design Manual.

Implementation Requirements: All calculations shall be completed using the "Storm Water Calculator" available at: www.srcity.org/stormwaterLID

Hydromodification Control/100% Volume Capture: Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by a 1.0" 24-hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual method. This is a retention requirement.

Treatment Requirement: Treatment of 100% of the flow calculated using the modified Rational Method and a known intensity of 0.20 inches per hour.

Delta Volume Capture Requirement: Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by a 1.0" 24-hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual method. This is a retention requirement.



STORM WATER CALCULATOR

LID BMP Summary Page & Site Global Values

Project Information: Project Name: <u>Neilmed Warehouse</u> Address/Location: <u>685 Aviation Blvd</u> Designer: <u>Brelje & Race Consulting Engineers</u> Date: <u>12/20/2019</u>		Site Information: Mean Seasonal Precipitation (MSP) of Project Site: <u>35.00</u> (inches) K=MSP/3(K= <u>1.17</u> Impervious area - pre development: <u>7,333.0</u> ft ² Impervious area - post development: <u>52,344.0</u> ft ²		Based upon the pre and post development impervious area, the post construction BMP requirement is: 100% Capture & Treatment
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Summary of Saved BMP Results:

BMP ID:	Tributary Area		Requirements		BMP Design Results						
	Tributary Area (ft ²)	Runoff Reduction Measures (Y/N)	Type of Requirement Met	Type of BMP Design	Percent Achieved	Hydromodification Control		Flow Base Treatment		Delta Volume Capture	
						Required V _{Hydromod} (ft ³)	Achieved (ft ³)	Required Q Treatment (cfs)	Achieved (ft ³)	Required Vdelta (ft ³)	Achieved (ft ³)
1 1-CAPT	16,075	No	Hydromod Volume Capture	Priority 1: P1-06 Swale with Bioretention	106.2	1024.459	1088.000				
2 2- CAPT	14,059	No	Hydromod Volume Capture	Priority 1: P1-06 Swale with Bioretention	109.0	935.6265	1020.000				
3 3-CAPT	13,396	No	Hydromod Volume Capture	Priority 1: P1-06 Swale with Bioretention	122.7	745.8893	915.0000				
4 4-CAPT	18,372	No	Hydromod Volume Capture	Priority 1: P1-06 Swale with Bioretention	102.1	1175.073	1200.000				
5 1-TREAT	16,075	No	100% Vertical Flow Treatment	Priority 1: P1-06 Swale with Bioretention	177.7			0.0620	0.1102		
6 2-TREAT	14,059	No	100% Vertical Flow Treatment	Priority 1: P1-06 Swale with Bioretention	243.9			0.0565	0.1377		
7 3-TREAT	13,396	No	100% Vertical Flow Treatment	Priority 1: P1-06 Swale with Bioretention	312.7			0.0466	0.1458		
8 4-TREAT	18,372	No	100% Vertical Flow Treatment	Priority 1: P1-06 Swale with Bioretention	290.6			0.0669	0.1944		
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8. STORM WATER CALCULATIONS



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	1-CAPTURE		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	16,075.0 ft²		
Description/Notes:			

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$		$V_{HYDROMOD} =$ 1,024.46 ft ³
Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate	
Post development ground cover description:	Impervious - Paved Parking, Rooftop, Driveways	
CN _{POST} :		
User Composite post development CN:	96.0	

BMP Sizing Tool: Hydromodification Requirement		Percent of Goal Achieved = 106.20 %
BMP Volume Below Ground		Ponded Water Above Ground
Porosity:	0.40	
Depth below perforated pipe if present:	4.00 ft	Depth: 0.00 ft
Width:	17.00 ft	Width: 0.00 ft
Length:	40.00 ft	Length: 0.00 ft
Area:	0.00 ft ²	Area: 0.00 ft ²



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	1-TREAT		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	16,075.0 ft ²		
Description/Notes:			

100% Treatment		Q_{TREATMENT} = 0.0620 cfs	
Post surface type:	Concrete		
C _{POST} :			
User Composite post development C _{POST} :	0.72		
User Input I _{Historical} :	0.00 in./hr.	Treatment Factor (Tf):	1 Calculated
		I _{Design Storm} :	0.20 in./hr.

BMP Sizing 100% Treatment Vertical		Percent of Goal Achieved = 177.73 %	
Infiltration rate of the specified BMP soil:	7.00 in./hr.		
Depth of drainage pipe:	1.50 ft		
BMP Length:	40.00 ft		
BMP Width:	17.00 ft		



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	2-CAPTURE		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	14,059.0 ft ²		
Description/Notes:			

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$		$V_{HYDROMOD}$ = 935.63 ft ³
Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate	
Post development ground cover description:	Impervious - Paved Parking, Rooftop, Driveways	
CN _{POST} :		
User Composite post development CN:	96.0	

BMP Sizing Tool: Hydromodification Requirement		Percent of Goal Achieved = 109.02 %	
BMP Volume Below Ground		Ponded Water Above Ground	
Porosity:	0.40	Depth:	0.00 ft
Depth below perforated pipe if present:	3.00 ft	Width:	0.00 ft
Width:	17.00 ft	Length:	0.00 ft
Length:	50.00 ft	Area:	0.00 ft ²
Area:	0.00 ft ²		



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	2-TREAT		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	14,059.0 ft ²		
Description/Notes:			

100% Treatment		Q _{TREATMENT} = 0.0565 cfs
Post surface type:	Asphalt	
C _{POST} :		
User Composite post development C _{POST} :	0.75	
User Input I _{Historical} :	0.00 in./hr.	
Treatment Factor (Tf):	1 Calculated	
I _{Design Storm} :	0.20 in./hr.	

BMP Sizing 100% Treatment Vertical		Percent of Goal Achieved = 243.85 %
Infiltration rate of the specified BMP soil:	7.00 in./hr.	
Depth of drainage pipe:	1.50 ft	
BMP Length:	50.00 ft	
BMP Width:	17.00 ft	



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	3-CAPTURE		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	13,396.0 ft²		
Description/Notes:			

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$		$V_{HYDROMOD}$ = 745.89 ft ³
Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate	
Post development ground cover description:	Impervious - Paved Parking, Rooftop, Driveways	
CN _{POST} :		
User Composite post development CN:	94.0	

BMP Sizing Tool: Hydromodification Requirement		Percent of Goal Achieved = 122.67 %
	BMP Volume Below Ground	Ponded Water Above Ground
Porosity:	0.40	
Depth below perforated pipe if present:	2.50 ft	Depth: 0.00 ft
Width:	0.00 ft	Width: 0.00 ft
Length:	0.00 ft	Length: 0.00 ft
Area:	915.00 ft ²	Area: 0.00 ft ²



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	3-TREAT		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	13,396.0 ft ²		
Description/Notes:			

100% Treatment		Q _{TREATMENT} = 0.0466 cfs	
Post surface type:	Asphalt		
C _{POST} :			
User Composite post development C _{POST} :	0.65	Treatment Factor (Tf):	1 Calculated
User Input I _{Historical} :	0.00 in./hr.	I _{Design Storm} :	0.20 in./hr.

BMP Sizing 100% Treatment Vertical		Percent of Goal Achieved = 312.67 %	
Infiltration rate of the specified BMP soil:	7.00 in./hr.		
Depth of drainage pipe:	1.50 ft		
BMP Length:	30.00 ft		
BMP Width:	30.00 ft		



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neimed Warehouse	
BMP ID:	4-CAPTURE		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	18,372.0 ft²		
Description/Notes:			

Hydromodification Requirement: 100% Volume Capture; $V_{HYDROMOD}$		$V_{HYDROMOD} =$ 1,175.07 ft³
Post development hydrologic soil type within tributary area:	D: 0 - 0.05 in/hr infiltration (transmission) rate	
Post development ground cover description:	Impervious - Paved Parking, Rooftop, Driveways	
CN _{POST} :		
User Composite post development CN:	96.0	

BMP Sizing Tool: Hydromodification Requirement		Percent of Goal Achieved = 102.12 %
	BMP Volume Below Ground	Ponded Water Above Ground
Porosity:	0.40	
Depth below perforated pipe if present:	2.50 ft	Depth: 0.00 ft
Width:	6.00 ft	Width: 0.00 ft
Length:	200.00 ft	Length: 0.00 ft
Area:	0.00 ft²	Area: 0.00 ft²



STORM WATER CALCULATOR

BMP Tributary Parameters		Project Name: Neilmed Warehouse	
BMP ID:	4-TREAT		
BMP Design Criteria:	100% Capture & Treatment		
Type of BMP Design:	Priority 1: P1-06 Swale with Bioretention		
BMP's Physical Tributary Area:	18,372.0 ft ²		
Description/Notes:	<div style="border: 1px solid black; height: 40px;"></div>		

































100% Treatment		Q _{TREATMENT} = 0.0669 cfs
Post surface type:	Asphalt	
C _{POST} :		
User Composite post development C _{POST} :	0.68	
User Input I _{Historical} :	0.00 in./hr.	
Treatment Factor (Tf):	1 Calculated	
I _{Design Storm} :	0.20 in./hr.	

BMP Sizing 100% Treatment Vertical		Percent of Goal Achieved = 290.56 %
Infiltration rate of the specified BMP soil:	7.00 in./hr.	
Depth of drainage pipe:	1.50 ft	
BMP Length:	200.00 ft	
BMP Width:	6.00 ft	

9. SOILS MAP



MAP LEGEND

Area of Interest (AOI)		 C	C
 Area of Interest (AOI)	Area of Interest (AOI)	 C:D	C:D
Soils		 D	D
Soil Rating Polygons		 Not rated or not available	Not rated or not available
 A	A	Water Features	
 A/D	A/D	 Streams and Canals	Streams and Canals
 B	B	Transportation	
 B:D	B:D	 Rds	Rds
 C	C	 Interstate Highways	Interstate Highways
 C:D	C:D	 US Routes	US Routes
 D	D	 Major Roads	Major Roads
 Not rated or not available	Not rated or not available	 Local Roads	Local Roads
Soil Rating Lines		Background	
 A	A	 Aerial Photography	Aerial Photography
 A/D	A/D		
 B	B		
 B:D	B:D		
 C	C		
 C:D	C:D		
 D	D		
 Not rated or not available	Not rated or not available		
Soil Rating Points			
 A	A		
 A/D	A/D		
 B	B		
 B:D	B:D		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000

Warning Soil Map may not be valid at this scale

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG.3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below

Soil Survey Area: Sonoma County, California
Survey Area Data: Version 12, Sep 13, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger

Date(s) aerial images were photographed: Jul 1, 2018—Jul 31, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HuB	Huichica loam, ponded, 0 to 5 percent slopes	D	1.5	100.0%
Totals for Area of Interest			1.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

APPENDIX A:

Composite Curve Number Calculations

C AND CN FACTOR CALCULATIONS

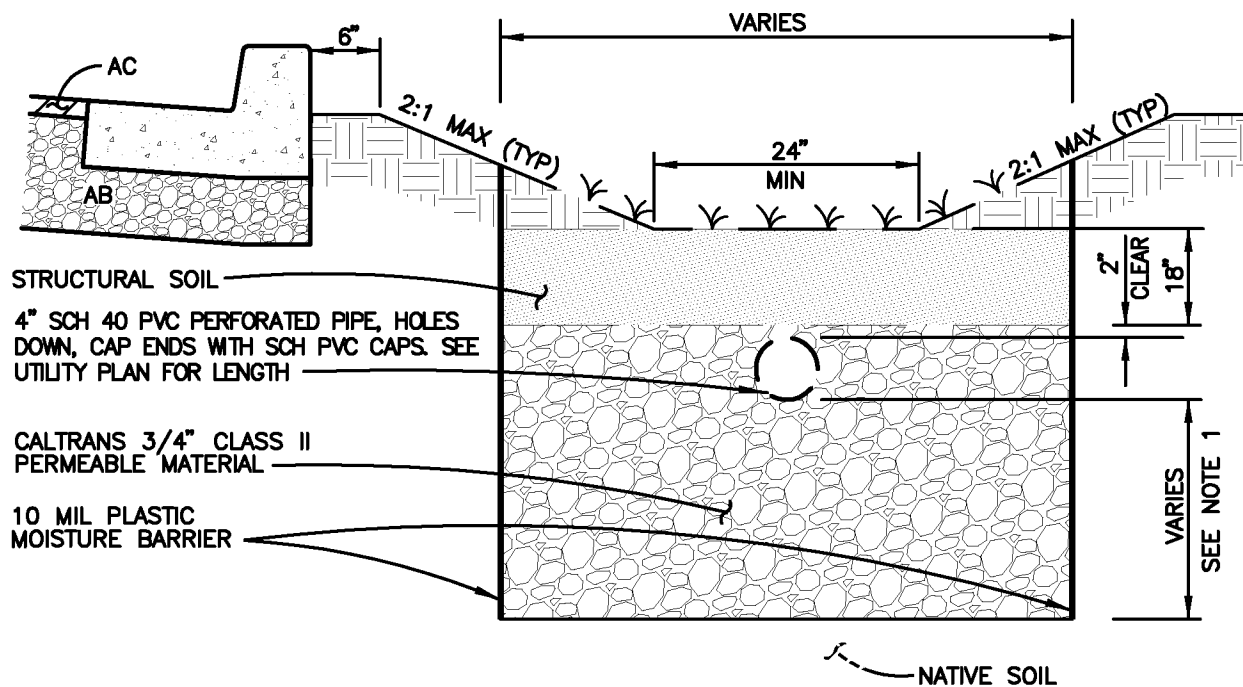
1				3			
TRIBUTARY AREA		SURFACE		TRIBUTARY AREA		SURFACE	
AREA (SF)	CN	CN*AREA		AREA (SF)	CN	CN*AREA	
8811	98	863478	ROOF	6068	98	594664	
2559	84	214956	LANDSCAPE	3464	84	290976	
383	98	37534	CONCRETE	2554	98	250292	
4322	98	423556	AC PAVING	1312	98	128576	
16075		1539524		13398		1264508	
TOTAL				TOTAL			
CN COMPOSITE	95.77			CN COMPOSITE	94.38		

2				4			
TRIBUTARY AREA		SURFACE		TRIBUTARY AREA		SURFACE	
AREA (SF)	C	C*AREA		AREA (SF)	C	C*AREA	
8811	0.90	7929.9	ROOF	6068	0.90	5461.2	
2559	0.10	255.9	LANDSCAPE	3464	0.10	346.4	
383	0.80	306.4	CONCRETE	2554	0.80	2043.2	
4322	0.70	3025.4	AC PAVING	1312	0.70	918.4	
16075		11517.6		13398		8769.2	
TOTAL				TOTAL			
C COMPOSITE	0.72			C COMPOSITE	0.65		

2				4			
TRIBUTARY AREA		SURFACE		TRIBUTARY AREA		SURFACE	
AREA (SF)	CN	CN*AREA		AREA (SF)	CN	CN*AREA	
8582	98	841036	ROOF	6067	98	594566	
1800	84	151200	LANDSCAPE	2929	84	246036	
0	98	0	CONCRETE	2100	98	205800	
3677	98	360346	AC PAVING	7276	98	713048	
14059		1352582		18372		1759450	
TOTAL				TOTAL			
CN COMPOSITE	96.21			CN COMPOSITE	95.8		

2				4			
TRIBUTARY AREA		SURFACE		TRIBUTARY AREA		SURFACE	
AREA (SF)	C	C*AREA		AREA (SF)	C	C*AREA	
8582	0.90	7723.8	ROOF	6067	0.90	5460.3	
1800	0.10	180	LANDSCAPE	2929	0.10	292.9	
0	0.80	0	CONCRETE	2100	0.80	1680	
3677	0.70	2573.9	AC PAVING	7276	0.70	5093.2	
14059		10477.7		18372		12526.4	
TOTAL				TOTAL			
C COMPOSITE	0.75			C COMPOSITE	0.68		

APPENDIX B:
Final Post Construction Details of BMP (drawings)



NOTES

1. SEE POST CONSTRUCTION BMP PLAN, SHEET C14 FOR BMP DIMENSIONS.

VEGETATED SWALE WITH BIORETENTION

NOT TO SCALE

NEILMED WAREHOUSE

VEGETATED SWALE WITH BIORETENTION

12/20/2019

APPENDIX C:

Maintenance - Checklists

Form A Storm Water Quality Feature Maintenance Check List - Standard Conditions -

Date: _____ Inspector: _____

Start Time: _____ Project: _____

Stop Time: _____ Address: _____

Inspection Status Codes:

S = Satisfactory * = Refer to Form B (Specials)

D = Deficient and/or Form C (Notes).

Are there any special conditions and/or maintenance requirements noted for BMP(s)? Y N (circle one)

If Yes, attach Form B for Project.

Drainage				
Drawdown - Drainage - Vector Risk - Pump Out-Blockage				
Reference code	D1	D2	D3	D4
BMP ID:	Evidence of standing or ponding of water in the BMP area after 72 hours of dry weather?	Does the high flow bypass function as designed?	Is there sediment accumulation in or around BMP?	Has water been observed flowing in the pervious concrete section during a low intensity storm?

Erosion						
Hydraulic Function - Failure - Sediment Clogging						
E1	E2	E3	E4	E5	E6	
Is there under cutting or washouts along the sidewalks and/or curbs abutting the planter area?	Is there channelization (gully) forming along the length of the planter area?	Is there accumulation of sediment (sand, dirt, mud) in the planter area?	Observed or potential transport of mulch to drainage system?	Are there voids or holes present in the BMP?	Is there evidence of animal activity?	

Vegetation				
Excessive Mowing - Herbicide Overuse - Health of Desired Vegetation -				
V1	V2	V3	V4	
Is the vegetation clogging the inlet or flow path?	Evidence of Excessive Mowing and/or Herbicide Overuse?	Are there dead or dry plants or excessive weeds?	Is there an absence of correct vegetation?	

General			Special Features
G1	G2	G4	
Trash and Debris - Improper Modifications - Damage			
Is there debris/trash accumulation in the BMP or high flow by pass?	Missing or damage structural features? (Grates, pipes, walls, curbs, etc.)	Evidence of improper modifications or removal of BMP?	See Additional Special Conditions or Form B

Storm Water Quality Special Feature Maintenance Check List

Date: _____ Inspector: _____

Start Time: _____ Project: _____

Stop Time: _____ Address: _____

Inspection Status Codes:

S = Satisfactory
* - See Notes on Form C

D = Deficient

Special Feature or Conditions

[illegible]

Office Use:

Complete: _____

Issues Corrective Action: _____

Re-Inspection Required: _____

Form C

Date: _____

Inspector: _____

Project: _____

Address: _____

[illegible]

APPENDIX D:

Operations & Maintenance Manuals

VEGETATED SWALE

Also known as: Bioretention Swale, Treatment Swale, and Grassy Swale



DESCRIPTION

The swale best management practice (BMP) functions as a soil and plant-based filtration and infiltration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of storm water runoff. Vegetated swales can serve as part of a storm water drainage system and can replace curbs, gutters and storm sewer systems.

ADVANTAGES

- Can be designed to achieve Treatment, Delta Volume Capture, or Hydromodification requirements.

- Enhances water quality of downstream water bodies through natural processes.
- Aesthetically pleasing.
- The vegetation reduces heat island effects and improves an area's landscape.
- Vegetated swales can be designed to convey high flow as well as water quality flow.

LIMITATIONS

- A thick vegetative cover is needed for these practices to function properly.
- Swales are more susceptible to failure if not properly maintained than other treatment BMPs.
- Can be difficult to avoid channelization, which may cause erosion and limit infiltration potential.
- Not effective and may even erode when flow velocities are high, if the grass cover is not properly maintained.
- May not be appropriate for industrial sites or locations where spills may occur.
- Grassed swales cannot treat a very large drainage area. Large areas may be divided and treated using multiple swales.
- Should not be used in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100' radius of the proposed BMP location, the North Coast Regional Water Quality Control Board will need to be contacted and the site reviewed.
- Should not be used in areas of slope instability where infiltrated storm water may cause failure. Slope stability should be determined by a licensed geotechnical engineer.
- Do not use in locations that can negatively impact building foundation or footings. Location shall be approved by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- The longest flow path for the swale shall have a minimum retention time of 12 minutes for conditions when the treatment flows enter the Vegetated Swale uniformly along the swale length. The longest flow path for the swale shall have a minimum retention time of 8 minutes if 90 percent or more of the treatment flow enters the swale at the upstream end.
- Swale should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, whichever is less, at the design treatment rate.
- Longitudinal slopes between 1% and 2.5% are recommended.
- Maximum allowable slope is 8% slope. In steep areas, check dams up to 24-inches high and at least 25 feet apart are allowed.
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.

- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
- Shall be planted with plants from the approved **Plant List** and **Tree List** included in Appendix F and shall be planted to achieve 51% cover.
- Vegetated swales shall have a maximum treatment width of 10 feet. The vegetated swale bed shall be at least 2-feet wide and no more than 7-feet wide. Parallel swales may be used if calculations show greater width is needed.
- The bed of the swale flow area shall slope at about 2% from toe of side slope to center of swale. Side slopes shall be no greater than a 2 to 1 slope.
- If vegetation is not established prior to rain, additional soil stabilization methods may be necessary.
- If the 10 or 100-year storm event flow velocity is greater than 4 feet per second, a permanent geofabric liner shall be used that is rated for the calculated flow velocity.
- If used, the perforated pipe trench shall be backfilled with $\frac{3}{4}$ " crushed rock with a 2-inch bed underneath and 6-inch cover.



SIZING DESIGN- GOAL AND REQUIREMENTS

- **For all projects:** The treatment component requires that all of the runoff generated by this water quality design storm from impermeable surfaces must be treated on site for the pollutants of concern.
- ***For projects that increase the amount of impervious surface, but create or replace less than a total of one acre:*** The **Delta Volume Capture** component requires that any increase in volume due to development for the water quality design storm must be infiltrated and/or reused on site. Further discussion of the Treatment and Delta Volume Capture requirements and the accompanying formulas can be found in Chapter 6.
- ***For projects that create or replace one acre or more of impervious surface:*** These larger projects must mitigate their impacts by meeting the **Hydromodification Requirement** by capturing 100% of the post development volume generated by the water quality rain event.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SWLID Submittal. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum maintenance shall include the following:

- Mow and irrigate during dry weather to the extent necessary to keep vegetation alive. Where 6-inch high grasses are used, the grass height shall be at least 3 inches after mowing. Where mowed grasses are shown, the grass height shall be mowed when the height exceeds 3 inches.
- Remove obstructions and trash from vegetated swale.
- Pesticides and fertilizers shall not be used in the swale.

Vegetated Swales shall be inspected and maintained monthly during the rainy season to review:

- Obstructions and trash.
- Pondered flow is drained within 72 hours after a rainfall event.
- Condition of grasses.
- If ponding is observed, grading will be required to restore positive drainage.

FLOGARD® CATCH BASIN INSERT FILTER

Removes Pollutants from Runoff Prior to Entering Waterways

Efficient System

Catches pollutants where they are easiest to catch, at the inlet.

Variable Design

Able to be retrofitted or used in new projects.

Treatment Train

Can be incorporated as part of a "Treatment Train".

No Standing Water

Helps to minimize bacteria and odor problems.

Focused Treatment

Removes petroleum hydrocarbons, trash and Total Suspended Solids (TSS).

Maximum Flexibility

Available in a variety of standard sizes to fit round and square inlets.

Economical

Earn a higher return on system investment.

Two-part stainless-steel insert to filter solids and oils/grease



Easy to install, inspect and maintain, even on small and confined sites

By the Numbers*:

Filter will remove up to 80% of Total Suspended Solids (TSS), at least 70% of oils and grease and 40% of Total Phosphorus (TP) associated with organic debris as well as Polycyclic Aromatic Hydrocarbons (PAH) from oil leaks and spills.

**Approx. for urban street application*

Catch Basin Filter Test Results Summary

Testing Agency	% TSS Removal	% Oil & Grease Removal	% PAH Removal
UCLA	80	70 to 80	
U of Auckland			
Tonking & Taylor, Ltd. (for City of Auckland)	78 to 95		
U of Hawaii (for City of Honolulu)	80		20 to 40

Call us today **(800) 579-8819** or visit our website for detailed product information, drawings and design tools at www.oldcastlestormwater.com

Multi-Purpose Catch Basin Insert Retains Sediment, Debris, Trash and Oils/Grease

FloGard® Catch Basin Insert Filters are recommended for areas subject to silt and debris as well as low-to-moderate levels of petroleum hydrocarbons (oils and grease). Examples of such areas include vehicle parking lots, aircraft ramps, truck and bus storage yards, business parks, residential and public streets.

Catch Basin Filter Competitive Feature Comparison

Evaluation of Catch Basin Filters (Based on flow-comparable units) (Scale 1-10)	Oldcastle Stormwater	Other Insert Filter Types**
Flow Rate	10	7
Removal Efficiency*	80%	45%
Capacity - Sludge & Oil	7	7
Service Life	10	3
Installation - Ease of Handling / Installation	8	6
Ease of Inspections & Maintenance	7	7
Value	10	2

*approximate, based on field sediment removal testing in urban street application

**average

Long-Term Value Comparison (Based on flow-comparable units) (Scale 1-10)	Oldcastle Stormwater	Other Insert Filter Types
Unit Value - Initial (\$/cfs treated)	10	4
Installation Value (\$/cfs treated)	10	7
Absorbent Replacement (annual avg (\$/cfs treated))	10	2
Materials Replacement Value (annual avg (\$/cfs treated))	10	10
Maintenance Value (annual avg (\$/cfs treated))	10	7
Total First Year ROI (\$/cfs treated)	10	5
Total Annual Avg Value (\$/cfs treated, avg over 20 yrs)*	10	5



Combination Inlet



Flat-Grated Inlet



Captured debris from FloGard Catch Basin Insert Filter in Dana Point, California



Circular Frame Catch Basin



FLOGARD+PLUS® CATCH BASIN INSERT FILTER

Inspection and Maintenance Guide



A division of
Oldcastle Infrastructure

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These specifications apply to the FloGard+Plus® Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed FloGard+Plus Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (wash racks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

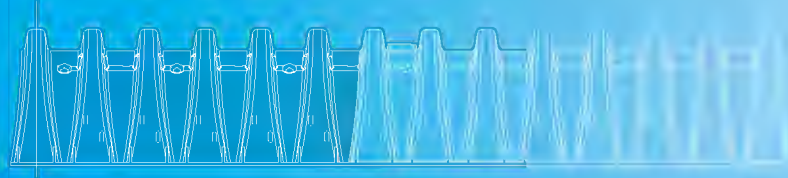
1. The catch basin grate shall be removed and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
2. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing FloGard+Plus catch basin inserts).
3. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc., shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary, and the pouch tethers re-attached to the liner's D-ring.
5. The grate shall be replaced.

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium will be replaced with new material. Once the exposed pouches and debris have been removed, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

DPS also has the capability of servicing all manner of storm drain filters, catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined-space trained and certified. Call us at (888) 950-8826 for further information and assistance.

Tech Sheet



Porosity of Structural Backfill

Tech Sheet # 1
November 2012

General:

StormTech advises that a porosity of 40% is appropriate to use for the storage capacity of structural aggregate used in the bedding and embedment zones around StormTech chambers. This memo provides technical support for the use of a porosity of 40%. The major points of the memo are:

- 40% porosity is appropriate for the clean, open graded, angular aggregate material StormTech recommends for foundation and embedment.
- Most of the porosity data available is based on a compacted condition. StormTech requires compaction of the foundation (bedding) and allows dumped aggregate embedment around the chambers.
- Test data indicates that the average porosity of all gradations of the *compacted* foundation is approximately 40%. The porosity of the *dumped* backfill in the embedment zone is typically greater than 40% and the calculated weighted average porosity therefore exceeds 40% for typical StormTech systems.
- Porosity is protected from soils migration by a non-woven geotextile that surrounds the entire system. For some exfiltration systems, a drainage net is substituted for the geotextile on the bottom of the bed.

Terms:

Porosity (n) is defined as the volume voids over the total volume expressed as a percent: $n = (V_v / V_t) \times 100\%$. Other terms commonly used to describe porosity include; "voids" and "void space". A related term that should not be confused with porosity is *void ratio* (e) which is the volume of voids over the volume of solids expressed as a decimal: $e = V_v / V_s$.

Compilation of Known Test Data:

<u>Sample</u>	<u>Data Source</u>	<u>Porosity</u>	<u>Bulk Density</u>	<u>Test / Description</u>
AASHTO # 4	StormTech lab	39.9%	94.3 lbs/ft ³	dumped, corrected ¹
AASHTO # 57	StormTech lab	45.4%	87.2 lbs/ft ³	dumped, corrected ¹
AASHTO # 4	StormTech lab	37.4%	103.0 lbs/ft ³	jigged & tamped, corrected ¹
AASHTO # 57	StormTech lab	38.7%	97.7 lbs/ft ³	jigged & tamped, corrected ¹
AASHTO # 57	NTH lab	50 - 51%		tapped & agitated, dried ²
AASHTO # 57	NTH lab	50 - 52%		tapped & agitated, dried ²
AASHTO # 3	NTH lab	53 - 54%		tapped & agitated, dried ²
-1 ½"	Anderson Eng. Cons.	41.9%	96.8 lbs/ft ³	dry rodded, C29 ³
-1 ½"	Anderson Eng. Cons.	35.3%	101.7 lbs/ft ³	dry rodded, C29 ³
-1 ½"	Anderson Eng. Cons.	37.8%	98.6 lbs/ft ³	dry rodded, C29 ³
-1 ½"	Anderson Eng. Cons.	41.3%	93.6 lbs/ft ³	dry rodded, C29 ³
-1 ½"	Anderson Eng. Cons.	38.2%	98.7 lbs/ft ³	dry rodded, C29 ³
-3/4"	Anderson Eng. Cons.	38.5%	100.3 lbs/ft ³	dry rodded, C29 ³
-3/4"	Anderson Eng. Cons.	38.9%	97.9 bs/ft ³	dry rodded, C29 ³

Compilation of Known Test Data:

<u>Sample</u>	<u>Data Source</u>	<u>Porosity</u>	<u>Bulk Density</u>	<u>Test / Description</u>
AASHTO # 4	Universal Eng. Serv.	44.3%	78.6 lbs/ft ³	rodded C29 ⁴
AASHTO # 57	Universal Eng. Serv.	43.2%	79.8 lbs/ft ³	rodded C29 ⁴
AASHTO # 4	Universal Eng. Serv.	46.1%	70.8 lbs/ft ³	rodded C29 ⁵
AASHTO # 57	Universal Eng. Serv.	42.8%	74.8 lbs/ft ³	rodded C29 ⁵
-1 ½" Crushed Rock	CTL Thompson TX	46%	90.5 lbs/ft ³	rodded C29 ⁶
-1" Crushed Rock	CTL Thompson TX	45%	91.6 lbs/ft ³	rodded C29 ⁶
-1 ½" Crushed Conc	CTL Thompson TX	48%	77.1 lbs/ft ³	rodded C29 ⁶

¹Testing was conducted by StormTech in October, 2003 using aggregate from Connecticut. Water was used to fill voids and a correction factor that reduced porosities by 3 to 16% was calculated and applied to correct for wall effects of the test container.

²Testing was conducted by NTH Consultants, Ltd. Exton, PA in December, 2002 for ADS. This was dry testing in accordance with the "Civil Engineering Reference Manual, Sixth Edition" by Michael R. Lindburg, PE.

³Testing was conducted by Anderson Engineering Consultants, Inc., Little Rock, AR in February, 2000 for 7 different aggregate samples from four suppliers in Arkansas.

⁴The material tested was lime rock from central Florida. Testing was conducted by Universal Engineering Sciences in Orlando, FL in November, 2005.

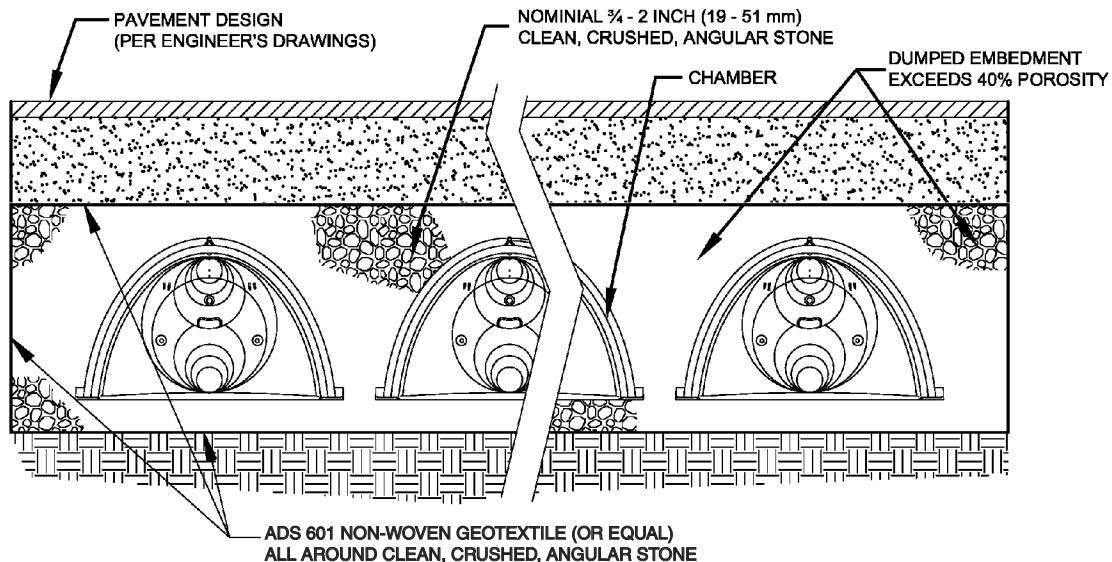
⁵The material tested was recycled, crushed concrete from central Florida. Testing was conducted by Universal Engineering Sciences in Orlando, FL in November, 2005.

⁶Testing was conducted by CTL | Thompson Texas, LLC in August, 2006.

ASTM C29 is the "Standard Test Method for Bulk Density (Unit Weight) and Voids in Aggregate".

Porosity References:

- "Urban Runoff Quality Management" WEF MOP 23 / ASCE MOP 87. Table 5.12 lists uniform sized gravel at 40%.
- "Controlling Urban Runoff:" by Thomas R. Schueler, July 1987 describes storage volume of the void space in the trench at 40% of the excavated trench volume.
- "On-site Stormwater Management: Applications for Landscape and Engineering" Second Edition by Bruce Ferguson and Thomas Debo states that open graded crushed stone has 40% void space.



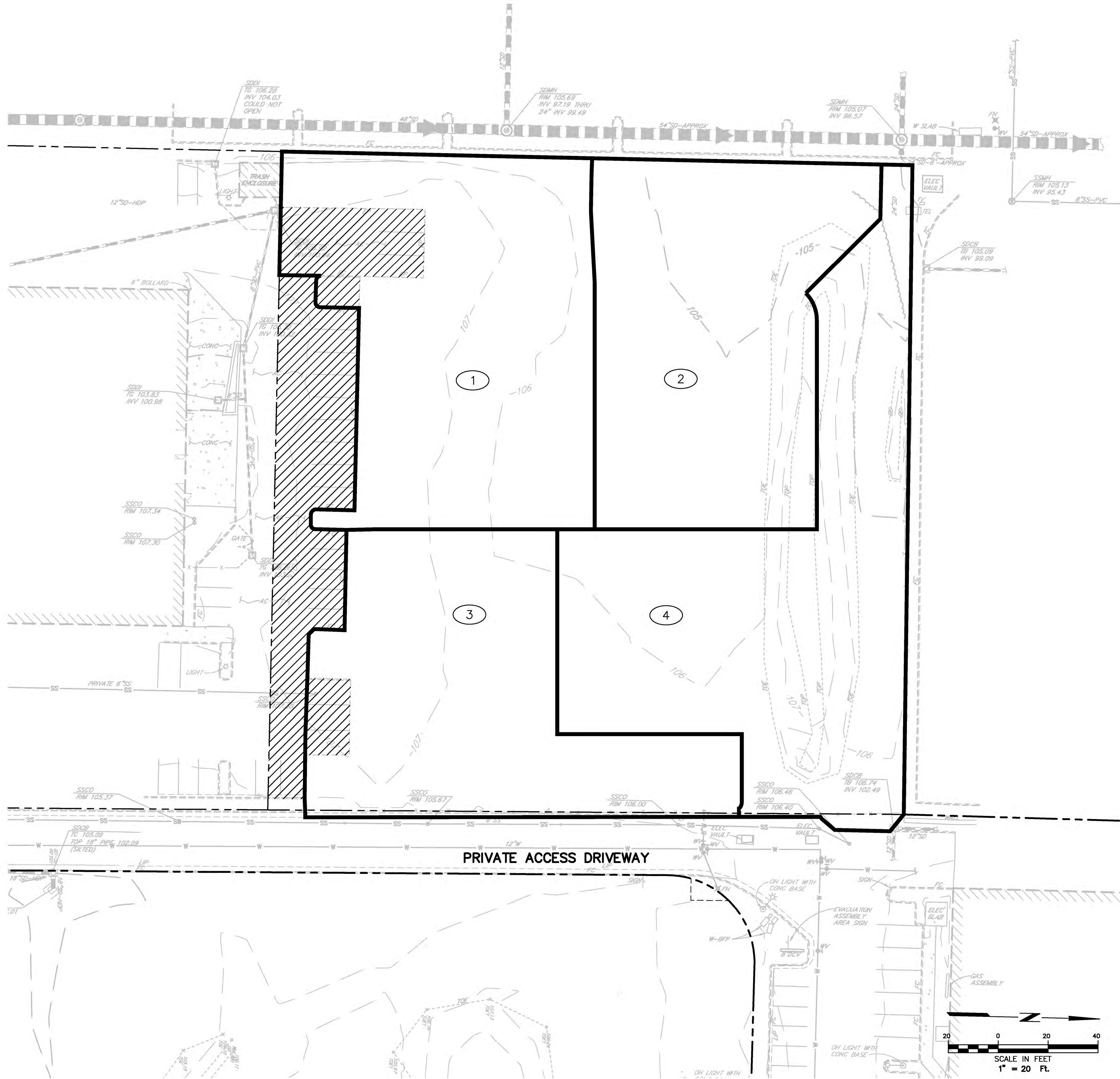
ADS "Terms and Conditions of Sale" are available on the ADS website, www.ads-pipe.com

StormTech is a registered trademark of StormTech, Inc.

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12-20-19 bailey \\4542.dwg 4542 03 EXHIBIT-EXISTING CONDITIONS EXHIBIT.dwg TAB: Layout1



LEGEND

- 1 (DMA) DRAINAGE MANAGEMENT AREA NUMBER
- EXISTING IMPERVIOUS IMPROVEMENTS (0.2 ACRES)
- K=1.17=35 INCH/YEAR

NOTES

1. HYDROLOGIC SOIL GROUP D PER USDA SOIL SURVEY.



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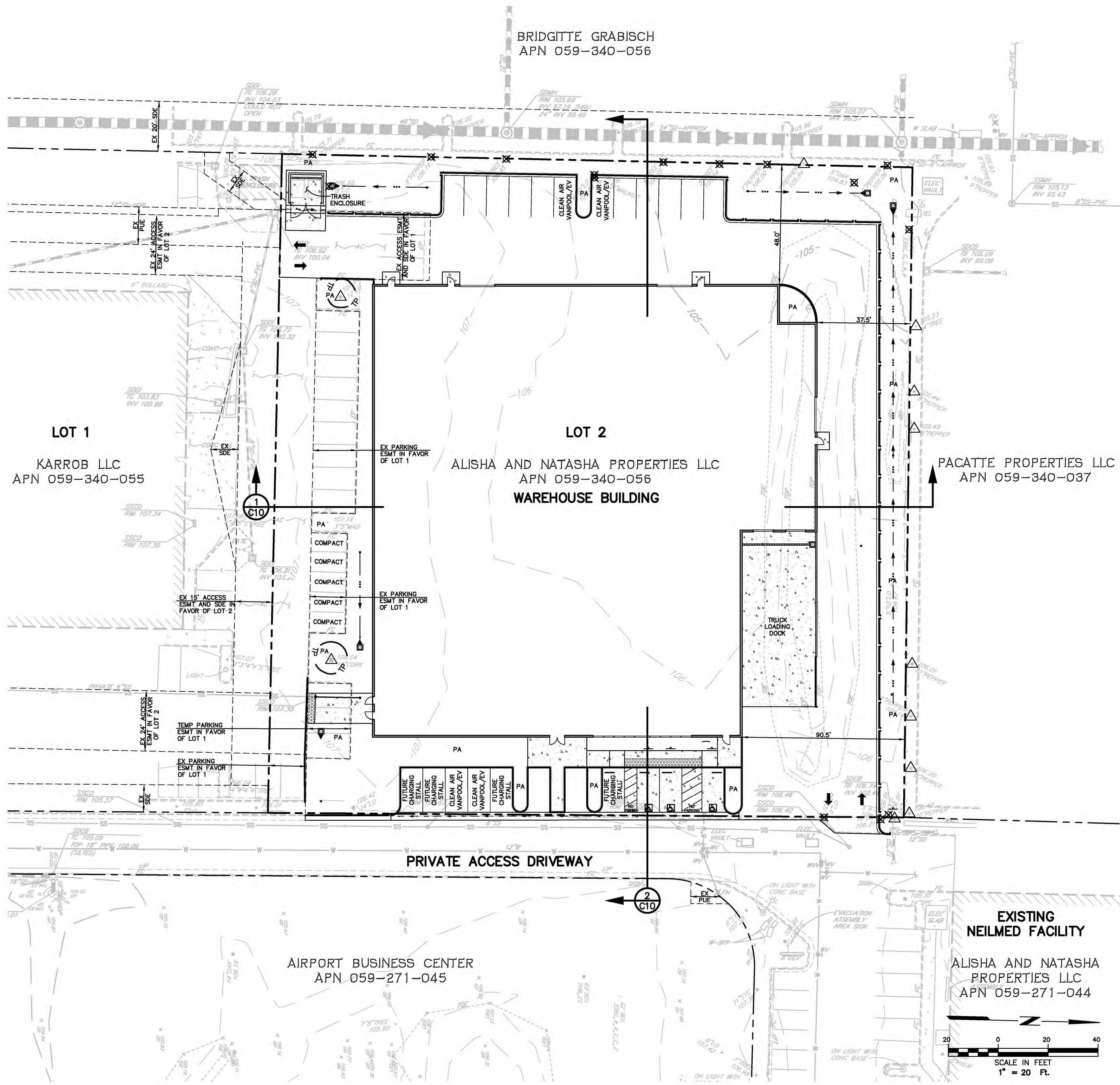
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SCALE:		
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SHEET TITLE		
EXISTING CONDITIONS EXHIBIT		

SHEET NUMBER

1 OF 1

12-20-19 bailey \\4542.dwg 4542 03 4542.03 SITE GRAD UTIL.dwg TAB: CS-SITE PLAN



LEGEND

- ✕ TREE TO BE REMOVED.
- △ TREE TO BE SAVED.
- TP — INSTALL TREE PROTECTION FENCING PER DETAIL SHEET C4.

PARKING COUNT

STANDARD	12
STANDARD IN ESMT	9
COMPACT IN ESMT	6
ADA	3
FUTURE EV CHARGING	6
CLEAN AIR/VAN POOL/EV	2
TOTAL	38



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SHEET TITLE

SITE PLAN

SHEET NUMBER

C5

LEGEND

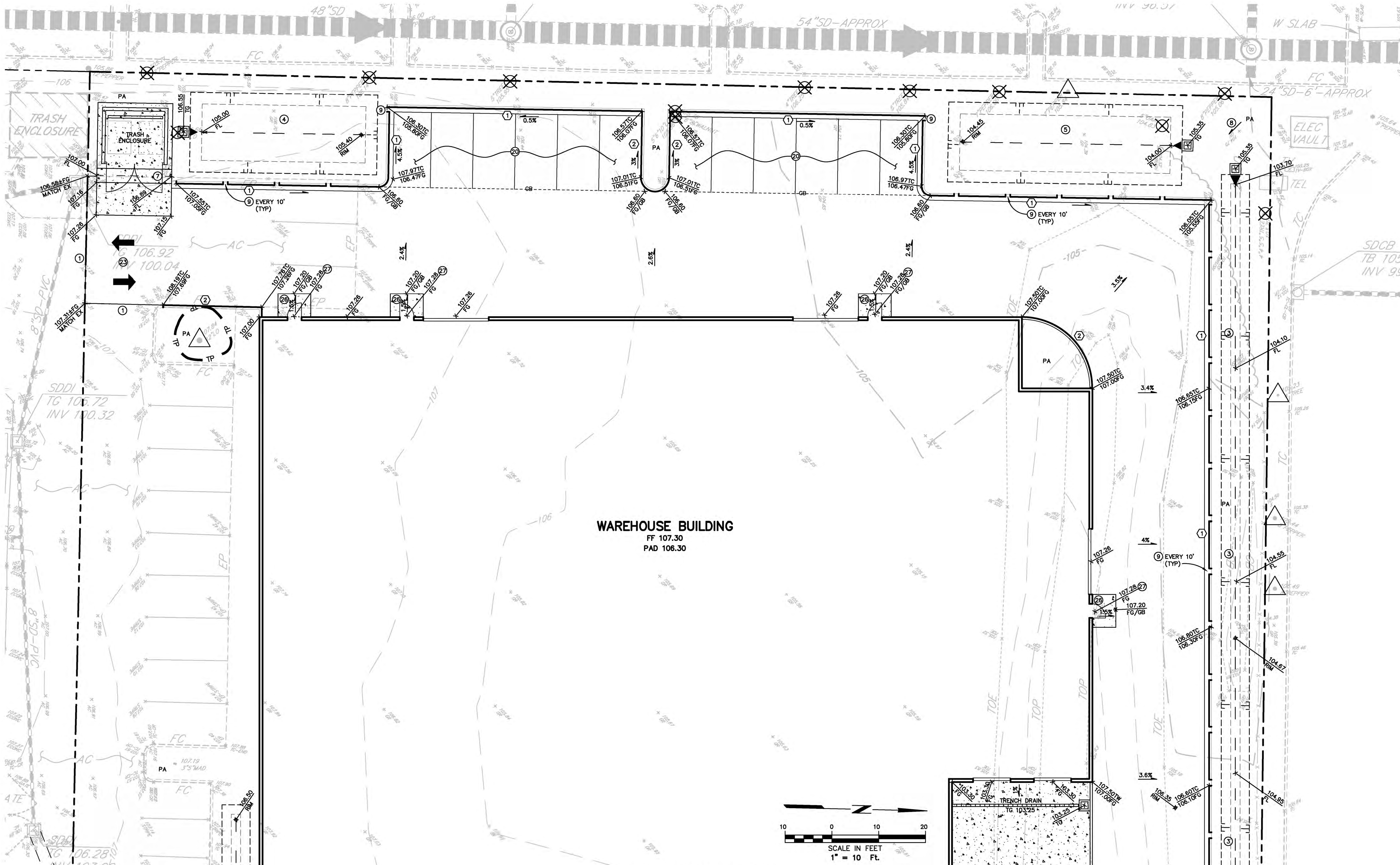
- ☒ TREE TO BE REMOVED.
- △ TREE TO BE SAVED.
- ①②③ CURB TYPES PER DETAILS SHEET C6.

SEE SITE PLAN, SHEET C5 FOR LOCATION AND TYPE OF EXISTING EASEMENTS.

GRADING NOTES

(ONLY NOTES RELEVANT TO THIS SHEET ARE SHOWN)

- MATCH EXISTING IMPROVEMENTS.
- VEGETATED SWALE WITH BIORETENTION 6'X200'X3' PER DETAIL SHEET C15.
- VEGETATED SWALE WITH BIORETENTION 17'X40'X4' PER DETAIL SHEET C15.
- VEGETATED SWALE WITH BIORETENTION 17'X50'X3' PER DETAIL SHEET C15.
- INSTALL VALLEY GUTTER PER DETAIL SHEET C15.
- GRADE LANDSCAPE AREA TO DRAIN TO STORM DRAIN INLET AT MINIMUM 1% SLOPE.
- 1' CURB OPENING PER DETAIL SHEET C15.
- INSTALL 27" ACO K200, PRE-SLOPED TRENCH DRAIN WITH GRATE 605Q OR APPROVED EQUAL, IN CONCRETE CRADLE PER DETAIL SHEET C16.
- PAINT 4" WIDE STALL STRIPE WHITE. SEE SHEET C12 FOR STALL DIMENSIONS.
- PAVEMENT MARKINGS. SEE ARCHITECTURAL PLANS FOR DETAILS.
- DOOR LANDING 5' x 7' 2% MAXIMUM IN ALL DIRECTIONS.
- FINISHED GRADE AT DOOR MAXIMUM 0.02' BELOW FINISHED FLOOR.



SEE SHEET C7



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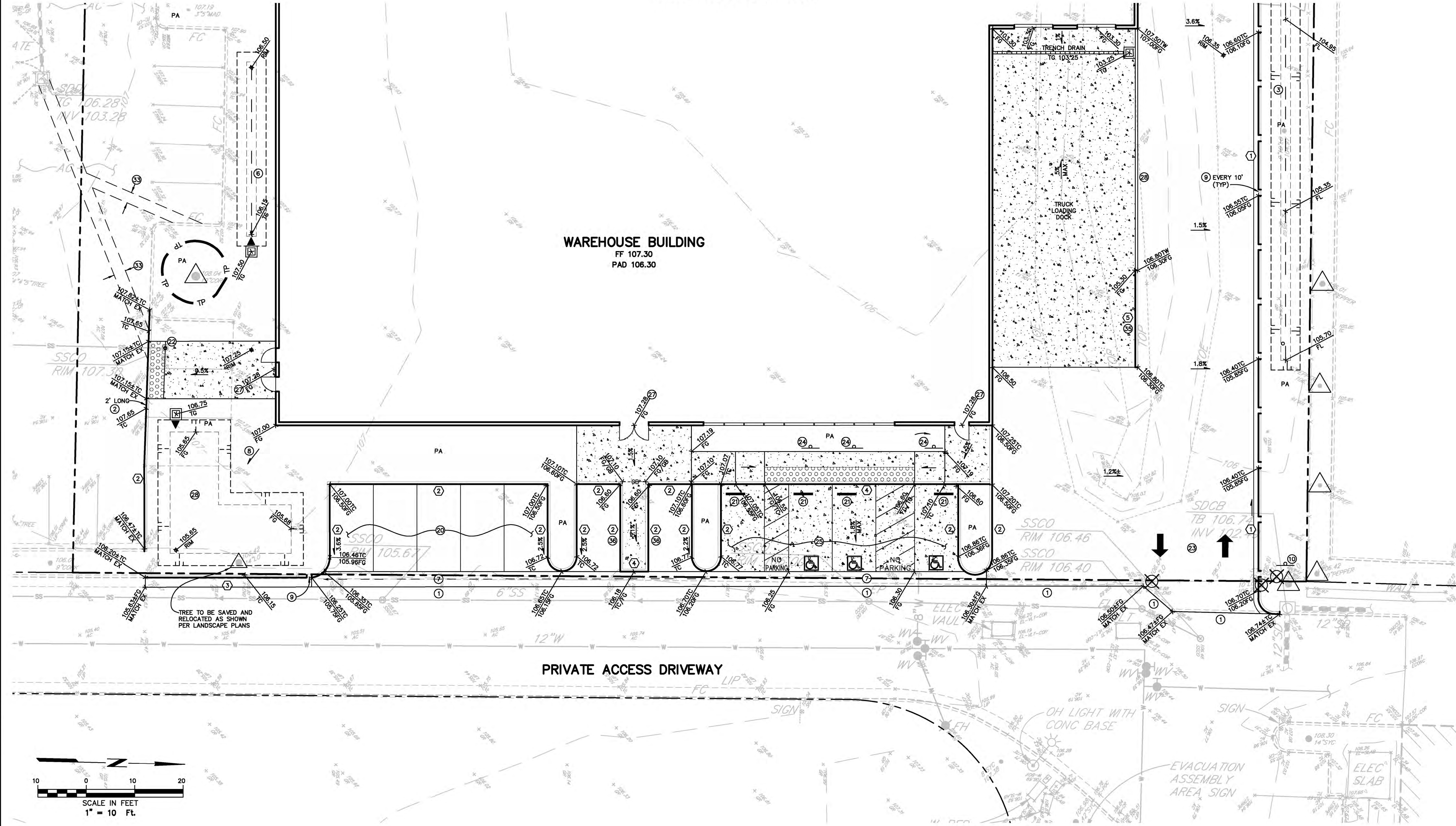
SHEET TITLE

GRADING PLAN WEST

SHEET NUMBER

C6

SEE SHEET C6



LEGEND

- ☒ TREE TO BE REMOVED.
- △ TREE TO BE SAVED.
- ①②③④⑤ CURB TYPES PER DETAILS SHEET C15.

SEE SITE PLAN, SHEET C5 FOR LOCATION AND TYPE OF EXISTING EASEMENTS.

GRADING NOTES

(ONLY NOTES RELEVANT TO THIS SHEET ARE SHOWN)

- ① MATCH EXISTING IMPROVEMENTS.
- ② CURB TRANSITION PER DETAIL SHEET C15.
- ③ VEGETATED SWALE WITH BIORETENTION 6'X200'X3' PER DETAIL SHEET C15.
- ④ VEGETATED SWALE WITH BIORETENTION 6'X40'X2' PER DETAIL SHEET C15.
- ⑤ INSTALL VALLEY GUTTER PER DETAIL SHEET C15.
- ⑥ GRADE LANDSCAPE AREA TO DRAIN TO STORM DRAIN INLET AT MINIMUM 1% SLOPE.
- ⑦ 1' CURB OPENING PER DETAIL SHEET C15.
- ⑧ ACCESSIBLE PARKING SIGN R100B (CA) PER DETAIL SHEET C17.
- ⑨ PAINT 4" WIDE STALL STRIPE WHITE. SEE SHEET C12 FOR STALL DIMENSIONS.
- ⑩ INSTALL WHEEL STOP PER DETAIL SHEET C17.
- ⑪ LOWER EXISTING SANITARY SEWER CLEANOUT TO RIM=107.17.
- ⑫ PAVEMENT MARKINGS. SEE ARCHITECTURAL PLANS FOR DETAILS.
- ⑬ ACCESSIBLE PARKING STALLS PER DETAIL SHEET C17.
- ⑭ FINISHED GRADE AT DOOR MAXIMUM 0.02' BELOW FINISHED FLOOR.
- ⑮ VEGETATED SWALE WITH BIORETENTION PER DETAIL SHEET C15. SEE SHEET C12 FOR DIMENSIONS.
- ⑯ RETAINING WALL. SEE STRUCTURAL DRAWINGS FOR DETAIL.
- ⑰ INSTALL VARIABLE HEIGHT CURB (6" TO 18").
- ⑱ INSTALL VARIABLE HEIGHT CURB (0" TO 6").
- ⑲ SAWCUT, REMOVE AND REPLACE EXISTING ASPHALT PER TRENCH BACKFILL AND PIPE BEDDING DETAIL TYPE A, SHEET C16.



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GRADING PLAN
EAST

SHEET NUMBER

C7

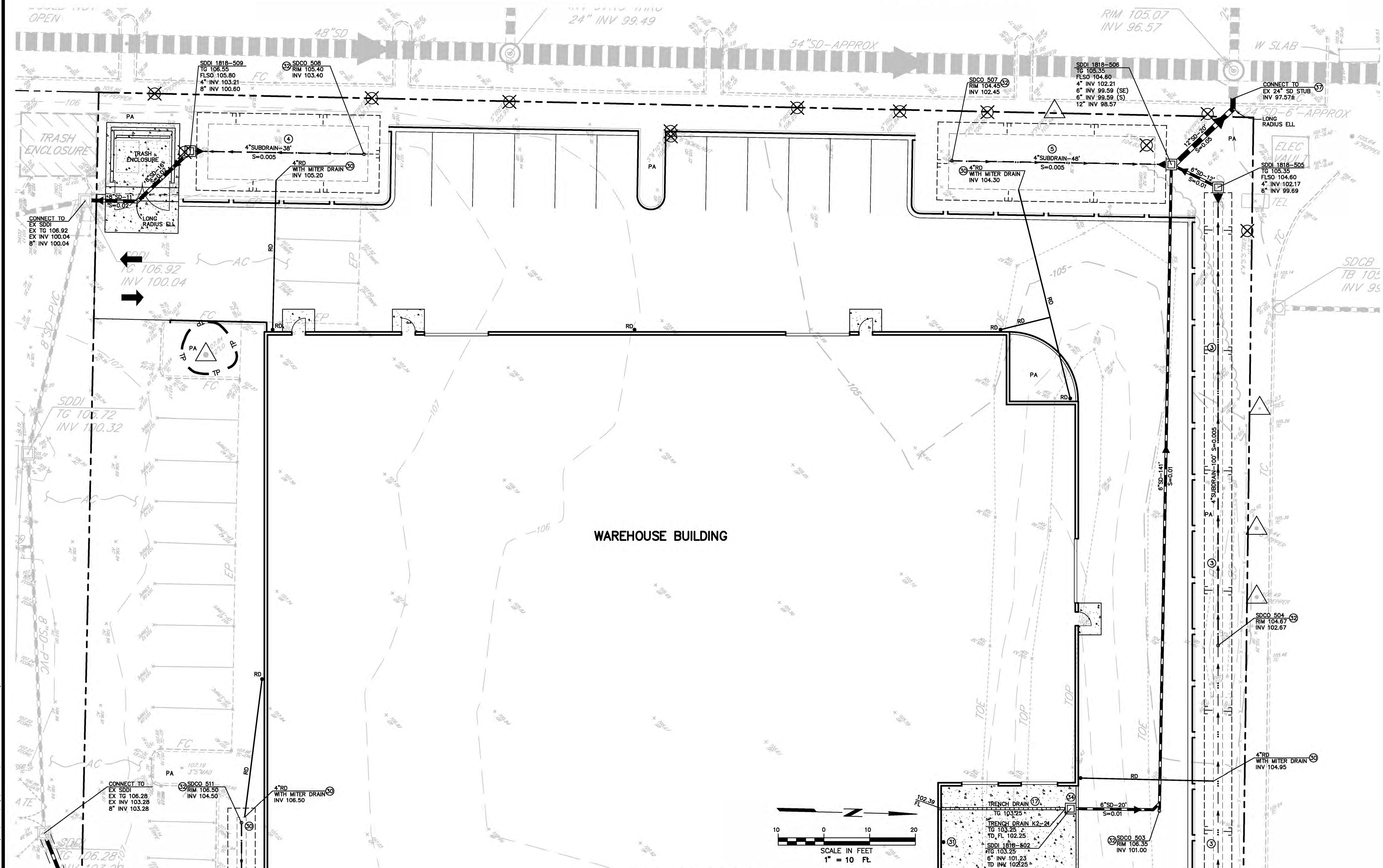
AS A FIRST ORDER OF WORK, CONTRACTOR SHALL FIELD LOCATE AND POTHOLE EXISTING UTILITIES AT PROPOSED POINTS OF CONNECTIONS AND CROSSINGS TO VERIFY VERTICAL AND HORIZONTAL LOCATIONS. CONTRACTOR SHALL SUBMIT VERIFIED UTILITY INFORMATION THROUGH THE RFI PROCESS TO THE ENGINEER TO CONFIRM ADEQUACY OF PROPOSED DESIGN. CONTRACTOR SHALL NOT ORDER AND/OR INSTALL UTILITIES UNTIL PROPOSED DESIGN IS CONFIRMED TO BE ADEQUATE.

SEE SITE PLAN, SHEET C5 FOR LOCATION AND TYPE OF EXISTING EASEMENTS.

UTILITY NOTES

(ONLY NOTES RELEVANT TO THIS SHEET ARE SHOWN)

- VEGETATED SWALE WITH BIORETENTION 6'X200'X3' PER DETAIL SHEET C15.
- VEGETATED SWALE WITH BIORETENTION 17'X40'X4' PER DETAIL SHEET C15.
- VEGETATED SWALE WITH BIORETENTION 17'X50'X3' PER DETAIL SHEET C15.
- VEGETATED SWALE WITH BIORETENTION 6'X40'X2' PER DETAIL SHEET C15.
- INSTALL 27" ACO K200, PRE-SLOPED TRENCH DRAIN WITH GRATE 605Q OR APPROVED EQUAL, IN CONCRETE CRADLE PER DETAIL SHEET C16.
- DISCHARGE ROOF DRAIN INTO VEGETATED SWALE WITH BIORETENTION.
- DISCHARGE DOWNSPOUT 6" ABOVE FINISHED GRADE.
- INSTALL SDCO/SSCO PER DETAIL SHEET C16.
- INSTALL FLOGARD CATCH BASIN INSERT FILTER PER DETAIL SHEET C15.
- CONNECT NEW 12" SD TO EX 24" SD WITH 24"X12" REDUCER.



SEE SHEET C9



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UTILITY PLAN WEST

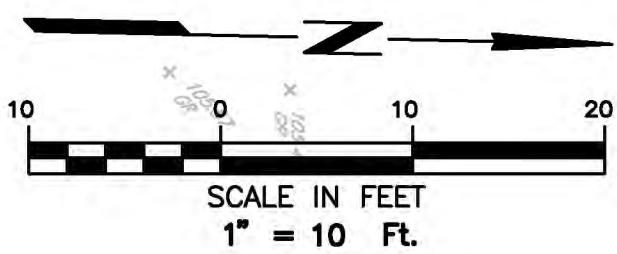
SHEET NUMBER

C8

SEE SHEET C8

WAREHOUSE BUILDING

PRIVATE ACCESS DRIVEWAY



AS A FIRST ORDER OF WORK, CONTRACTOR SHALL FIELD LOCATE AND POTHOLE EXISTING UTILITIES AT PROPOSED POINTS OF CONNECTIONS AND CROSSINGS TO VERIFY VERTICAL AND HORIZONTAL LOCATIONS. CONTRACTOR SHALL SUBMIT VERIFIED UTILITY INFORMATION THROUGH THE RFI PROCESS TO THE ENGINEER TO CONFIRM ADEQUACY OF PROPOSED DESIGN. CONTRACTOR SHALL NOT ORDER AND/OR INSTALL UTILITIES UNTIL PROPOSED DESIGN IS CONFIRMED TO BE ADEQUATE.

SEE SITE PLAN, SHEET C5 FOR LOCATION AND TYPE OF EXISTING EASEMENTS.

UTILITY NOTES

(ONLY NOTES RELEVANT TO THIS SHEET ARE SHOWN)

- 3 VEGETATED SWALE WITH BIORETENTION 6'X200'X3' PER DETAIL SHEET C15.
- 6 VEGETATED SWALE WITH BIORETENTION 6'X40'X2' PER DETAIL SHEET C15.
- 11 CONNECT TO EXISTING 8" WATER.
- 12 WATER METER AND REDUCED PRESSURE BACKFLOW PREVENTER PER TOWN OF WINDSOR STANDARDS NO. 509 AND NO. 510.
- 13 IRRIGATION METER AND REDUCED PRESSURE BACKFLOW PREVENTER PER TOWN OF WINDSOR STANDARDS NO. 509 AND NO. 510.
- 14 INSTALL CONCRETE THRUST BLOCK PER DETAIL SHEET C16.
- 15 8" DOUBLE DETECTOR CHECK AND FIRE DEPARTMENT CONNECTION PER TOWN OF WINDSOR STANDARD NO. 511.
- 17 INSTALL 27' ACO K200, PRE-SLOPED TRENCH DRAIN WITH GRATE 605Q OR APPROVED EQUAL, IN CONCRETE CRADLE PER DETAIL SHEET C16.
- 22 LOWER EXISTING SANITARY SEWER CLEANOUT TO RIM=107.17.
- 28 VEGETATED SWALE WITH BIORETENTION PER DETAIL SHEET C15. SEE SHEET C12 FOR DIMENSIONS.
- 30 DISCHARGE ROOF DRAIN INTO VEGETATED SWALE WITH BIORETENTION.
- 31 DISCHARGE DOWNSPOUT 6" ABOVE FINISHED GRADE.
- 32 INSTALL SDCO/SSCO PER DETAIL SHEET C16.
- 33 SAWCUT, REMOVE AND REPLACE EXISTING ASPHALT PER TRENCH BACKFILL AND PIPE BEDDING DETAIL TYPE A, SHEET C16.
- 34 INSTALL FLOGRAD CATCH BASIN INSERT FILTER PER DETAIL SHEET C15.



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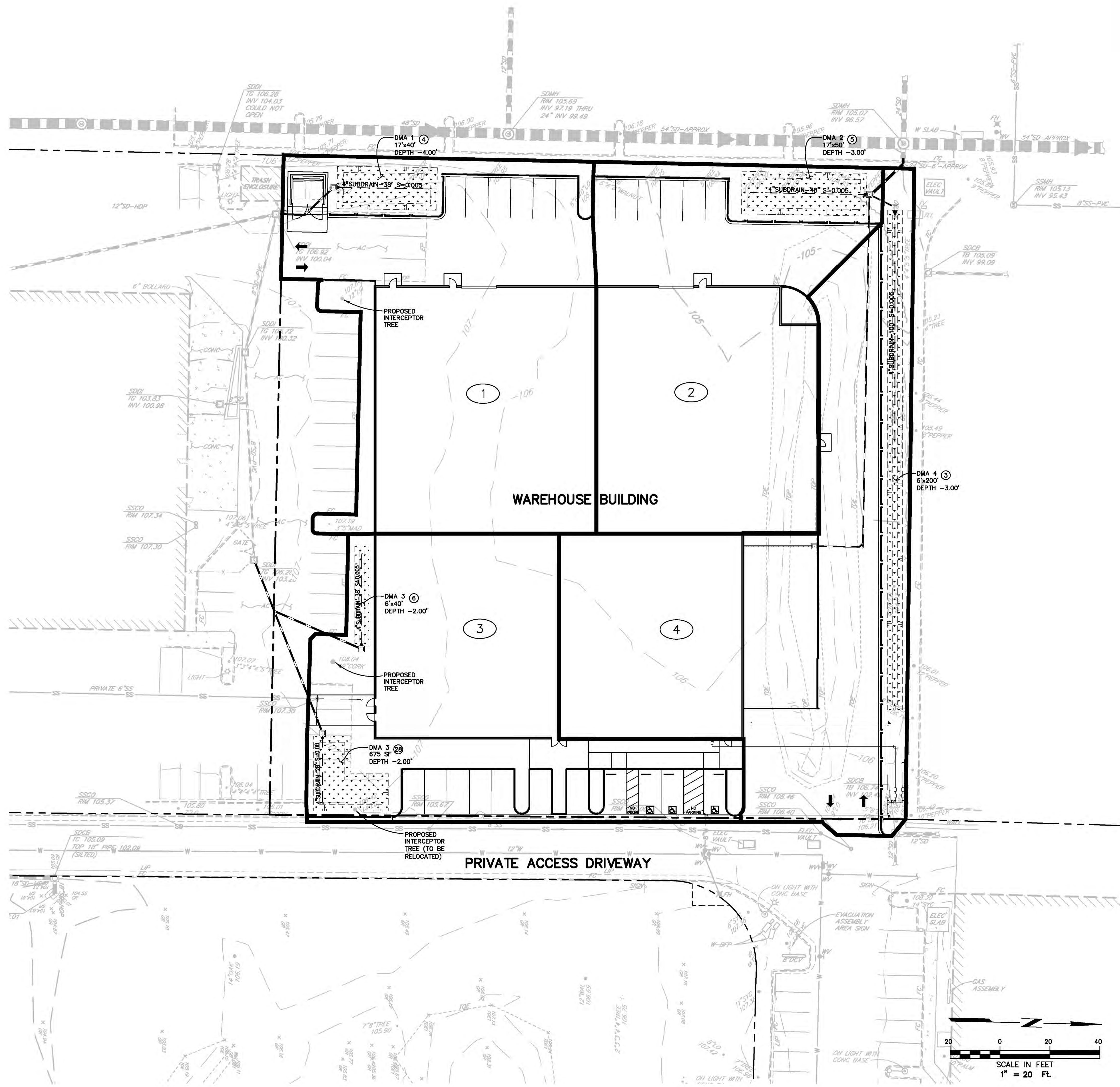
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UTILITY PLAN
EAST

SHEET NUMBER

C9






POST CONSTRUCTION BMP TABLE			
NAME	WIDTH	LENGTH	DEPTH
DMA 1	17 FT	40 FT	-4.00 FT
DMA 2	17 FT	50 FT	-3.00 FT
DMA 3	915 SF		-2.50 FT
DMA 4	6 FT	200 FT	-2.50 FT

UTILITY NOTES

(ONLY NOTES RELEVANT TO THIS SHEET ARE SHOWN)

- ③ VEGETATED SWALE WITH BIORETENTION 6'X200'X3' PER DETAIL SHEET C15.
- ④ VEGETATED SWALE WITH BIORETENTION 17'X40'X4' PER DETAIL SHEET C15.
- ⑤ VEGETATED SWALE WITH BIORETENTION 17'X50'X3' PER DETAIL SHEET C15.
- ⑥ VEGETATED SWALE WITH BIORETENTION 6'X40'X2' PER DETAIL SHEET C15.
- ②⑧ VEGETATED SWALE WITH BIORETENTION PER DETAIL SHEET C15. SEE SHEET C12 FOR DIMENSIONS.

LEGEND

- | | |
|---|--|
| DEPTH | MINIMUM DEPTH BELOW PERFORATED PIPE |
|  | VEGETATED SWALE WITH BIORETENTION PER DETAIL SHEET C15 |
|  | BMP AREA BOUNDARY |
|  | (DMA) DRAINAGE
MANAGEMENT AREA NUMBER |



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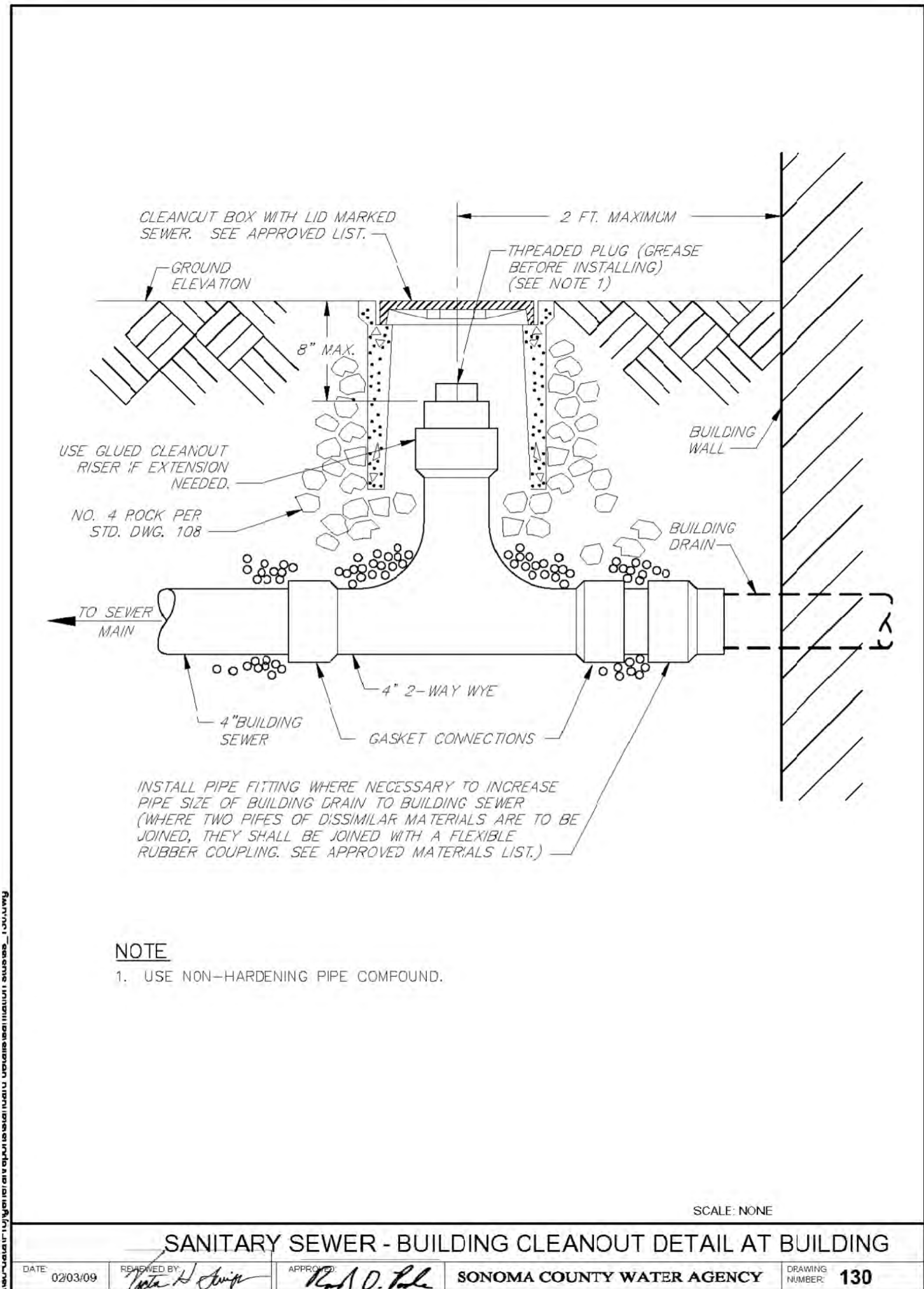
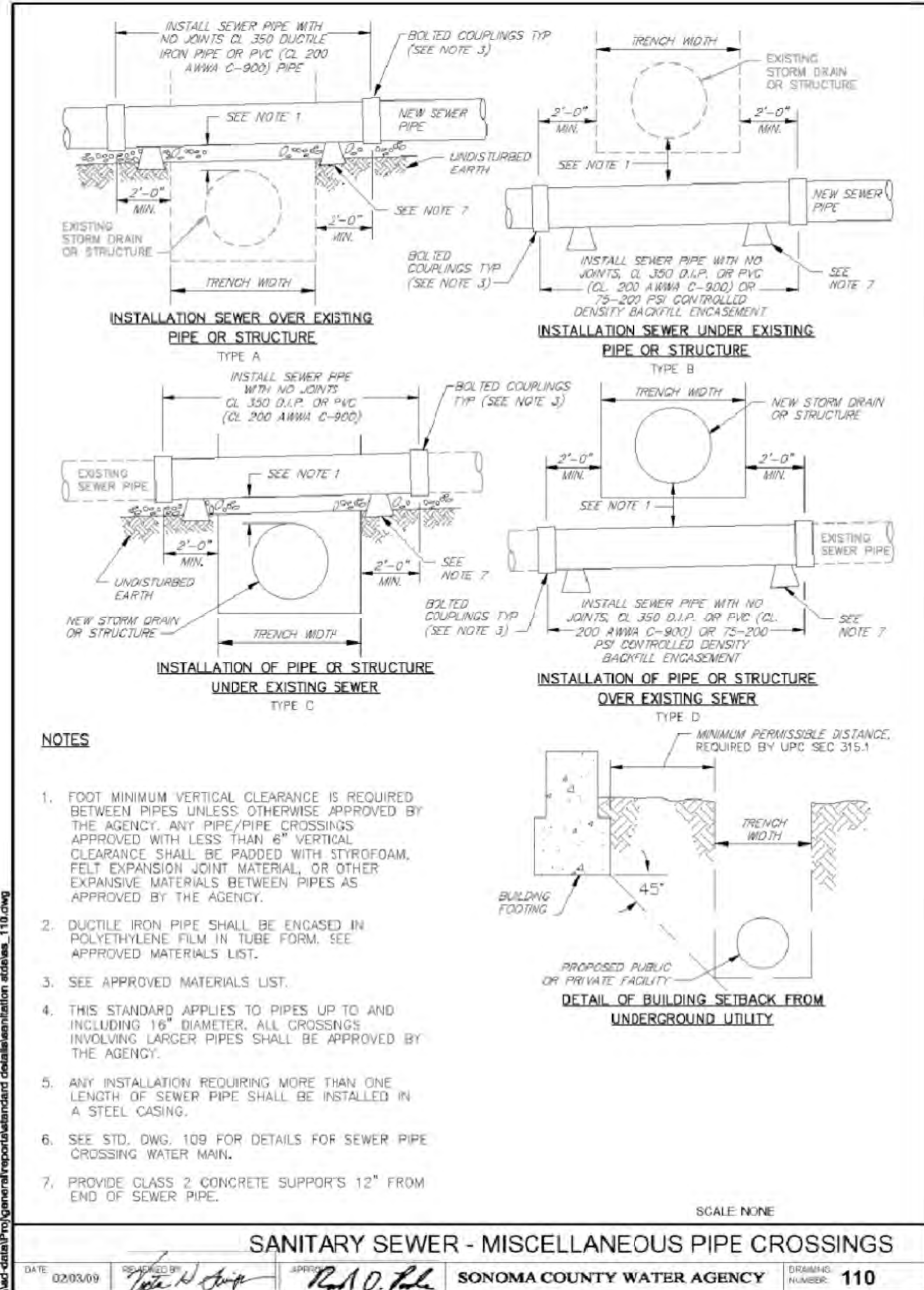
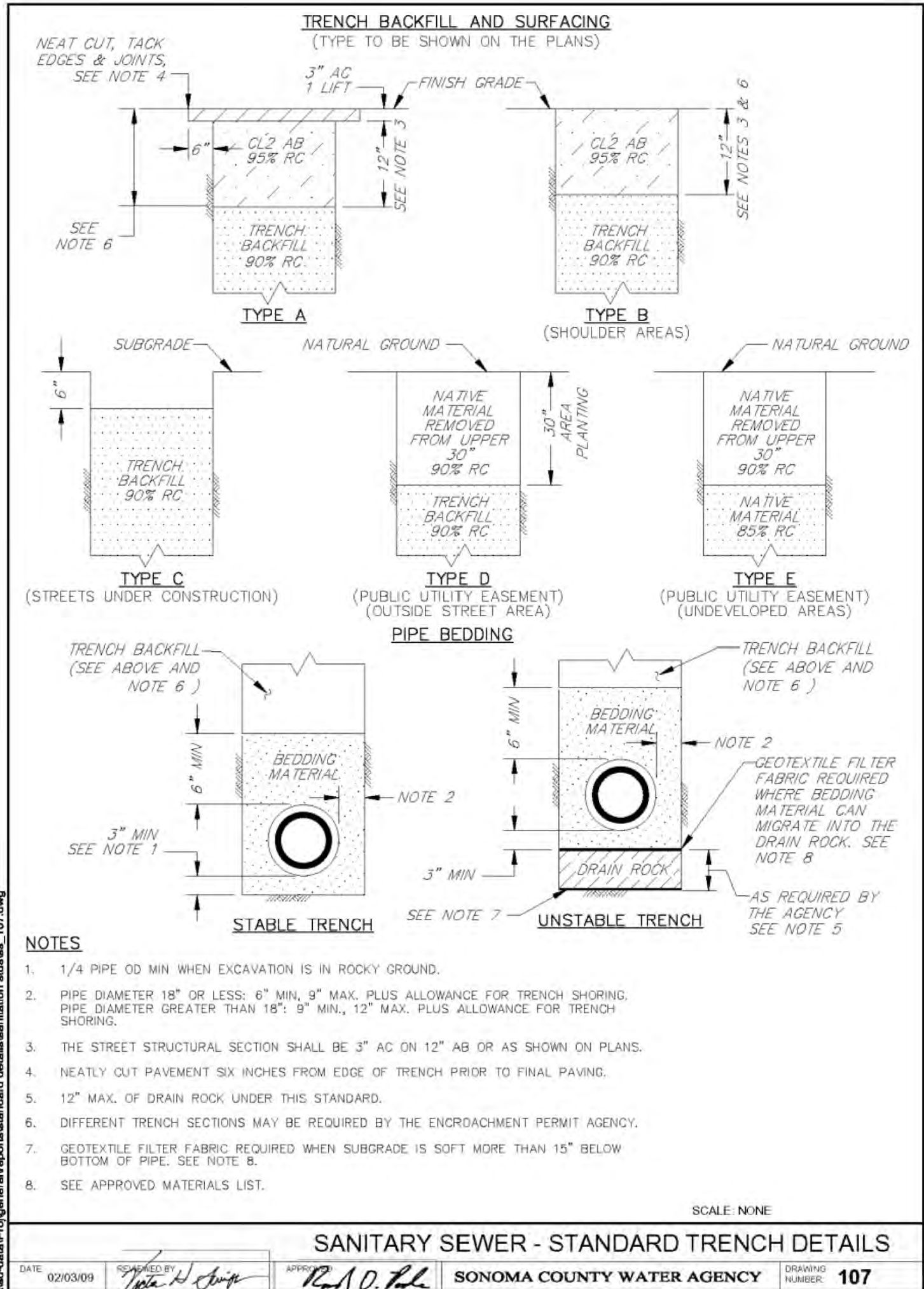
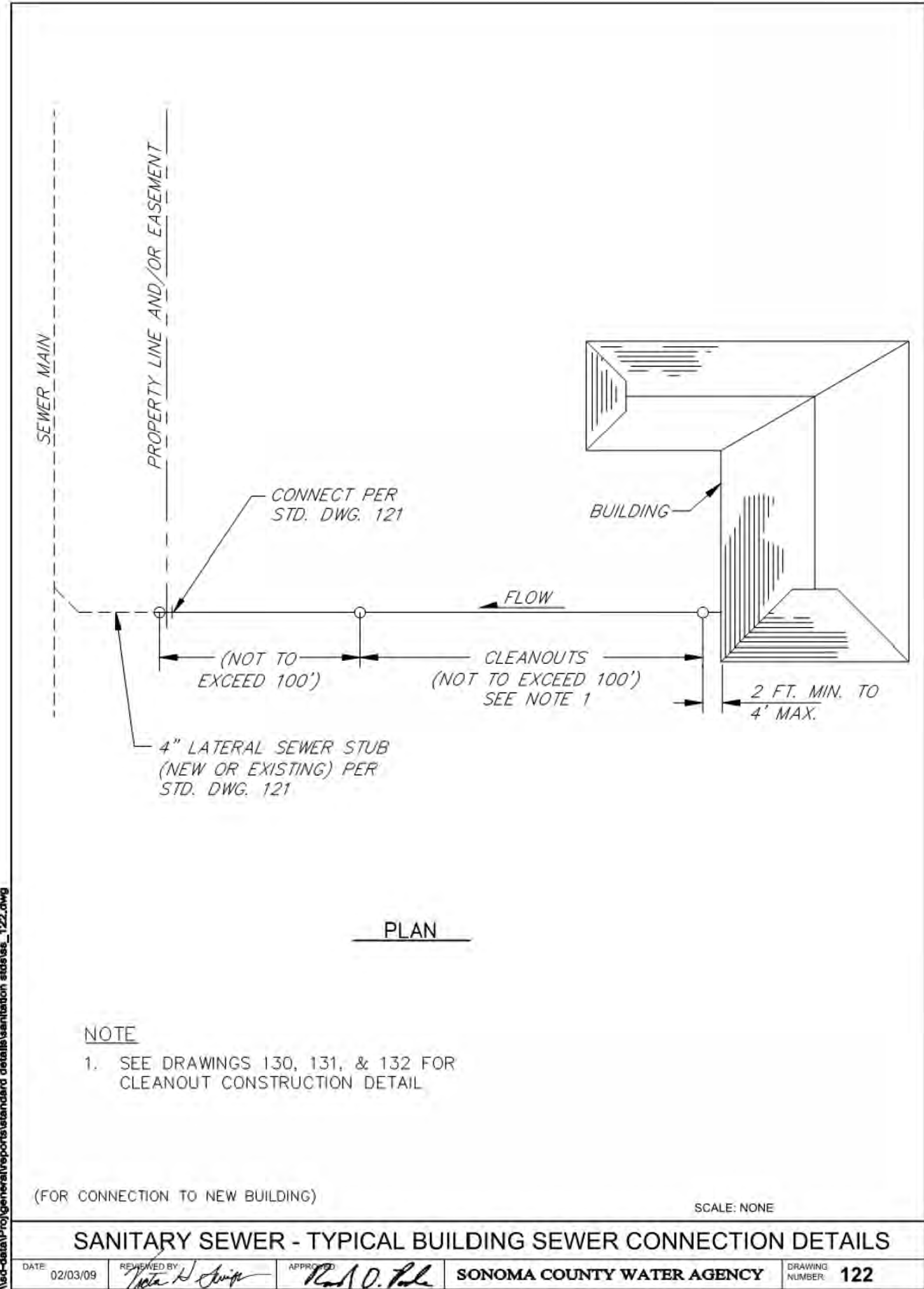
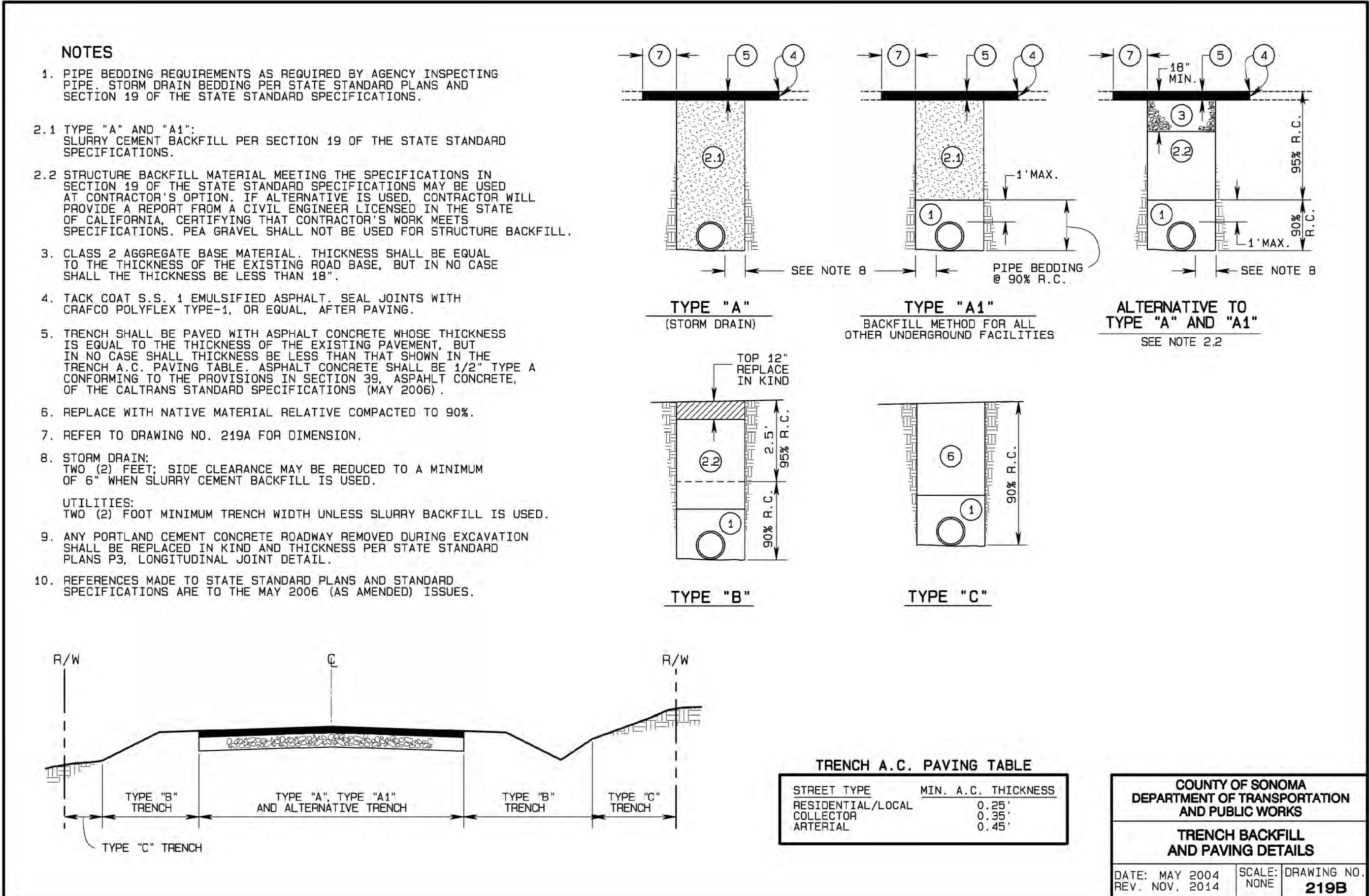
SHEET TITLE

POST CONSTRUCTION BMP PLAN

SHEET NUMBER

C14

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SEAL

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**NEILMED
WAREHOUSE**

685 AVIATION BOULEVARD
SANTA ROSA, CA 95403

REV	DATE	DESCRIPTION
PROJECT NO:	1807/4542.03	
CAD DWG FILE:	4542.03 DETAIL.dwg	
DRAWN BY:	PIT	
SCALE:	AS SHOWN	
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SHEET TITLE		
SHEET NUMBER		

COUNTY & SONOMA
WATER DETAILS

C19