City of West Linn
Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656-3535 • westlinnoregon.gov

DEVELOPMENT REVIEW APPLICATION

For Office Use Only		
STAFF CONTACT	PROJECT NO(S). ELD-24-06	PRE-APPLICATION NO. n/a
NON-REFUNDABLE FEE(S) $4,900	REFUNDABLE DEPOSIT(S)	TOTAL $4,900

Type of Review (Please check all that apply):

[X] **MIDDLE HOUSING LAND DVISION**

- [ ] Annexation (ANX)
- [ ] Appeal (AP)
- [ ] CDC Amendment (CDC)
- [ ] Code Interpretation (MISC)
- [ ] Conditional Use (CUP)
- [ ] Design Review (DR
- [ ] Tree Easement Vacation (MISC)
- [ ] Expediated Land Division (ELD)
- [ ] Extension of Approval (EXT)
- [ ] Final Plat (FP) Related File #_____
- [ ] Flood Management Area (FMA)
- [ ] Historic Review (HDR)
- [ ] Lot Line Adjustment (LLA)
- [ ] Minor Partition (MIP)
- [ ] Modification of Approval (MOD)
- [ ] Non-Conforming Lots, Uses & Structures
- [ ] Planned Unit Development (PUD)
- [ ] Street Vacation
- [X] Subdivision (SUB)
- [ ] Temporary Uses (MISC)
- [ ] Time Extension (EXT)
- [ ] Right of Way Vacation (VAC)
- [ ] Variance (VAR)
- [ ] Water Resource Area Protection/Single Lot (WAP)
- [ ] Water Resource Area Protection/Wetland (WAP)
- [ ] Willamette & Tualatin River Greenway (WRG)
- [ ] Zone Change (ZC)

Pre-Application, Home Occupation, Sidewalk Use, Addressing, and Sign applications require different forms, available on the website.

Site Location/Address: 5743-5773 SW Broadway Street, West Linn, Oregon 97068

Assessor's Map No.: 22E30CB
Tax Lot(s): 1800, 1900, & 1901
Total Land Area: .48 Acres

Brief Description of Proposal:
Application for Middle Housing Land Division to create seven (7) parcels intended for the construction of townhomes.

Applicant Name*: Dan Williams
Address: 2000 SW 1st Ave, Suite 420
City State Zip: Portland, OR 97201
Phone: 503-819-7754
Email: dan@fasterpermits.com

Owner Name (required): DREAMBUILDER CUSTOM HOMES INC
Address: 1125 SW BORLAND RD
City State Zip: WEST LINN, OR 97068
Phone: 503-880-7132
Email: tim@dreambuildercustomhome.com

Consultant Name:
Address:
City State Zip:
Phone:
Email:

1. Application fees are non-refundable (excluding deposit). Applications with deposits will be billed monthly for time and materials above the initial deposit. ***The applicant is financially responsible for all permit costs.**
2. The owner/applicant or their representative should attend all public hearings.
3. A decision may be reversed on appeal. The decision will become effective once the appeal period has expired.
4. Submit this form, application narrative, and all supporting documents as a single PDF through the Submit a Land Use Application web page: https://westlinnoregon.gov/planning/submit-land-use-application

The undersigned property owner authorizes the application and grants city staff the **right of entry** onto the property to review the application. Applications with deposits will be billed monthly for time and materials incurred above the initial deposit. The applicant agrees to pay additional billable charges.

Applicant's signature Date **12/20/24**

Owner's signature ***(required)*** Date **12/20/24**

SUBMITTAL PACKAGE CONTENTS
MIDDLE HOUSING LAND DIVISION
5743-5773 SW Broadway Street

0_Development Review Application
1_Application Narrative_MHLD
2_FD Permit Application 2024-0180 Middle Housing 5743-5773 Broadway St
3_FS-1 2024-0180 Middle Housing 5743-5773 Broadway St
4_Geotechnical Report
5_Stormwater Report
6_SITE PLAN-R2
7_Broadway Street Civil3 Utility (1) (19) (3)
8_Broadway Street Civil3 Grad (1) (4) (2)
9_EROSION PLAN

0_Development Review Application

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Applicant's signature Date **12/20/24**

Owner's signature ***(required)*** Date **12/20/24**

DEVELOPMENT REVIEW CHECKLIST

The application form and supporting materials should be submitted electronically through https://westlinnoregon.gov/planning/submit-land-use-application **as one (1) .pdf file**. To create a single PDF file, go to Adobe Acrobat Free Merge PDF online tool. Other free Acrobat PDF tools like converting a file to PDF or reducing the file size are available on the Adobe website.

Supporting reports may be uploaded separately through this web form *if* the file size is too large. The separate submissions should be numbered (i.e., Submittal 1 of 2) and noted under transmittal contents. All plan set files MUST be flattened and reduced.

Submission requirement to upload through the web form:

- .pdf format.
- Individual file size no larger than 128 MB.
- Do not attach 'zip' files. Our server will reject all 'zip' files.
- Reduce and flatten all plan sets BEFORE uploading plan sets. The raster/vector settings should be optimized for printing.

A complete application must include the following:

- ☑ Development Review Application. Original signatures from all owners must be on the application form. **Do NOT use DocuSign.**
- ☑ A **project narrative** outlining the project's scope in detail, including the changes to the site, structure, landscaping, parking, land use, and lot consolidations.
- ☑ Complete written responses to identified approval criteria in the Community Development Code (CDC).
- ☑ A Service Provider Letter from Tualatin Valley Fire and Rescue - https://www.tvfr.com/399/Service-Provider-Permit Please contact Jason Arn at jason.arn@tvfr.com with any questions about TVF&R requirements.
- ☑ Vicinity Map showing the site within the City.
- ☑ Site Plan drawn to scale showing the:
    - Taxlot and address of the project,
    - Area of the site (acres or square feet),
    - Zoning and Neighborhood Association,
    - Location and dimensions of existing and proposed buildings, structures,
    - Location of existing and proposed on-site driveways and off-street parking,
    - Configuration and dimensions of all existing and proposed lots and tracts, including a proposed park, open space, and or drainage tracts or easements,
    - Location and width of existing and proposed easement for access, drainage, etc., and
    - Location of existing and proposed trees and other proposed landscaping.
    - Location of existing public and private utilities, easements, and 100-year floodplain,
    - Sensitive areas, including the location of on-site wetlands and riparian areas,
    - Location of existing off-site driveways across the street,
    - If applicable, internal circulation system, name, and location of existing and proposed roadways and roadway easements (private and public), and
    - Location and width of existing and proposed on-site pedestrian and bicycle facilities on-site.
- ☑ If applicable, a Utility Plan and Landscape plan, drawn to scale.
- ☑ If applicable, Building elevation drawings with exterior elevations for every side of each structure, height including building materials and floor levels, drawn to scale.
- ☐ If required, documentation of any required meeting with the respective City-recognized neighborhood association per CDC 99.038.
- ☐ Any other materials identified by city staff at the pre-application meeting.

For applications that the Planning Commission decides, the applicant or applicant's representative should present their proposal to the PC at the public hearing.

1_Application Narrative_MHLD

Broadway Townhomes

Prepared for:
Tim Walker
DreamBuilder Custom Homes Inc.

Prepared by:

EMERIO
ENGINEERING • SURVEYING • DESIGN
1500 Valley River Drive, Suite 100
Eugene, OR 97401
503.746.8812
emeriodesign.com

December 3, 2024

Project Summary

Request:	Application for Middle Housing Land Division to create seven (7) parcels intended for the construction of townhomes.
Location and Map Number:	5743-5773 SW Broadway Street, West Linn, Oregon 97068 Clackamas County Assessor's Map No. 2-2e-30CB, Tax Lots 1800, 1900, & 1901
Applicant/Owner:	Tim Walker Dreambuilder Custom Homes Inc. 16805 Gassner Lane Lake Oswego, Oregon 97035 Phone: 503-880-7132 Email: tim@dreambuildercustomhome.com
Engineer/Planner:	Emerio Design, LLC 1500 Valley River Drive Suite 100 Eugene, OR 97401 503-746-8812 Engineer: Dan Boultinghouse, PE Planner: Jennifer Arnold dboultinghouse@emeriodesign.com jarnold@emeriodesign.com

Exhibits:
A – County Assessor's Map
B – Aerial Photograph
C – Zoning Map

I. Project Description

Dreambuilder Custom Homes Inc, the applicant, is proposing a Middle Housing Land Division to create seven (7) lots for the construction of townhomes on three existing parcels identified as Clackamas County Assessor's Map No. 2-2e-30CB, Tax Lots 1800, 1900, & 1901 (Exhibit A); they can also be located by their addresses, 5743-5773 SW Broadway Street. The base zone applied to these properties is Residential, R5.

The proposed development conforms to all applicable sections of the Oregon Revised Statutes (ORS) and the City of West Linn Community Development Code (CDC). This application provides findings of fact that demonstrate conformance with all applicable standards of the previously mentioned governing regulations. Applicable criteria of the ORS and CDC will appear in *italics* followed by the applicant's responses in **bold** font.

II. Existing Conditions

The development site consists of three parcels each with an area of approximately 5,400 square feet, resulting in a total project area of about 16,200 square feet. All three parcels have frontage on Broadway Street, a local street. Sidewalk, curb, gutter, and driveway cuts have already been constructed to serve future development of these properties.

Elevations on the subject properties increase from 170 feet near the north property boundary to 202 feet above mean sea level near the southeast corner. West Linn Maps indicates slopes are in the 10 to 25 percent range and can exceed 25 percent in certain locations. The subject properties are undeveloped and contain no significant trees or vegetation. There are no significant natural features located within the boundaries of the subject properties.

For adjacent zones and land uses refer to Exhibit B for an aerial photograph and Exhibit C for a zoning map. All surrounding uses are detached, single-dwelling units zoned either R5 or R10.

III. Middle Housing Land Division; Conditions of Approval (ORS 92.031)

(1) *As used in this section, "middle housing land division" means a partition or subdivision of a lot or parcel on which the development of middle housing is allowed under ORS 197A.420 (2) or (3).*

(2) *A city or county shall approve a tentative plan for a middle housing land division if the application includes:*

(a) *A proposal for development of middle housing in compliance with the Oregon residential specialty code and land use regulations applicable to the original lot or parcel allowed under ORS 197A.420 (5);*

Response: The applicant is proposing a middle housing land division to create seven (7) lots from three existing parent parcels to construct townhomes. The subject properties are zoned R5 and per CDC 13.030(3) townhomes are outright permitted use.

Compliance with the applicable Oregon Residential Specialty Code regulations will be demonstrated during the Building Permit review process. This element of the criterion will be addressed at a future date and time. As for the local land use regulations applicable to this project, ORS 197.758(5) states:

"Local governments may regulate siting and design of middle housing required to be permitted under this section, provided that the regulations do not, individually or cumulatively, discourage

the development of all middle housing types permitted in the area through unreasonable costs or delay. Local governments may regulate middle housing to comply with protective measures adopted pursuant to statewide land use planning goals."

The City of West Linn has the authority to regulate siting and design of middle housing units such as townhomes. These standards include minimum property line setbacks, sidewall transitions, maximum floor-area-ratio, lot coverage, and building height. These standards, however, are traditionally reviewed under the Building Permit review process. Consequently, this element of the criterion will also be addressed at a future date and time.

(b) *Separate utilities for each dwelling unit;*

Response: As illustrated by the attached utility plan, separate utilities will be provided for each of the proposed dwelling units. Therefore, this criterion is satisfied.

(c) *Proposed easements necessary for each dwelling unit on the plan for:*

(A) *Locating, accessing, replacing and servicing all utilities;*

Response: The proposed land division includes the creation of a 10-foot-wide public utility easement along the frontage of Broadway Street. Additionally, a 10-foot-wide private storm easement will be created for the locating, accessing, and replacing of a private stormwater system serving the proposed townhomes. These easements will appear on the final plat. Therefore, this criterion is satisfied.

(B) *Pedestrian access from each dwelling unit to a private or public road;*

Response: The proposed land division will create seven parcels for the construction of townhomes. All proposed dwellings will have pedestrian access to SW Broadway Street, a public street, via dedicated driveways. Therefore, this criterion is satisfied.

(C) *Any common use areas or shared building elements;*

Response: The proposed land division will create lots for townhomes, which will have shared common walls. Maintenance easements will be shown on the final plat centered on the shared property lines with common walls. Therefore, this criterion will be satisfied in the future.

(D) *Any dedicated driveways or parking; and*

Response: Six of the seven townhomes will be accessed via shared driveways. Shared access easements will be shown over these driveways on the final plat. Therefore, this criterion will be satisfied in the future.

(E) *Any dedicated common area;*

Response: The proposed land division will not create dedicated common use areas. Therefore, no easements are required, and this criterion is met.

(d) *Exactly one dwelling unit on each resulting lot or parcel, except for lots, parcels or tracts used as common areas; and*

Response: The proposed land division will create seven lots for seven townhomes. No single parcel will contain more than one dwelling unit. This land division does not create common lots, parcels, or tracts. Therefore, this criterion is satisfied.

(e) *Evidence demonstrating how buildings or structures on a resulting lot or parcel will comply with applicable building codes provisions relating to new property lines and, notwithstanding the creation of new lots or parcels, how structures or buildings located on the newly created lots or parcels will comply with the Oregon residential specialty code.*

Response: Building setbacks are shown on the submitted site plan, which demonstrates compliance with the appropriate standards outlined the West Linn CDC. Compliance with the applicable Oregon Residential Specialty Code regulations will be demonstrated during the Building Permit review process. Therefore, this element of the criterion will be addressed at a future date and time.

(3) *A city or county may add conditions to the approval of a tentative plan for a middle housing land division to:*

(a) *Prohibit the further division of the resulting lots or parcels.*

(b) *Require that a notation appear on the final plat indicating that the approval was given under this section.*

Response: The applicant acknowledges and understands that the above conditions of approval may be required with the approval of this application.

(4) *In reviewing an application for a middle housing land division, a city or county:*

(a) *Shall apply the procedures under ORS 197.360 to 197.380.*

(b) *May require street frontage improvements where a resulting lot or parcel abuts the street consistent with land use regulations implementing ORS 197A.420.*

(c) *May not subject an application to approval criteria except as provided in this section, including that a lot or parcel require driveways, vehicle access, parking or minimum or maximum street frontage.*

(d) *May not subject the application to procedures, ordinances or regulations adopted under ORS 92.044 or 92.046 that are inconsistent with this section or ORS 197.360 to 197.380.*

(e) *May allow the submission of an application for a middle housing land division at the same time as the submission of an application for building permits for the middle housing.*

(f) *May require the dedication of right of way if the original parcel did not previously provide a dedication.*

Response: The applicant acknowledges and understands this application will be processed according to the procedures under ORS 197.360 to 197.380. Compliance with this portion of the criterion will occur through completion of the land use process.

The subject properties have approximately 150 feet of frontage on Broadway Street, a local street. No half-street improvements or right-of-way dedications will be required because the project's frontage has already been improved to local street standards. Therefore, the portions of this criterion related to street improvements have been satisfied.

(5) *The type of middle housing developed on the original parcel is not altered by a middle housing land division.*

Response: The subject properties are currently undeveloped. No housing will be altered by this application. Therefore, this criterion is met.

(6) *Notwithstanding ORS 197A.425 (1), a city or county is not required to allow an accessory dwelling unit on a lot or parcel resulting from a middle housing land division.*

Response: The applicant acknowledges and understands that the city is not required to allow accessory dwelling units now or in the future.

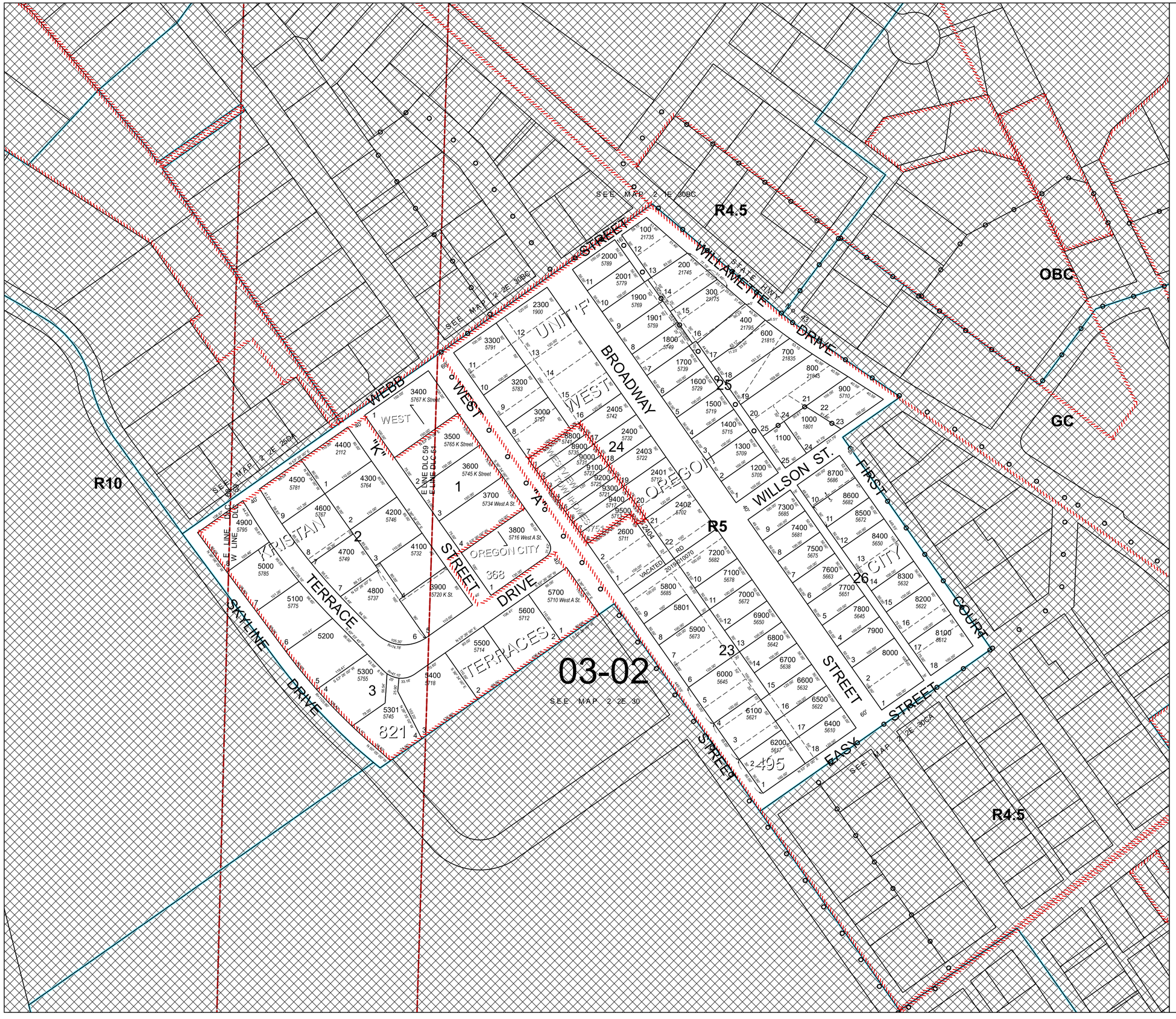
(7) *The tentative approval of a middle housing land division is void if and only if a final subdivision or partition plat is not approved within three years of the tentative approval. Nothing in this section or ORS 197.360 to 197.380 prohibits a city or county from requiring a final plat before issuing building permits.*

Response: The applicant acknowledges and understands that this application is void if the final plat is not approved within three years of the tentative approval.

IV. Conclusion

This application narrative and accompanying plan set demonstrate that all applicable provisions of the Oregon Revised Statutes Chapter 92, Subdivisions and Partitions, and the City of West Linn Community Development Code are satisfied.

Exhibit A – Clackamas County Assessor Map



2 2E 30CB
WEST LINN

N.W.1/4 S.W.1/4 SEC.30 T.2S. R.2E. W. M.
CLACKAMAS COUNTY

1" = 100'

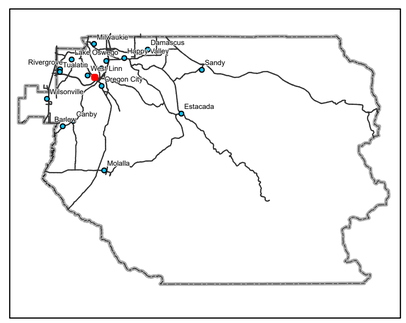
D. L. C.
HUGH BURNS NO. 51
DANIEL BURNS NO. 59 & 68

Cancelled Numbers
2500
6300
3100
500
4000
1101
2100
2200
2900
2800
2700

Parcel Boundary
Private Road ROW
Historical Boundary
Railroad Centerline
Tax Code Lines
Map Index
Water Lines
Land Use Zoning
Plats
Water

Corner
Section Corner
1/16th Line
Govt Lot Line
DLC Line
Meander Line
PLSS Section Line
Historic Corridor 40'
Historic Corridor 20'

N
W E
S



THIS MAP IS FOR ASSESSMENT PURPOSES ONLY

2 2E 30CB
WEST LINN

Print Date: 10/17/2024

Exhibit B – Aerial Photograph

City of West Linn

Legend

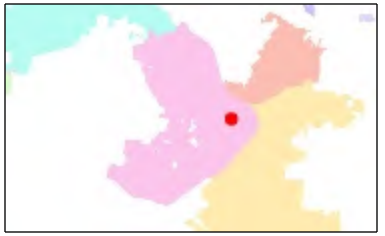
Points of Interest

- Fire Station
- City Hall
- Police Station
- Public School

Named Parks and OS

0 0.01 0.03 Miles

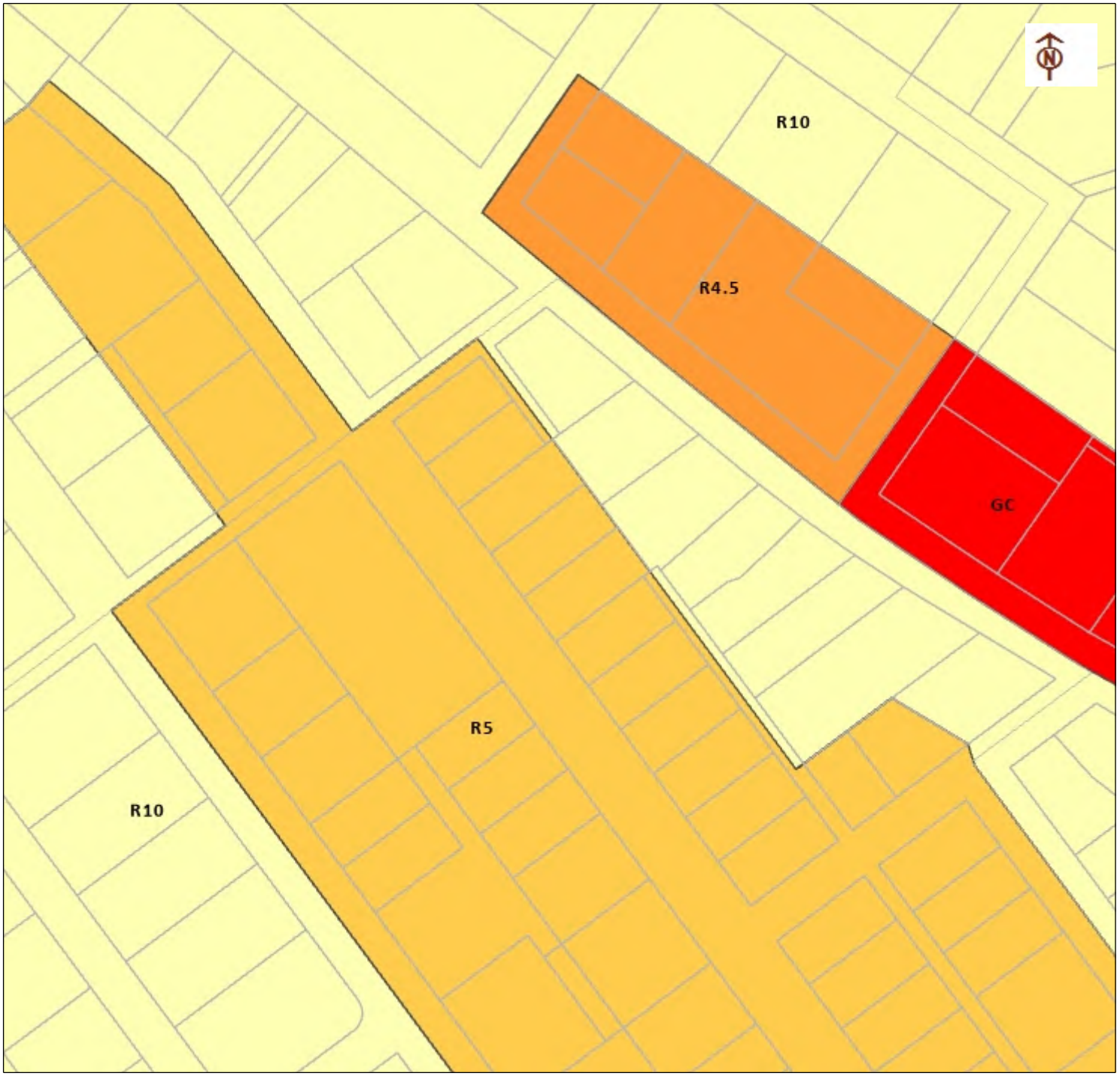
1: 1,128



Notes

This map was automatically generated using Geocortex Essentials.

Exhibit C – West Linn Zoning Map



City of West Linn

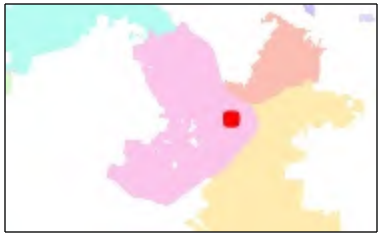
Legend

Zoning

- Single and Multi Family R-2.1
- Single and Multi Family R-3
- Single-Family R-4.5
- Single-Family R-5
- Single-Family R-7
- Single-Family R-10
- Single-Family R-15
- Single-Family R-20
- Single-Family R-40
- Mixed Use
- Neighborhood Commercial
- General Commercial
- Office Business Center
- Campus Industrial
- General Industrial

0 0.03 0.06 Miles

1: 2,257



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2_FD Permit Application 2024-0180 Middle Housing 5743-5773 Broadway St

FIRE CODE / LAND USE / BUILDING REVIEW APPLICATION

Tualatin Valley Fire & Rescue

North Operating Center
11945 SW 70th Avenue
Tigard, OR 97223
Phone: 503-649-8577

South Operating Center
8445 SW Elligsen Rd
Wilsonville, OR 97070
Phone: 503-649-8577

REV 6-30-20

Project Information

Applicant Name: Tim Walker

Address: 16805 Gassner Lane, Lake Oswego, OR 97035

Phone: 503-880-7132

Email: tim@dreambuildercustomhome.com

Site Address: 5743-5773 SW Broadway Street

City: West Linn, Oregon 97068

Map & Tax Lot #: 2-2e-30CB, 1800, 1900, & 1901

Business Name: Dreambuilder Custom Homes, Inc.

Land Use/Building Jurisdiction: West Linn

Land Use/ Building Permit # N/A

Choose from: Beaverton, Tigard, Newberg, Tualatin, North Plains, West Linn, Wilsonville, Sherwood, Rivergrove, Durham, King City, Washington County, Clackamas County, Multnomah County, Yamhill County

Project Description

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Permit/Review Type (check one):

- ☑ Land Use / Building Review - Service Provider Permit
- ☐ Emergency Radio Responder Coverage Install/Test
- ☐ LPG Tank (Greater than 2,000 gallons)
- ☐ Flammable or Combustible Liquid Tank Installation (Greater than 1,000 gallons)
  - * Exception: Underground Storage Tanks (UST) are deferred to DEQ for regulation.
- ☐ Explosives Blasting (Blasting plan is required)
- ☐ Exterior Toxic, Pyrophoric or Corrosive Gas Installation (in excess of 810 cu.ft.)
- ☐ Tents or Temporary Membrane Structures (in excess of 10,000 square feet)
- ☐ Temporary Haunted House or similar
- ☐ OLCC Cannabis Extraction License Review
- ☐ Ceremonial Fire or Bonfire (For gathering, ceremony or other assembly)

For Fire Marshal's Office Use Only

TVFR Permit # 2024-0180

Permit Type: SPP-West Linn

Submittal Date: 11-26-2024

Assigned To: DFM Arn

Due Date: NA

Fees Due: $0.

Fees Paid: $0.

Approval/Inspection Conditions

(For Fire Marshal's Office Use Only)

This section is for application approval only

0930 11-26-2024

Fire Marshal or Designee Date

Conditions: See approved fire service plan.

See Attached Conditions: ☐ Yes ☒ No

Site Inspection Required: ☐ Yes ☒ No

This section used when site inspection is required

Inspection Comments:

Final TVFR Approval Signature & Emp ID Date

3_FS-1 2024-0180 Middle Housing
5743-5773 Broadway St

SITE RELATED NOTES:

STORMWATER DESIGN LOCATED WEST OF RESIDENCE. SEE CIVIL ENGINEERING SHEETS.

DRIVEWAY TO BE 6" CONCRETE SLAB (3500 P.S.I.) ON 4" MIN. OF 2-3 INCH ROCK ON COMPACTED FILL

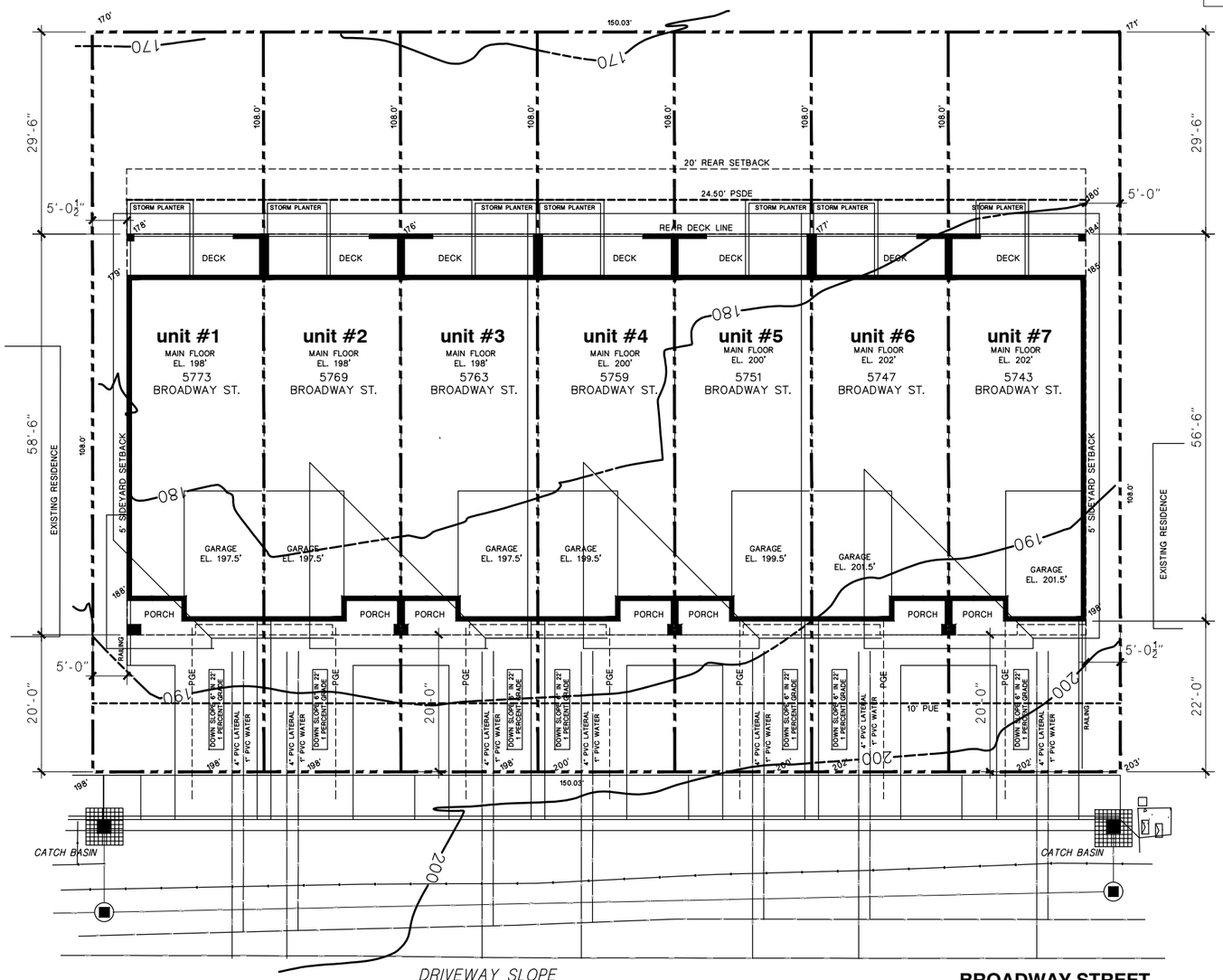
TOTAL BUILDING SQUARE FOOTAGE

20,188 SQ, FT,

IMPERVIOUS

DRIVE / WALK	1,698 SQ. FT.
ROOF	9,083 SQ. FT.
TOTAL AREA	10,871 SQ. FT.
LOT AREA	16,203 SQ. FT.
PERCENTAGE	66.5 %

UNDERGROUND WATER
UNDERGROUND GAS LINE
SANITARY SEWER LINE
STORM LINE



FIRE SERVICE SITE PLAN

SCALE 1" = 20'-0"

JOB No. 22086 DATE 11-12-2024 FS-1

SITE INFORMATION:

CONSTRUCTION LOCATION:
TAX LOTS 1800-1900 / TAX MAP 2S, 2E, 30CB
LOCATED IN THE S.W. 1/4 SEC. 30, T.2S, R.2E, W.M.
5769 BROADWAY STREET CITY OF WEST LINN
CLACKAMAS COUNTY

TVFR FIRE SERVICE PLANS

PROJECT: NEW CONSTRUCTION - TOWNHOUSE

BUILDER:
DreamBuilder Custom Homes, Inc.
TIM WALKER 503.880.7132
tim@dreambuildercustomhome.com

WATTON DESIGN WORKS, Inc.
1880
Willamette Falls Drive
Suite 200
West Linn, Or.
97068

FRONT ELEVATION - WEST

SCALE : 1/4" = 1'-0"

REAR ELEVATION - EAST

SCALE : 1/4" = 1'-0"

WATTON DESIGN WORKS, Inc.
1880 Willamette Falls Drive
Suite #200-D
West Linn, Or. 97068
503.655.1001
wattondesign.com

PROJECT: ATTACHED TOWNHOMES

CONSTRUCTION LOCATION:
TAX LOTS 1800-1900 / TAX MAP 2S, 2E, 30CB
LOCATED IN THE S.W. 1/4 SEC. 30, T.2S, R.2E, W.M.
CITY OF WEST LINN
CLACKAMAS COUNTY

TVFR FIRE SERVICE - EXTERIOR ELEVATIONS

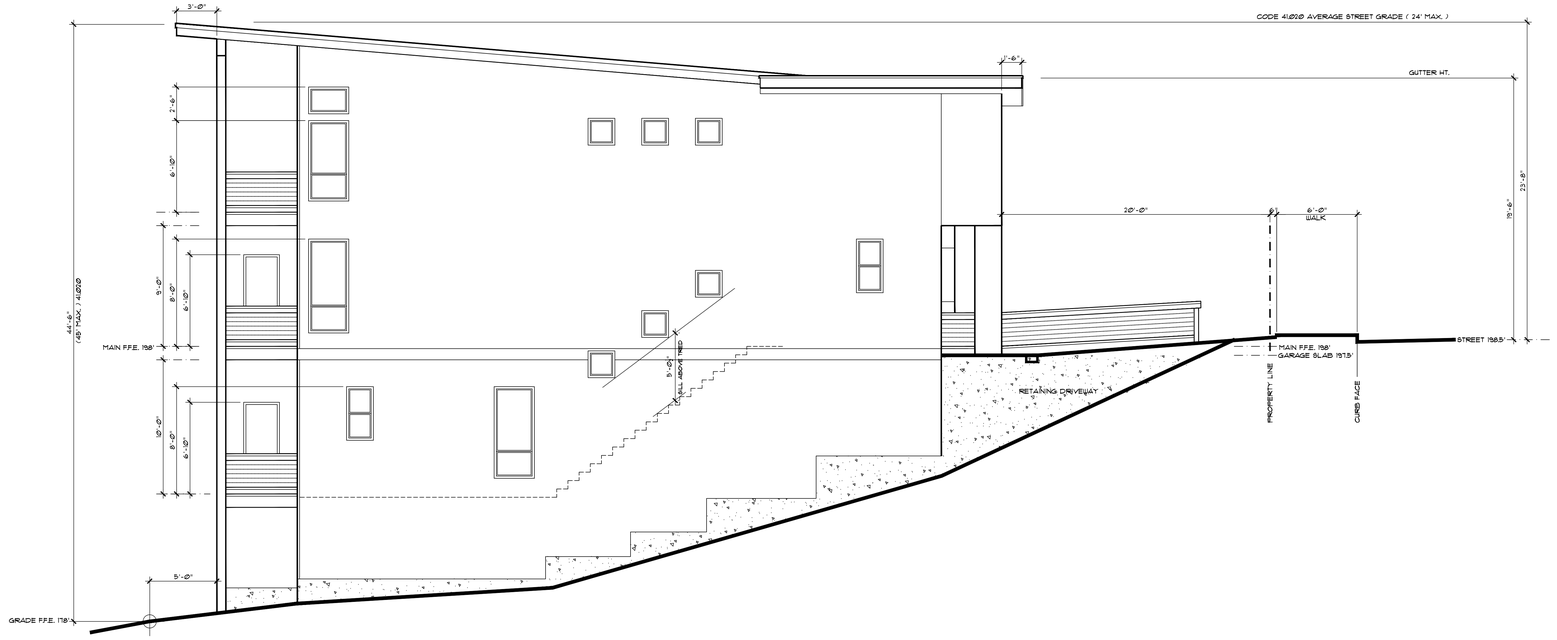
SQUARE FOOTAGE	
MAIN AREA	764 S.F.
UPPER AREA	982 S.F.
LOWER AREA	890 S.F.
TOTAL AREA	2636 S.F.
GARAGE AREA	248 S.F.

BUILDER:
DreamBuilder Custom Homes, Inc.
TIM WALKER 503.880.7132
tim@dreambuildercustomhome.com

DATE:
Est. 12-14-2024
Rev.
Rev.
Rev.

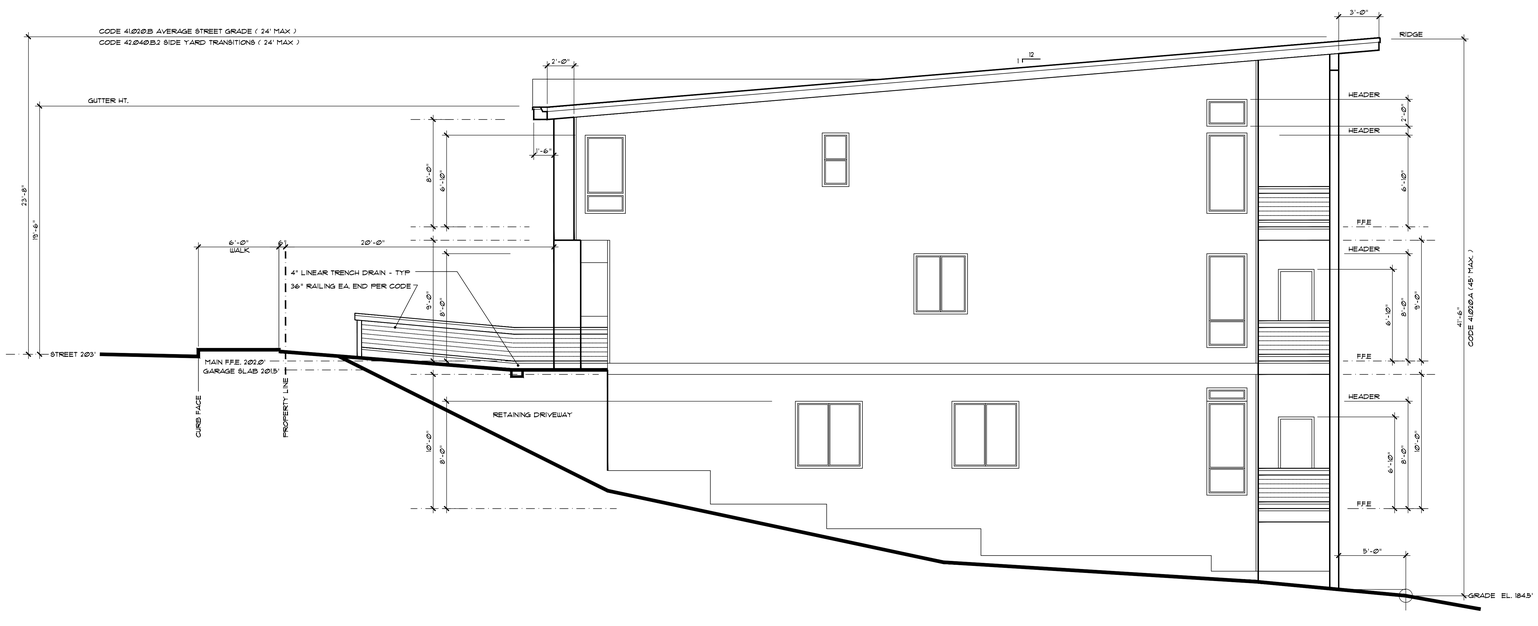
JOB No.
22086

SHEET
FS-2



LEFT ELEVATION - NORTH

SCALE : 1/4" = 1'-0"



RIGHT ELEVATION - SOUTH

SCALE : 1/4" = 1'-0"

WATTON DESIGN WORKS, Inc.
1880 Willamette Falls Drive
Suite #200-D
West Linn, Or. 97068
503.655.1001
wattondesign.com

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JOB No.
22086

SHEET
FS-3

4_Geotechnical Report

REDMOND GEOTECHNICAL SERVICES

Geotechnical Investigation

and

Geologic Landslide Hazards Study Services

Proposed Single-Family Residential Home Development Project

Tax Lot No's. 1800 and 1900

21765 Willamette Drive

Lake Oswego (Clackamas County), Oregon

for

DreamBuilder Custom Homes

Project No. 1098.023.G
August 3, 2018

REDMOND GEOTECHNICAL SERVICES

August 3, 2018

Mr. Tim Walker
DreamBuilder Custom Homes
16805 Gassner Lane
Lake Oswego, Oregon 97035

Dear Mr. Walker:

Re: Geotechnical Investigation and Geologic Landslide Hazards Study Services, Proposed Single-Family Residential Home Development Project, Tax Lot No's. 1800 and 1900, 21765 Willamette Drive, Lake Oswego (Clackamas County), Oregon

Submitted herewith is our report entitled "Geotechnical Investigation and Geologic Landslide Hazards Study Services, Proposed Single-Family Residential Home Development Project, Tax Lot No's. 1800 and 1900, 21765 Willamette Drive, Lake Oswego (Clackamas County), Oregon". The scope of our services was outlined in our formal proposal to Mr. Tim Walker of DreamBuilder Custom Homes dated June 13, 2018. Written authorization of our services was provided by Mr. Tim Walker of DreamBuilder Custom Homes on June 14, 2018.

During the course of our investigation, we have kept you and/or others advised of our schedule and preliminary findings. We appreciate the opportunity to assist you with this phase of the project. Should you have any questions regarding this report, please do not hesitate to call.

Sincerely,

Daniel M. Redmond, P.E., G.E.
President/Principal Geotechnical Engineer

PO Box 20547 • Portland, Oregon 97294 • Fax 503/286-7176 • Phone 503/285-0598

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GEOTECHNICAL INVESTIGATION
&
GEOLOGIC LANDSLIDE HAZARDS STUDY SERVICES
PROPOSED SINGLE-FAMILY RESIDENTIAL HOME DEVELOPMENT PROJECT
TAX LOT NO'S. 1800 AND 1900, 21765 WILLAMETTE DRIVE
LAKE OSWEGO (CLACKAMAS COUNTY), OREGON

INTRODUCTION

Redmond Geotechnical Services, LLC is please to submit to you the results of our Geotechnical Investigation and Geologic Landslide Hazards Study report at the site of the proposed residential development property located generally to the east of Broadway Street and south of Webb Street in Lake Oswego (Clackamas County), Oregon. The general location of the subject site is shown on the Site Vicinity and Geologic Map, Figure No. 1. The purpose of our geotechnical investigation and geologic landslide hazards study services at this time was to explore the existing subsurface soils and/or groundwater conditions across the subject site and assess the presence and/or degree of any existing and/or ancient (historic) landslide(s) at the site with regard to potential stability problems and/or development. Additionally, we have provided supplemental geotechnical design and/or construction recommendations with regard to construction of the new residential homes and their associated site improvements.

PROJECT DESCRIPTION

We understand that present plans are to construct one (1) or more new single-family residential structures at the subject property. Reportedly, we understand that the proposed development of the subject property will consist of the construction of up to three (3) new single-family residential structures. The new single-family residential structures are generally anticipated to be two- and/or three-story structures constructed with wood framing. Additionally, due to the existing sloping site conditions, we understand that the residential structures may be constructed with a partial and/or below grade basement level. As such, the proposed new residential structures will likely include one (1) or more partial and/or below grade retaining walls.

Support of the new residential structures is anticipated to include conventional shallow individual (spread) column footings and continuous (strip) footings as well as concrete slab-on-grade floor systems. Structural loading information, although unavailable at this time, is anticipated to be fairly typical and light for this type of wood-frame single-family structure and is expected to result in maximum dead plus live continuous (strip) and individual (spread) column footing loads on the order of about 2.0 to 3.5 kips per lineal foot (klf) and 15 to 35 kips, respectively.

CANBY QUADRANGLE
OREGON
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 OREGON CITY 15' QUADRANGLE

SCALE 1:24000

1 MILE
7000 FEET
1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—WILLAMETTE RIVER DATUM

SITE VICINITY AND GEOLOGIC MAP

Project No. 1098.023.G	**TAX LOT NO'S. 1800 AND 1900 21765 WILLAMETTE DRIVE**	Figure No. 1

SCOPE OF WORK

The subject site has reportedly been flagged by the City of Lake Oswego and/or Clackamas County as a potential slope and/or geologic hazards area, apparently because a portion of the subject property is shown as having existing slope gradients greater than 15 percent. Additionally, the "Relative Earthquake Hazard Map (HEHRP) of Lake Oswego and/or Clackamas County, Oregon" indicates that the subject property is located within Zone B. In this regard, the purpose of our geotechnical investigation studies was to evaluate the overall site subsurface soil and/or groundwater conditions underlying the site with regard to the proposed new single-family residential development at the site and any associated impacts or concerns with respect to the new residential construction as well as provide appropriate geotechnical design and construction recommendations for the project. Additionally, the purpose of the geologic landslide hazards study was to assess the presence and/or degree of any existing and/or ancient (historic) landslide(s) at the site with regard to potential stability problems associated with development of the site. Specifically, the geotechnical investigation and geologic landslide hazards study included the following scope of work items:

1. Review of available and relevant (pertinent) geologic information including available landslide mapping, historic topographic maps and historic aerial photographs.

2. A site vicinity geologic and detailed site reconnaissance to observe the area geology and geologic features that could be related to past landslide activity in the area and a visual reconnaissance of existing road cuts and fills as well as pavement areas for indications of slope movement.

3. A subsurface exploration program of the soil and groundwater conditions underlying the site by means of two (2) exploratory test pit excavations. The exploratory test pits were excavated with tracked excavation equipment to depths of between two (2) and seven (7) feet beneath existing site grades at the approximate locations as shown on the Site Exploration Plan, Figure No. 2.

4. Laboratory testing to help evaluate and identify pertinent physical and engineering properties of the subsurface soils encountered relative to the stability of the existing moderately steep slope and/or the planned residential development of the site. The laboratory testing consisted of tests to help evaluate the natural (field) moisture content, maximum dry density and optimum moisture content, Atterberg Limits and gradational characteristics as well as direct shear strength tests.

5. A literature review and engineering evaluation and assessment of the regional seismicity to evaluate the potential ground motion hazard(s) at the subject site. The evaluation and assessment included a review of the regional earthquake history and sources such as potential seismic sources, maximum credible earthquakes, and reoccurrence intervals as well as a discussion of the possible ground response to the selected design earthquake(s), fault rupture, landsliding, liquefaction, and tsunami and seiche flooding.

6. Engineering analyses utilizing the field and laboratory data as a basis for furnishing recommendations for foundation support of the proposed new single-family residential structures. Recommendations include maximum design allowable contact bearing pressure(s), depth of footing embedment, estimates of foundation settlement, lateral soil resistance and/or lateral earth pressures, and foundation subgrade preparation as well as recommended foundation setbacks from slopes. Additionally, construction and/or permanent subsurface water drainage considerations have also been prepared. Further, our report includes recommendations regarding site preparation, placement and compaction of structural fill materials, suitability of the on-site soils for use as structural fill, criteria for import fill materials, and preparation of foundation and floor slab subgrades.

SITE CONDITIONS

Site Geology

Based on the Geologic Map of the Lake Oswego Quadrangle, Clackamas, Multnomah, and Washington Counties, Oregon (GMS-59), the subject site is underlain at depth by the Sentinel Bluffs unit of the Grande Ronde Basalt deposits (Tgsb) of middle Miocene age. Within the map area, two flows that were formerly designated as "-1 and -2 flows" of Beeson and Moran (1979) are present. Flows typically display blocky to columnar jointing and rarely display an entablature/colonnade jointing pattern. Fresh exposures are light to dark gray; weathered surfaces are greenish gray to dark gray. The lower flow is typically fine- to medium-grained basalt and sparsely plagioclase phyric, with small tabular plagioclase phenocrysts. The upper flow is fine- to medium-grained, commonly diktytaxitic, and aphyric. Unit thickness ranges from 25 to 150 feet within the map area. Sentinel Bluffs flows are distinguished from both younger Frenchman Sprinmgs units and older Grande Ronde units on the basis of stratigraphic position, composition, lithology, and normal paleomagnetic polarity (see Reidel) and others, 1989; Beeson and others, 1989).

Surface Conditions

The subject proposed new residential development property is comprised of two (2) separate tax lots (TL's 1800 and 1900) and is generally rectangular in shape and encompasses a total plan area of approximately 0.35 acres. The proposed residential property is located along the easterly flank of an existing north/south trending ridge and is roughly bounded to the west by Broadway Street, to the north and south by existing single-family residential home sites, and to the east by a public alley, existing single-family residential properties and Willamette Drive. At the time of our study, the subject property was improved and contained an existing single-family residential home.

Surface vegetation across the site generally consists of a moderate growth of ground cover consisting of grass, weeds and brush as well as trees. Topographically, the subject property is best characterized as gently to moderately sloping terrain descending downwards towards the east at slope gradients of about 20 to 25 percent. Overall topographic relief across the entire site is estimated at about thirty (30) feet and ranges from a low about Elevation 170 feet near the easterly property boundary to a high of about Elevation 200 feet near the southwesterly property corner.

Subsurface Soil Conditions

Our understanding of the subsurface soil conditions underlying the subject site was developed by means of two (2) exploratory test pits excavated to depths of between two (2) and seven (7) feet beneath existing site grades on June 29, 2018 with tracked excavating equipment. The location of the exploratory test pits were located in the field by marking off distances from existing and/or known site (land) features and is shown in relation to the existing site improvements on the Site Exploration Plan, Figure No. 2. Detailed logs of the test pit explorations, presenting conditions encountered at each location explored, are presented in the Appendix, Figure No. A-4.

The exploratory test pit excavations were observed by staff from Redmond Geotechnical Services, LLC who logged the test pit explorations and obtained representative samples of the subsurface soils encountered at the site. Additionally, the elevation of the exploratory test pit excavations were referenced from an Existing Conditions Map prepared by Centerline Concepts and should be considered as approximate. All subsurface soils encountered at the site and/or within the exploratory test pit excavation were logged and classified in general conformance with the Unified Soil Classification System (USCS) which is outlined on Figure No. A-3.

The test pit explorations performed at the subject property revealed that the subject site is generally underlain by native soils comprised of residual and/or highly to slightly weathered Columbia River Basalt bedrock deposits of middle Miocene age. Specifically, the subsurface soils underlying the project area consist of native soil deposits generally comprised of an upper and/or surficial layer of topsoil materials composed of approximately 8 to 12 inches of moist to very moist, soft, organic, sandy, clayey silt. These surficial topsoil materials were inturn underlain by residual and/or over-burden soils composed of medium brown, very moist, medium stiff becoming medium to reddish-brown and stiff at depth, sandy, clayey silt to a depth of about five (5.0) feet beneath the existing site and/or surface grades. These residual and/or over-burden soils are best characterized by relatively low to moderate strength and moderate compressibility. The residual and/or over-burden soils were found to be underlain by gray-brown to gray, dense to very dense, highly to slightly weathered and fractured Basalt bedrock deposits to the maximum depth explored of about seven (7.0) feet beneath existing site grades. These highly to slightly weathered and fractured Basalt bedrock deposits are best characterized by relatively moderate to high strength and low to compressibility. In addition, localized fill soils were also encountered in the area of test hole TH-#2 which consisted of approximately two (2) feet of poorly to moderately compacted, clayey, sandy silt.

Groundwater

Groundwater was not encountered within the exploratory test pit explorations at the time of our field work to depths of up to seven (7) feet beneath the existing site and/or surface grades. However, groundwater elevations in the area and/or across the site are expected to fluctuate seasonally in accordance with rainfall conditions and/or site utilization and may approach to near surface elevations during periods of heavy and/or prolonged rainfall.

LEGEND

TH-#2 Indicates approximate location of exploratory test hole

FITH-#1 Indicates approximate location of field infiltration test

N

GRAPHIC SCALE

SITE EXPLORATION PLAN

Project No. 1098.023.G	**TAX LOT NO'S. 1800 AND 1900 21765 WILLAMETTE DRIVE**	Figure No. 2

INFILTRATION TESTING

We performed one (1) field infiltration test at the site on June 29, 2018. The infiltration test was performed in field infiltration test hole FITH-#1 at a depth of between three (3) and four (4) feet beneath the existing site and/or surface grades. The subgrade soils encountered in the infiltration test hole consisted of sandy, clayey silt. The infiltration testing was performed in general conformance with current EPA and/or Clackamas County Encased Falling Head test method which consisted of advancing a 6-inch diameter PVC pipe approximately 6 inches into the exposed soil horizon at each test location. Using a steady water flow, water was discharged into the pipe and allowed to penetrate and saturate the subgrade soils. The water level was adjusted over a two (2) hour period and allowed to achieve a saturated subgrade soil condition consistent with the bottom elevation of the surrounding test pit excavation. Following the required saturating period, water was again added into the PVC pipe and the time and/or rate at which the water level dropped was monitored and recorded. Each measurable drop in the water level was recorded until a consistent infiltration rate was observed and/or repeated.

Based on the results of the field infiltration testing at the site, we have found that the native sandy, clayey silt subgrade soil deposits posses an ultimate infiltration rate on the order of about 0.6 inches per hour (in/hr).

LABORATORY TESTING

Representative samples of the on-site subsurface soils were collected at selected depths and intervals from the test pit excavations and returned to our laboratory for further examination and testing and/or to aid in the classification of the subsurface soils as well as to help evaluate and identify their engineering strength and compressibility characteristics. The laboratory testing consisted of visual and textural sample inspection, moisture content determinations, maximum dry density and optimum moisture content, Atterberg Limits and gradation analyses as well as direct shear strength tests. Results of the various laboratory tests are presented in the Appendix, Figure No's. A-5 through A-8.

SEISMICITY AND EARTHQUAKE SOURCES

The seismicity of the southwest Washington and northwest Oregon area, and hence the potential for ground shaking, is controlled by three (3) separate fault mechanisms. These include the Cascadia Subduction Zone (CSZ), the mid-depth intraplate zone, and the relatively shallow crustal zone. Descriptions of these potential earthquake sources are presented below.

The CSZ is located offshore and extends from northern California to British Columbia. Within this zone, the oceanic Juan de Fuca Plate is being subducted beneath the continental North American Plate to the east. The interface between these two (2) plates is located at a depth of approximately 15 to 20 kilometers (km). The seismicity of the CSZ is subject to several uncertainties, including the maximum earthquake magnitude and the recurrence intervals associated with various magnitude earthquakes.

Anecdotal evidence of previous CSZ earthquakes have been observed within coastal marshes along the Washington and Oregon coastlines. Sequences of interlayered peat and sands have been interpreted to be the result of large Subduction Zone earthquakes occurring at intervals on the order of 300 to 500 years, with the most recent event taking place approximately 300 years ago. A recent study by Geomatrix (1995) suggests that the maximum earthquake associated with the CSZ is moment magnitude (Mw) 8 to 9. This is based on an empirical expression relating moment magnitude to the area of fault rupture derived from earthquakes that have occurred within subduction zones in other parts of the world. An Mw 9 earthquake would involve a rupture of the entire CSZ. As discussed by Geomatrix (1995) this has not occurred in other subduction zones that have exhibited much higher levels of historical seismicity than the CSZ, and is considered unlikely. For the purpose of this study an earthquake of Mw 8.5 was assumed to occur within the CSZ.

The intraplate zone encompasses the portion of the subducting Juan de Fuca Plate located at a depth of approximately 30 to 50 km below western Washington and western Oregon. Very low levels of seismicity have been observed within the intraplate zone in western Oregon and western Washington. However, much higher levels of seismicity within this zone have been recorded in Washington and California. Several reasons for this seismic quiescence were suggested in the Geomatrix (1995) study and include changes in the direction of subduction between Oregon, Washington, and British Columbia as well as the effects of volcanic activity along the Cascade Range. Historical activity associated with the intraplate zone includes the 1949 Olympia magnitude 7.1 and the 1965 Puget Sound magnitude 6.5 earthquakes. Based on the data presented within the Geomatrix (1995) report, an earthquake of magnitude 7.25 has been chosen to represent the seismic potential of the intraplate zone.

The third source of seismicity that can result in ground shaking within the Oregon and southwest Washington area is near-surface crustal earthquakes occurring within the North American Plate. The historical seismicity of crustal earthquakes in this area is higher than the seismicity associated with the CSZ and the intraplate zone. The 1993 Scotts Mills (magnitude 5.6) and Klamath Falls (magnitude 6.0), Oregon earthquakes were crustal earthquakes.

Liquefaction

Seismic induced soil liquefaction is a phenomenon in which loose, granular soils and some silty soils, located below the water table, develop high pore water pressures and lose strength due to ground vibrations induced by earthquakes. Soil liquefaction can result in lateral flow of material into river channels, ground settlements and increased lateral and uplift pressures on underground structures. Buildings supported on soils that have liquefied often settle and tilt and may displace laterally. Soils located above the ground water table cannot liquefy, but granular soils located above the water table may settle during the earthquake shaking.

Our review of the subsurface soil test pit logs from our exploratory field exploration (TH-#1 and TH-#2) indicates that the site is generally underlain by dense to very dense, highly to slightly weathered and fractured Basalt bedrock deposits. Additionally, groundwater was not encountered at the site during our field exploration work.

As such, due to the dense to very dense nature of the bedrock deposits beneath the site as well as the apparently low groundwater elevation at the site, it is our opinion that the site has a very low potential for liquefaction during the design earthquake motions previously described.

Landslides

No ancient and/or active landslides were observed at and/or are known to be present on the subject site. Additionally, the subject site is characterized as moderately sloping terrain and the native sandy, clayey silt subgrade soil deposits beneath the site and/or in the immediate area possesses relatively moderate strength. However, Dogami mapping indicates that the area to the northwest has been associated with past landsliding. Specifically, the area to the northwest of the subject property and/or to the west of Broadway Street has been associated with previous relatively small landslides. However, this area of mapped instability is located along the easterly flank of a downward trending slope. Additionally, this area of instability is located above about Elevation 200 feet. As such, based on a review of the City of Lake Oswego and/or Clackamas County Landslide Hazards Map(s), the risk of slope instability at the subject site resulting in landslides and/or lateral earth movements do not appear to present a significant potential geologic hazard for this project.

Surface Rupture

Although the site is generally located within a region of the country known for seismic activity, no known faults exist on and/or immediately adjacent to the subject site. The closest known fault is located approximately 500 to 1,000 feet to the northeast of the subject property. As such, the risk of surface rupture due to faulting is considered negligible.

Tsunami and Seiche

A tsunami, or seismic sea wave, is produced when a major fault under the ocean floor moves vertically and shifts the water column above it. A seiche is a periodic oscillation of a body of water resulting in changing water levels, sometimes caused by an earthquake. Tsunami and seiche are not considered a potential hazard at this site because the proposed apartment development is not near to the coast and/or there are no immediately adjacent significant bodies of water.

Flooding and Erosion

Stream flooding is a potential hazard that should be considered in lowland areas of Clackamas County and Lake Oswego. The FEMA (Federal Emergency Management Agency) flood maps should be reviewed as part of the design for the proposed new residential structure and site improvements. Elevations of structures on the site should be designed based upon consultants reports, FEMA (Federal Emergency Management Agency), and Clackamas County requirements for the 100-year flood levels of any nearby creeks and/or streams.

Slope Hazards

We evaluated potential slope hazards by examining historic aerial photographs of the subject site, reviewing available topographic and geologic maps, LIDAR imagery, and conducting a geologic reconnaissance of the subject property. During the reconnaissance, we observed existing roadways and/or structures immediately adjacent to and/or in the area for indications of slope movement.

There are no steep slopes (i.e., greater than 50 percent) at and/or adjacent to the subject property. The steepest existing slope gradient at the subject property is approximately 20 to 25 percent which is located across the lower southeasterly portion of the subject property. Our site reconnaissance of the subject property found it to be as shown on available maps, LIDAR and aerial photos - moderately steep terrain and showing no evidence of anomalous topography, nor any evidence of present and/or past slope instability. Given that the adjacent properties to the north, south, east and west have been developed for several years, one would expect to find fairly obvious evidence of existing slope movement and/or slope failures if the slopes at and/or near to the subject property are marginally stable. Specifically, our review of LIDAR imagery and aerial photographs found no evidence of slope instability at and/or on other developed and/or undeveloped residential properties located immediately adjacent to the subject property.

CONCLUSIONS AND RECOMMENDATIONS

General

Our review of available geologic maps, examination of historic aerial photographs and LIDAR imagery as well as our site reconnaissance found no evidence of landslides at and/or immediately adjacent to the subject property. The closets know mapped and/or suspected landslide area is located approximately 1/8-mile to the northwest of the subject property and/or to the northwest of Broadway Street. As such, it appears that the inclusion of the subject property in the potential slope hazard mapping of Lake Oswego and/or Clackamas County is based solely on the existing site topography exceeding a slope gradient of 15 percent.

In this regard, based on the results of our field explorations, laboratory testing and engineering analyses, it is our opinion that the site is presently stable and generally suitable for the proposed new single-family residential development and its associated site improvements described herein provided that the recommendations contained within this report are properly incorporated into the design and construction of the project.

The primary features of concern at the site and/or for the project are 1) the presence of the existing site improvements, 2) the planned excavation and construction of below grade retaining wall(s) of the proposed residential structures and, 3) the moisture sensitivity and erosion potential of the upper and/or near surface sandy, clayey silt subgrade soils across the site.

In regard to the presence of the existing site improvements, we understand that the existing residential home will be razed from the site. In this regard, close monitoring by the Geotechnical Engineer during the site grading and earthwork operations will be required.

With regard to the planned excavation and construction of below grade retaining walls for the proposed new residential structures, we are of the opinion that a retaining wall height of approximately eight (8) feet or less should not result in the development of any significant additional loads beneath the retaining wall that would likely result in destabilization of the existing moderately steep slope. However, we point out that any retaining walls constructed along and/or directly adjacent to the top of the existing moderately steep slope should be sufficiently embedded such that at least eight (8) feet of separation is developed between the face of the existing slope and the outer (downslope) bearing edge of the retaining wall footing. Where significantly higher retaining walls are planned and/or desired, this office should be consulted.

In regard to the moisture sensitivity and erosion potential of the native (on-site) sandy, clayey silt subgrade soil deposits across the site, we are of the opinion that all site grading and earthwork operations would best be performed during the drier summer months which is typically June through September. Additionally, we are generally of the opinion that the greatest potential for soil erosion will occur during and/or immediately following construction. As such, in areas that have been stripped and cleared of surface vegetation, erosion at the site can be minimized by implementing a project erosion control plan which should include the judicious use of straw bales and silt fences. Additionally, all erosion control devices should be in place and remain in place throughout all of the site grading and earthwork operations. Erosion and sedimentation of exposed sandy subgrade soils can also be minimized by quickly re-vegetating exposed areas of soil and by staging construction (if possible) such that large areas of the site are not denuded and exposed at the same time. Areas of exposed sandy soils requiring immediate and/or temporary protection against erosion should be covered either with mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture or hydroseeded with an approved seed-mulch-fertilizer mixture.

The following sections of this report provide specific recommendations regarding subgrade preparation and grading as well as foundation, retaining wall and floor slab design and construction for the new residential home project.

Site Preparation

As an initial step in site preparation, we recommend that the proposed new residential home site area(s) and its/their associated structural and/or site improvement area(s) be stripped and cleared of all existing improvements, any existing undocumented fill materials, surface debris, existing vegetation, topsoil materials, and/or any other deleterious materials present at the time of construction. In general, we envision that the site stripping to remove existing vegetation and topsoil materials will generally be about 8 to 12 inches. However, localized areas requiring deeper removals, such as any existing undocumented fill materials and/or old foundation remnants, will be encountered and should be evaluated at the time of construction by the Geotechnical Engineer.

The stripped and cleared materials should be properly disposed of as they are generally considered unsuitable for use/reuse as fill materials.

Following the completion of the site stripping and clearing work and prior to the placement of any required structural fill materials and/or structural improvements, the exposed subgrade soils within the planned structural improvement area(s) should be inspected and approved by the Geotechnical Engineer and possibly proof-rolled with a half and/or fully loaded dump truck. Areas found to be soft or otherwise unsuitable should be over-excavated and removed or scarified and recompacted as structural fill. During wet and/or inclement weather conditions, proof rolling and/or scarification and recompaction as noted above may not be appropriate.

The on-site native sandy, clayey silt subgrade soil materials are generally considered suitable for use/reuse as structural fill materials provided that they are free of organic materials, debris, and rock fragments in excess of about 6 inches in dimension. However, if site grading is performed during wet or inclement weather conditions, the use of some of the on-site native subgrade soil materials which contain significant silt and clay sized particles will be difficult at best. In this regard, during wet or inclement weather conditions, we recommend that an import structural fill material be utilized which should consist of a free-draining (clean) granular fill (sand & gravel) containing no more than about 5 percent fines. Representative samples of the materials which are to be used as structural fill materials should be submitted to the Geotechnical Engineer and/or laboratory for approval and determination of the maximum dry density and optimum moisture content for compaction.

In general, all site earthwork and grading activities should be scheduled for the drier summer months (June through September) if possible. However, if wet weather site preparation and grading is required, it is generally recommended that the stripping of topsoil materials be accomplished with a tracked excavator utilizing a large smooth-toothed bucket working from areas yet to be excavated. Additionally, the loading of strippings into trucks and/or protection of moisture sensitive subgrade soils will also be required during wet weather grading and construction. In this regard, we recommend that areas in which construction equipment will be traveling be protected by covering the exposed subgrade soils with a geotextile fabric such as Mirafi 140N followed by at least 12 inches or more of crushed aggregate base rock. Further, the geotextile fabric should have a minimum Mullen burst strength of at least 250 pounds per square inch for puncture resistance and an apparent opening size (AOS) between the U.S. Standard No. 70 and No. 100 sieves.

All structural fill materials placed within the new single-family residential home sites should be moistened or dried as necessary to near (within 3 percent) optimum moisture conditions and compacted by mechanical means to a minimum of 92 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Structural fill materials should be placed in lifts (layers) such that when compacted do not exceed about 8 inches. Additionally, all fill materials placed within five (5) lineal feet of the perimeter (limits) of the proposed residential structure should be considered structural fill. Further, all structural fill materials placed on sloping ground which exceeds an existing slope gradient of about 20 percent (5H to 1V) should be properly benched and keyed into the native slope.

All aspects of the site grading should be monitored and approved by a representative of Redmond Geotechnical Services, LLC.

Foundation Support

Based on the results of our investigation, it is our opinion that the subject site is suitable for support of the proposed new two- and/or three-story wood-frame residential structure(s) provided that the following foundation design recommendations are followed. The following sections of this report present specific foundation design and construction recommendations for the planned new residential structure(s).

Shallow Foundations

In general, conventional shallow continuous (strip) footings and individual (spread) column footings may be supported by approved native (untreated) medium stiff to stiff, sandy, clayey silt subgrade soil materials and/or by properly placed and compacted silty sand structural fill soils based on an allowable contact bearing pressure of up to 2,000 pounds per square foot (psf). This recommended allowable contact bearing pressure is intended for dead loads and sustained live loads and may be increased by one-third for the total of all loads including short-term wind or seismic loads. In general, continuous strip footings should have a minimum width of at least 16 inches and be embedded at least 18 inches below the lowest adjacent finish grade (includes frost protection). Individual column footings (where required) should be embedded at least 18 inches below grade and have a minimum width of at least 24 inches. Additionally, foundations should be constructed no closer than about eight (8) feet from the face of existing moderately steep slope.

Total and differential settlements of foundations constructed as recommended above and supported by approved native subgrade soils or by properly compacted structural fill materials are expected to be well within the tolerable limits for this type of lightly loaded wood-frame structure and should generally be less than about 1-inch and 1/2-inch, respectively.

Allowable lateral frictional resistance between the base of the footing element and the supporting subgrade bearing soil can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.35 and 0.45 for native silty subgrade soils and/or import gravel fill materials, respectively. In addition, lateral loads may be resisted by passive earth pressures on footings poured "neat" against in-situ (native) subgrade soils or properly backfilled with structural fill materials based on an equivalent fluid density of 250 pounds per cubic foot (pcf). This recommended value includes a factor of safety of approximately 1.5 which is appropriate due to the amount of movement required to develop full passive resistance.

Floor Slab Support

In order to provide uniform subgrade reaction beneath concrete slab-on-grade floors, we recommend that the floor slab area be underlain by a minimum of 6 inches of free-draining (less than 5 percent passing the No. 200 sieve), well-graded, crushed rock. The crushed rock should help provide a capillary break to prevent migration of moisture through the slab. Additional moisture protection, where needed, can be provided by using a 10-mil polyolefin geo-membrane sheet such as StegoWrap.

The base course materials should be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Where floor slab subgrade materials are undisturbed, firm and stable and where the underslab aggregate base rock section has been prepared and compacted as recommended above, we recommend that a modulus of subgrade reaction of 200 pci be used for design.

Retaining/Below Grade Walls

Retaining and/or below grade walls should be designed to resist lateral earth pressures imposed by native soils or granular backfill materials as well as any adjacent surcharge loads. For walls which are unrestrained at the top and free to rotate about their base, we recommend that active earth pressures be computed on the basis of the following equivalent fluid densities:

Non-Restrained Retaining Wall Pressure Design Recommendations

Slope Backfill (Horizontal/Vertical)	Equivalent Fluid Density/Silt (pcf)	Equivalent Fluid Density/Gravel (pcf)
Level	35	30
3H:1V	60	50
2H:1V	90	80

For walls which are fully restrained at the top and prevented from rotation about their base, we recommend that at-rest earth pressures be computed on the basis of the following equivalent fluid densities:

Restrained Retaining Wall Pressure Design Recommendations

Slope Backfill (Horizontal/Vertical)	Equivalent Fluid Density/Silt (pcf)	Equivalent Fluid Density/Gravel (pcf)
Level	45	35
3H:1V	65	60
2H:1V	95	90

The above recommended values assume that the walls will be adequately drained to prevent the buildup of hydrostatic pressures. Where wall drainage will not be present and/or if adjacent surcharge loading is present, the above recommended values will be significantly higher.

Backfill materials behind walls should be compacted to 90 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Special care should be taken to avoid over-compaction near the walls which could result in higher lateral earth pressures than those indicated herein. In areas within three (3) to five (5) feet behind walls, we recommend the use of hand-operated compaction equipment.

Excavation/Slopes

Temporary excavations of up to about four (4) feet in depth may be constructed with near vertical inclinations. Temporary excavations greater than about four (4) feet but less than eight (8) feet should be excavated with inclinations of at least 1 to 1 (horizontal to vertical) or properly braced/shored. Where excavations are planned to exceed about eight (8) feet, this office should be consulted. All shoring systems and/or temporary excavation bracing for the project should be the responsibility of the excavation and/or grading contractor.

Permanent cut and/or fill slopes should be constructed no steeper than about 2H to 1V.

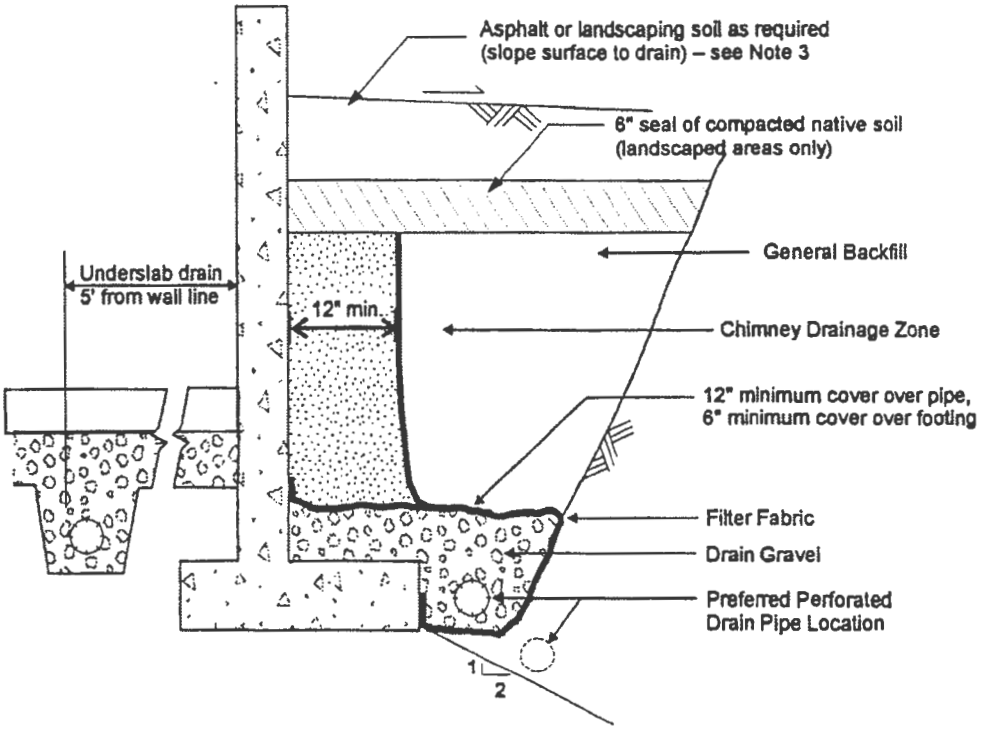
Surface Drainage/Groundwater

We recommend that positive measures be taken to properly finish grade the site so that drainage waters from the building and landscaping areas as well as adjacent properties or buildings are directed away from the new residential structures foundations and/or floor slabs as well as the existing moderately steep slope. All roof drainage should be directed into conduits that carry runoff water away from the residential structure(s) to a suitable outfall. Roof downspouts should not be connected to foundation drains. A minimum ground slope of about 2 percent is generally recommended in unpaved areas around the residential structure(s).

Groundwater was not encountered at the site in any of the exploratory test pits at the time of excavation. Additionally, although groundwater elevations in the area may fluctuate seasonally and may temporarily pond/perch near the ground surface during periods of prolonged rainfall, based on our current understand of the site grading required to bring the subject site to finish design grades, we are of the opinion that an underslab drainage system is not required for the proposed single-family structure(s). However, due to our understanding that the proposed residential structure(s) may be constructed with a below grade retaining wall and basement area, we are generally of the opinion that a perimeter footing/foundation drainage system should be utilized around the perimeter of the proposed residential structure(s). Additionally, a foundation drain is recommended for any other below grade footings and/or retaining walls. A typical recommended perimeter footing and/or retaining wall footing drain detail is shown on Figure No. 3.

Design Infiltration Rates

Based on the results of our field infiltration testing, we recommend using the following infiltration rate to design any on-site near surface storm water infiltration and/or disposal systems for the project:



SCHEMATIC - NOT TO SCALE

NOTES:

1. Filter Fabric to be non-woven geotextile (Amoco 4545, Mirafi 140N, or equivalent)
2. Lay perforated drain pipe on minimum 0.5% gradient, widening excavation as required. Maintain pipe above 2:1 slope, as shown.
3. All-granular backfill is recommended for support of slabs, pavements, etc. (see text for structural fill).
4. Drain gravel to be clean, washed ¾" to 1½" gravel.
5. General backfill to be on-site gravels, or ¾"-0 or 1½"-0 crushed rock compacted to 92% Modified Proctor (AASHTO T-180).
6. Chimney drainage zone to be 12" wide (minimum) zone of clean washed, medium to coarse sand or drain gravel if protected with filter fabric. Alternatively, prefabricated drainage structures (Miradrain 6000 or similar) may be used.

PERIMETER FOOTING/RETAINING WALL DRAIN DETAIL

Project No. 1098.023.G	**TAX LOT NO'S. 1800 AND 1900 21765 WILLAMETTE DRIVE**	Figure No. 3

Subgrade Soil Type	Recommended Infiltration Rate
sandy, clayey SILT (ML)	0.3 inches per hour (in/hr)

Note: A safety factor of two (2) was used to calculate the above recommended design infiltration rate. Additionally, given the gradational variability of the on-site sandy, clayey sit subgrade soils beneath the site as well as the anticipation of some site grading for the project, it is generally recommended that field testing be performed during and/or following construction of any on-site storm water infiltration system(s) in order to confirm that the above recommended design infiltration rates are appropriate.

Seismic Design Considerations

Structures at the site should be designed to resist earthquake loading in accordance with the methodology described in the 2014 and/or latest edition of the State of Oregon Structural Specialty Code (OSSC) and/or Amendments to the 2015 International Building Code (IBC). The maximum considered earthquake ground motion for short period and 1.0 period spectral response may be determined from the Oregon Structural Specialty Code and/or Figures 1613 (1) and 1613 (2) of the 2009 National Earthquake Hazard Reduction Program (NEHRP) "Recommended Provisions for Seismic Regulations for New Buildings and Other Structures" published by the Building Seismic Safety Council. We recommend Site Class "C" be used for design per Table 1613.5.2. Using this information, the structural engineer can select the appropriate site coefficient values (Fa and Fv) from Tables 1613.5.3 (1) and 1613.5.3 (2) of the IBC to determine the maximum considered earthquake spectral response acceleration for the project.

However, we have assumed the following response spectrum for the project:

Table 1. IBC Seismic Design Parameters

Site Class	S_S	S_1	Fa	Fv	S_{MS}	S_{M1}	S_{DS}	S_{D1}
C	0.944	0.407	1.022	1.393	0.965	0.566	0.644	0.378

Notes: 1. S_S and S_1 were established based on the USGS 2015 mapped maximum considered earthquake spectral acceleration maps for 2% probability of exceedence in 50 years.

2. Fa and Fv were established based on 2015 IBC tables 1613.5.3 (1) and 1613.5.3 (2) using the selected S_S and S_1 values.

Erosion Control

During our field exploration program, we observed soil types that would generally be considered highly susceptible to erosion. In our opinion, the primary concern regarding soil erosion potential will likely occur during and/or immediately following construction in areas that have recently been stripped and cleared of surface vegetation. Erosion at the site during construction can be minimized by implementing a project erosion control plan which should include the judicious use of straw bales and silt fences. If used, these erosion control devices should be in place and remain in place throughout all of the site grading and earthwork operations. Erosion and sedimentation of exposed sandy subgrade soils can also be minimized by quickly re-vegetating exposed areas of soil and by staging (if possible) construction such that large areas of the site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture or hydroseeded with an approved seed-mulch-fertilizer mixture.

CONSTRUCTION MONITORING AND TESTING

We recommend that **Redmond Geotechnical Services, LLC** be retained to provide construction monitoring and testing services during all earthwork operations for the proposed new residential development. The purpose of our monitoring services would be to confirm that the site conditions reported herein are as anticipated, provide field recommendations as required based on the actual conditions encountered, document the activities of the grading contractor and assess his/her compliance with the project specifications and recommendations. It is important that our representative meet with the contractor prior to grading to help establish a plan that will minimize costly over-excavation and site preparation work. Of primary importance will be observations made during site preparation, structural fill placement, footing excavations and construction as well as retaining wall backfill and construction of subsurface drains.

CLOSURE AND LIMITATIONS

This report is intended for the exclusive use of the addressee and/or their representative(s) to use to design and construct the proposed new single-family residential structure(s) and its/their associated site improvements described herein as well as to prepare any related construction documents. The conclusions and recommendations contained in this report are based on site conditions as they presently exist and assume that the explorations are representative of the subsurface conditions between the explorations and/or across the study area. The data, analyses, and recommendations herein may not be appropriate for other structures and/or purposes. We recommend that parties contemplating other structures and/or purposes contact our office. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report. Additionally, the above recommendations are contingent on Redmond geotechnical Services, LLC being retained to provide all site inspections and construction monitoring services associated with all aspects of the site grading, earthwork operations, and foundation preparation work for this project.

Redmond Geotechnical Consultants, LLC will not assume any responsibility and/or liability for any engineering judgment, inspection, and/or testing performed by others.

It is the owners/developers responsibility for insuring that the project designers and/or contractors involved with this project implement our recommendations into the final design plans, specifications and/or construction activities for the project. Further, in order to avoid delays during construction, we recommend that the final design plans and specifications for the project be reviewed by our office to evaluate as to whether our recommendations have been properly interpreted and incorporated into the project.

If during any future site grading and construction, subsurface conditions different from those encountered in the explorations are observed or appear to be present beneath excavations, we should be advised immediately so that we may review these conditions and evaluate whether modifications of the design criteria are required. We also should be advised if significant modifications of the proposed site development are anticipated so that we may review our conclusions and recommendations.

LEVEL OF CARE

The services performed by the Geotechnical Engineer for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in the area under similar budget and time restraints. No warranty or other conditions, either expressed or implied, is made.

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APPENDIX A

TEST PIT LOGS & LABORATORY TEST RESULTS

APPENDIX

FIELD EXPLORATIONS AND LABORATORY TESTING

FIELD EXPLORATION

Subsurface conditions at the site were explored by excavating two (2) exploratory test pits on June 29, 2018. The approximate location of the test pit exploration is shown in relation to the existing site improvements on the Site Exploration Plan, Figure No. 2.

The test pits were excavated using tracked excavating equipment in general conformance with ASTM Methods in Vol. 4.08, D-1586-94 and D-1587-83. The test pits were excavated to depths of between 2.0 and 7.0 feet beneath existing site grades. Detailed logs of the test pits are presented on the Log of Test Pits, Figure No. A-4. The soils were classified in accordance with the Unified Soil Classification System (USCS), which is outlined on Figure No. A-3.

The exploration program was coordinated by a field engineer who monitored the excavating and exploration activity, obtained representative samples of the subsurface soils encountered, classified the soils by visual and textural examination, and maintained continuous logs of the subsurface conditions. Disturbed and/or undisturbed samples of the subsurface soils were obtained at appropriate depths and/or intervals and placed in plastic bags and/or with a thin walled ring sample.

Groundwater was not encountered within either exploratory test pits at the time of excavating.

LABORATORY TESTING

Pertinent physical and engineering characteristics of the soils encountered during our subsurface investigation were evaluated by a laboratory testing program to be used as a basis for selection of soil design parameters and for correlation purposes. Selected tests were conducted on representative soil samples. The program consisted of tests to evaluate the existing field moisture content, maximum dry density and optimum moisture content, Atterberg Limits and gradational characteristics as well as direct shear strength properties of the native sandy, clayey silt subgrade soils.

Dry Density and Moisture Content Determinations

Density and moisture content determinations were performed on both disturbed and relatively undisturbed samples from the test pit explorations in general conformance with ASTM Vol. 4.08 Part D-216. The results of these tests were used to calculate existing overburden pressures and to correlate strength and compressibility characteristics of the soils. Test results are shown on the test pit log at the appropriate sample depths.

Maximum Dry Density

One (1) Maximum Dry Density and Optimum Moisture Content test was performed on a representative sample of the on-site near surface sandy, clayey silt subgrade soils in accordance with ASTM Vol. 4.08 Part D-1557-91. The test was conducted to help establish various engineering properties and/or for use as structural fill. The test results are presented on Figure No. A-5.

Atterberg Limits

Liquid Limit (LL) and Plastic Limit (PL) tests were performed on representative samples of the subsurface sandy, clayey silt subgrade soils in accordance with ASTM Vol. 4.08 Part D-4318-95. These tests were conducted to facilitate classification of the soils and for correlation purposes. The test results appear graphically on Figure No. A-6.

Gradation Analysis

Gradation analyses were performed on representative samples of the native sandy, clayey silt subgrade soils in accordance with ASTM Vol. 4.08 Part D-422. The test results were used to classify the soil in accordance with the Unified Soil Classification System (USCS). The test results are shown graphically on Figure No. A-7.

Direct Shear Strength Test

One (1) Direct Shear Strength test was performed on a relatively undisturbed and/or remolded sample at a continuous rate of shearing deflection (0.02 inches per minute) in accordance with ASTM Vol. 4.08 Part D-3080-79. The test results were used to determine engineering strength properties and are shown graphically on Figure No. A-8.

The following figures are attached and complete the Appendix:

Figure No. A-3	Key To Exploratory Boring Logs
Figure No. A-4	Log of Test Pits
Figure No. A-5	Maximum Dry Density Test Results
Figure No. A-6	Atterberg Limits Test Results
Figure No. A-7	Gradation Test Results
Figure No. A-8	Direct Shear Strength Test Results

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS — MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS — MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS — LIQUID LIMIT IS LESS THAN 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS — LIQUID LIMIT IS GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

DEFINITION OF TERMS

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4"	3"	12"	
SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

GRAIN SIZES

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/FOOT†
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

CLAYS AND PLASTIC SILTS	STRENGTH‡	BLOWS/FOOT†
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

CONSISTENCY

†Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon (ASTM D-1586).

‡Unconfined compressive strength in tons/sq. ft. as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation.

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KEY TO EXPLORATORY TEST PIT LOGS
Unified Soil Classification System (ASTM D-2487)

21765 WILLAMETTE DRIVE
West Linn, Oregon

PROJECT NO.	DATE	
1098.023.G	8/03/18	Figure A-3

BACKHOE COMPANY: Jim Smith Excavating BUCKET SIZE: 24 inches DATE: 6/29/18

DEPTH (FEET)	BAG SAMPLE	DENSITY TEST	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
						TEST PIT NO. TH-#1 ELEVATION 188'±
0					ML	Dark brown, moist, soft, organic, clayey, sandy SILT (Topsoil)
					RK	Gray-brown to gray, dense to very dense, slightly to moderately weathered and fractured BASALT bedrock
5						Total Depth = 2.0 feet (Refusal) No groundwater encountered at time of exploration
10						
15						
						TEST PIT NO. TH-#2 ELEVATION 186'±
0	X				ML	FILL: Medium brown, moist to very moist, poorly to moderately compacted, clayey, sandy SILT with trace of organics
	X			22.2	ML	NATIVE GROUND: Medium to dark brown, very moist, soft to medium stiff, sandy, clayey SILT with traces of organics and rock fragments
5					RK	Gray-brown, moist, medium dense to dense, highly to moderately weathered and fractured BASALT bedrock
10						Total Depth = 7.0 feet No groundwater encountered at time of exploration
15						

LOG OF TEST PITS

PROJECT NO. 1098.023.G | 21765 WILLAMETTE DRIVE | FIGURE NO. A-4

MAXIMUM DENSITY TEST RESULTS

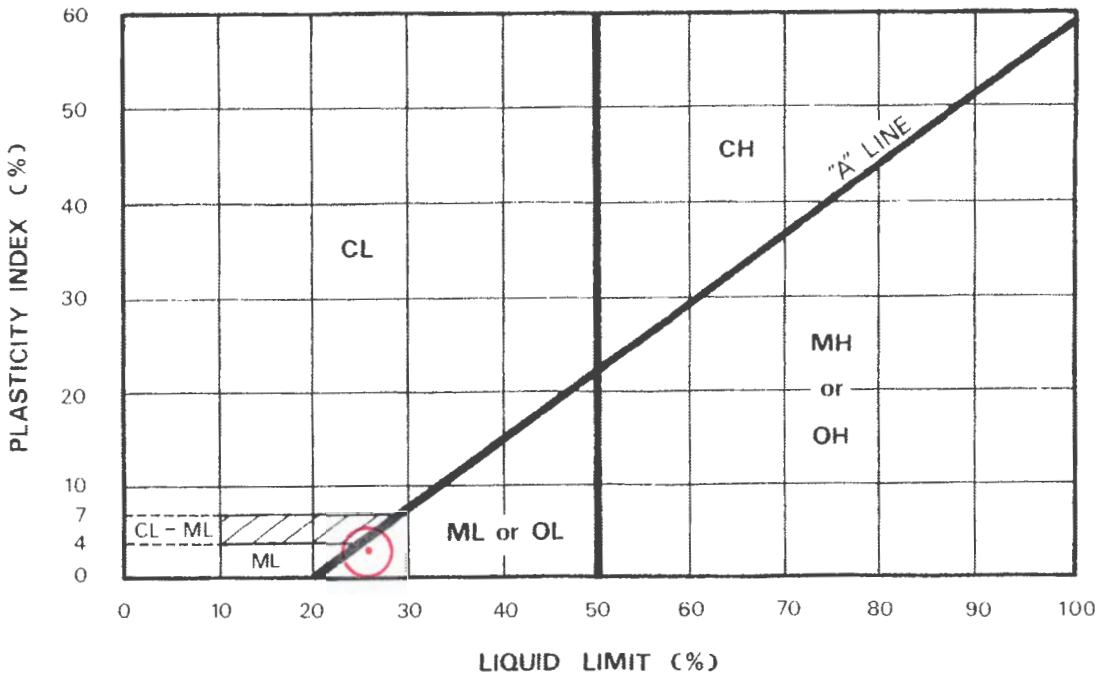
SAMPLE LOCATION	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)
TH-#2 @ 3.0'	Medium to dark brown, sandy, clayey SILT (ML)	110.0	16.0

EXPANSION INDEX TEST RESULTS

SAMPLE LOCATION	INITIAL MOISTURE (%)	COMPACTED DRY DENSITY (pcf)	FINAL MOISTURE (%)	VOLUMETRIC SWELL (%)	EXPANSION INDEX	EXPANSIVE CLASS.

MAXIMUM DENSITY & EXPANSION INDEX TEST RESULTS

PROJECT NO.: 1098.023.G | 21765 WILLAMETTE DRIVE | FIGURE NO.: A-5



KEY SYMBOL	BORING NO.	SAMPLE DEPTH (feet)	NATURAL WATER CONTENT %	LIQUID LIMIT %	PLASTICITY INDEX %	PASSING NO. 200 SIEVE %	LIQUIDITY INDEX	UNIFIED SOIL CLASSIFICATION SYMBOL
⊙	TH-#2	3.0	22.2	25.6	3.7	81.1		ML

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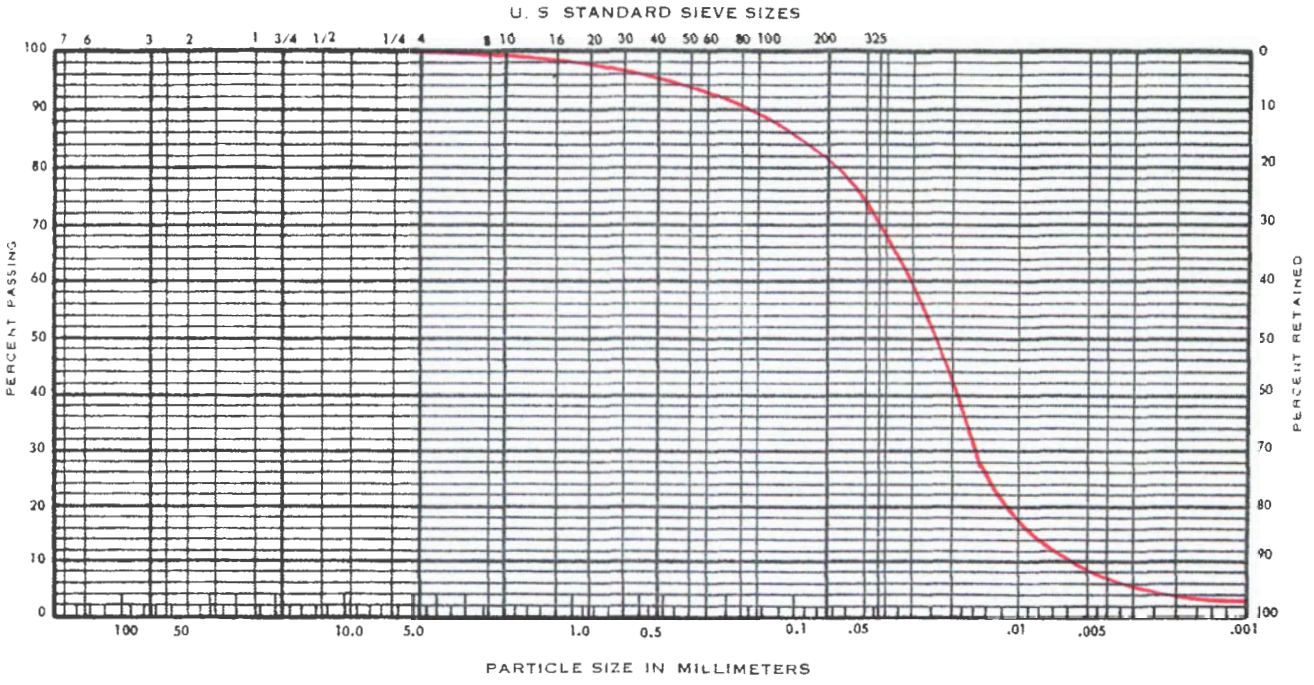
PLASTICITY CHART AND DATA

21765 WILLAMETTE DRIVE
West Linn, Oregon

PROJECT NO.	DATE	
1098.023.G	8/03/18	Figure A-6

UNIFIED SOIL CLASSIFICATION SYSTEM

(ASTM D 422-72)



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

KEY SYMBOL	BORING NO.	SAMPLE DEPTH (feet)	ELEV. (feet)	UNIFIED SOIL CLASSIFICATION SYMBOL	SAMPLE DESCRIPTION
—	TH-#2	3.0		ML	Medium to dark brown, sandy clayey SILT

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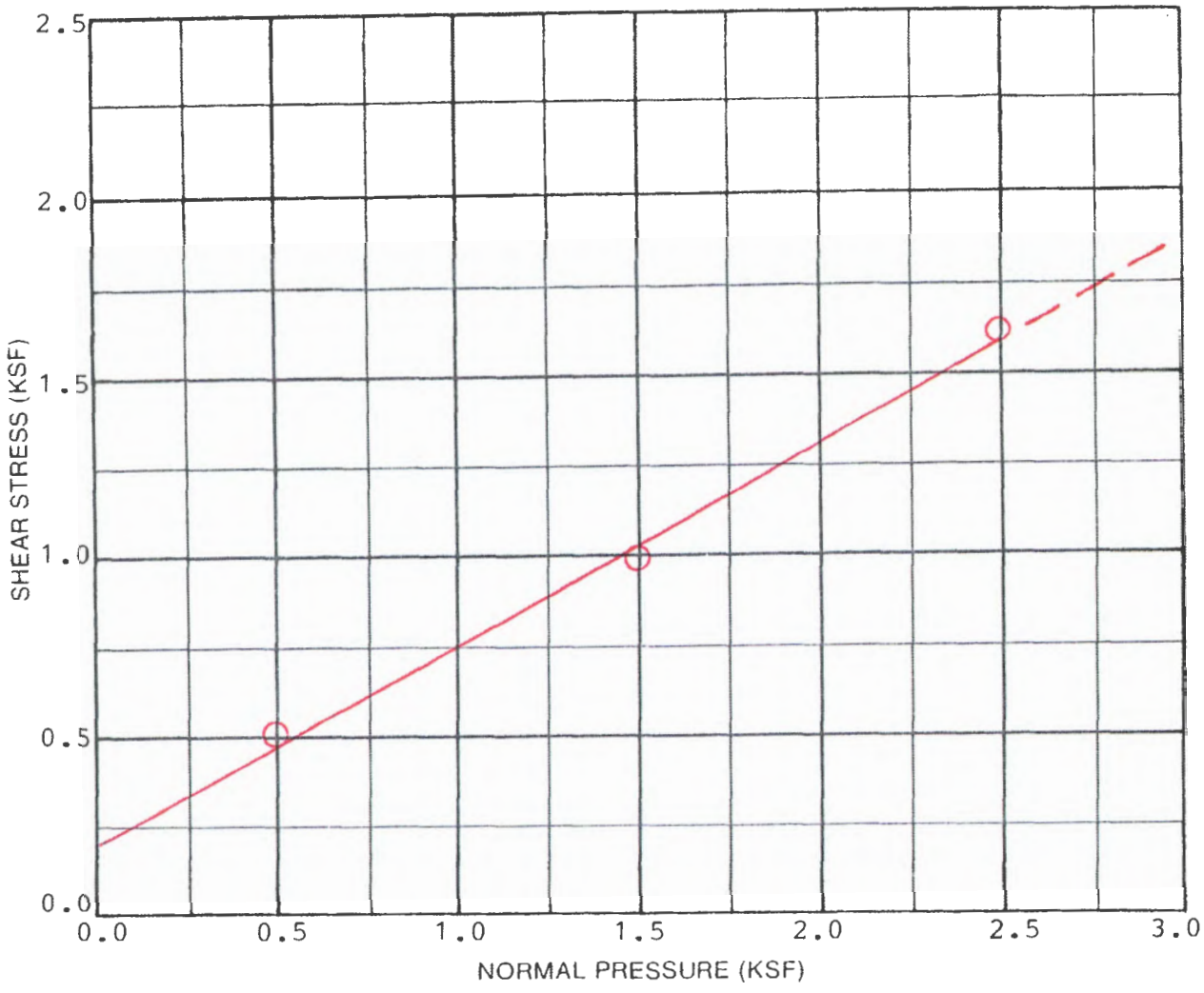
GRADATION TEST DATA

21765 WILLAMETTE DRIVE
West Linn, Oregon

PROJECT NO.	DATE	FIGURE
1098.023.G	8/03/18	A-7



SAMPLE DATA	
DESCRIPTION:	Medium to dark brown, sandy, clayey SILT (ML) (Remolded)
BORING NO.:	TH-#2
DEPTH (ft.): 3.0	ELEVATION (ft):
TEST RESULTS	
APPARENT COHESION (C):	200 psf
APPARENT ANGLE OF INTERNAL FRICTION (Φ):	28°

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	0.5	1.5	2.5	
SHEAR STRENGTH (KSF)	0.5	1.0	1.6	
INITIAL H_2O CONTENT (%)	16.0	16.0	16.0	
FINAL H_2O CONTENT (%)	16.4	12.1	7.8	
INITIAL DRY DENSITY (PCF)	98.0	98.0	98.0	
FINAL DRY DENSITY (PCF)	98.7	101.6	106.3	
STRAIN RATE:	0.02 inches per minute			

REDMOND GEOTECHNICAL SERVICES
PO Box 20547 • Portland, Oregon 97294

DIRECT SHEAR TEST DATA

21765 WILLAMETTE DRIVE
West Linn, Oregon

PROJECT NO.	DATE	
1098.023.G	8/03/18	Figure A-8

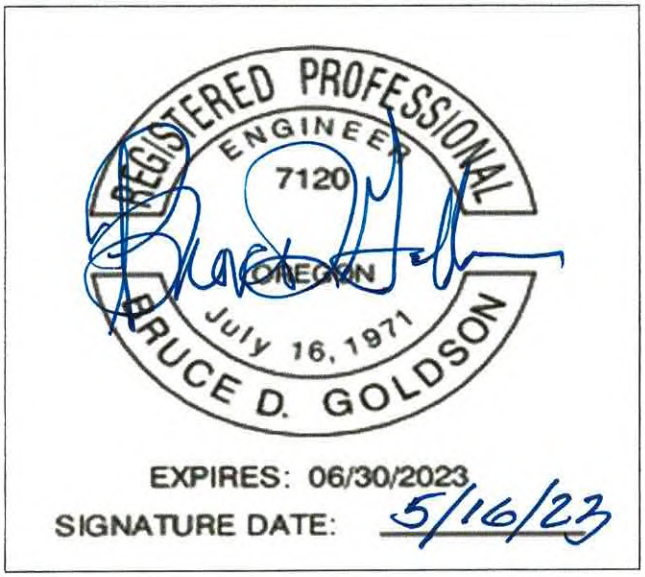
5_Stormwater Report

Broadway Townhomes
21765 Willamette Drive

West Linn, Oregon

DRAINAGE ANALYSIS

May 2023



Prepared By:

Bruce D. Goldson, PE

Theta, llc

PO Box 1345, Lake Oswego, Oregon 97035

2018-276

INDEX

PURPOSE:

This is a proposed 7-lot townhome development on a very steep parcel sloping south to north, with street improvements on Broadway and the storm system for the new impervious storm flow directed towards Highway 43. Since the infiltration was found to be only 0.6 inches per hour total infiltration is not practical. Individual flow through planters are proposed for each unit

NARRATIVE ASSUMPTIONS

Regulatory

2.0013 Minimum Design Criteria

A. Storm Detention Facilities

2. Storms to be evaluated shell include to 2, 5, 10, 25, and 100-year event. Allowable post-development discharge rates for the 2, 5, 10, and 25-year events hall be that of the pre-development rate. An outfall structure such as a "V-North" weir of single of multiple orifice structure shall be designed to control the release rate for the above events. No flow control orifice smaller than 1 in. shall be allowed. If the maximum release cannot be met with all the site drainage controlled by a single 1 in. orifice, the allowable release rate provided by the 1 in. orifice will be considered adequate as approved by the City Engineer.

References Regulatory

1. King County Department of Public Works, Surface Water Management Division, Hydrographic Programs, Version 4.21B
2. City of Portland Sewer & Drainage Facilities Design Manual, Chart 1
3. City of West Linn Public Works Design Standards (2010) Section two-storm Facilities Design Manual

Summary

Event	Pre flow	Post flow	With Orifices
2-year	0.01 cfs	0.0.02 cfs	0.01 cfs

5-year	**0.02 cfs**	**0.03 cfs**	**0.02 cfs**
10-year	**0.02 cfs**	**0.03 cfs**	**0.02 cfs**
25-year	**0.02 cfs**	**0.03 cfs**	**0.02 cfs**

Time of concentration

Assumed 5 minutes.

Areas:

Each unit has 1422 SF of impervious area

HYDROGRAPH RESULTS (DETENTION, WATER QUALITY, INFILTRATION)

KING COUNTY DEPARTMENT OF PUBLIC WORKS
Surface Water Management Division
HYDROGRAPH PROGRAMS
Version 4.21B
1 - INFO ON THIS PROGRAM
2 - SBUHYD
3 - MODIFIED SBUHYD
4 - ROUTE
5 - ROUTE2
6 - ADDHYD
7 - BASEFLOW
8 - PLOTHYD
9 - DTATA
10 - REFAC
11 - RETURN TO DOS

ENTER OPTION:
2
SBUH/SCS METHOD FOR COMPUTING RUNOFF HYDROGRAPH
STORM OPTIONS:
1 - S.C.S. TYPE-1A
2 - 7-DAY DESIGN STORM
3 - STORM DATA FILE
SPECIFY STORM OPTION:
1
S.C.S. TYPE - 1A RAINFALL DISTRIBUTION
ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)
25,24,3.9
Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
XXXXXXXXXXXX 25-YEAR 24-HOUR STORM xxxx 3.90 "TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.033,86,0.0,98,5.0
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.02	7.67		294		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:25bex
SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S - STOP

C
ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.0,86,0.033,98,13.7
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.03	7.67		439		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:25bpx

SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S – STOP
N

---

1 - S.C.S. TYPE-1A
2 - 7-DAY DESIGN STORM
3 - STORM DATA FILE
SPECIFY STORM OPTION:
1
S.C.S. TYPE - 1A RAINFALL DISTRIBUTION
ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)
2,24,2.5
Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
XXXXXXXXXXX 2-YEAR 24-HOUR STORM xxxx 2.50 "TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.033,86,0.0,98,5
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.01	7.67		148		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:2bex
SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S - STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.0,86,0.033,98,5
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.02	7.67		272		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:2bpx
SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S – STOP
N

---

1 - S.C.S. TYPE-1A
2 - 7-DAY DESIGN STORM
3 - STORM DATA FILE
SPECIFY STORM OPTION:
1
S.C.S. TYPE - 1A RAINFALL DISTRIBUTION
ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)
5,24,3.1
Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
XXXXXXXXXXXX 5-YEAR 24-HOUR STORM xxxx 3.10 "TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.033,86,0.0,98,5
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.02	7.67		209		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:5bex
SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S - STOP

C
ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.0,86,0.033,98,5
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.03	7.67		343		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:wr5

SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S – STOP
N

---

1 - S.C.S. TYPE-1A
2 - 7-DAY DESIGN STORM
3 - STORM DATA FILE
SPECIFY STORM OPTION:
1
S.C.S. TYPE - 1A RAINFALL DISTRIBUTION
ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)
10,24,3.40
Xxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
XXXXXXXXXXXX 10-YEAR 24-HOUR STORM xxxx 3.40 "TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.033,86,0.0,98,5
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.02	7.67		240		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:10bex
SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S - STOP

C
ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1
0.0,86,0.033,98,5
DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
.0	.0	86.0	.0	98.0	5.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
.03	7.67		379		

ENTER [dk:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:
C:10bpx

DETENTION

Version 4.21B
1 - INFO ON THIS PROGRAM
2 - SBUHYD
8 - PLOTHYD
9 - DTATA
10 - REFAC
11 - RETURN TO DOS

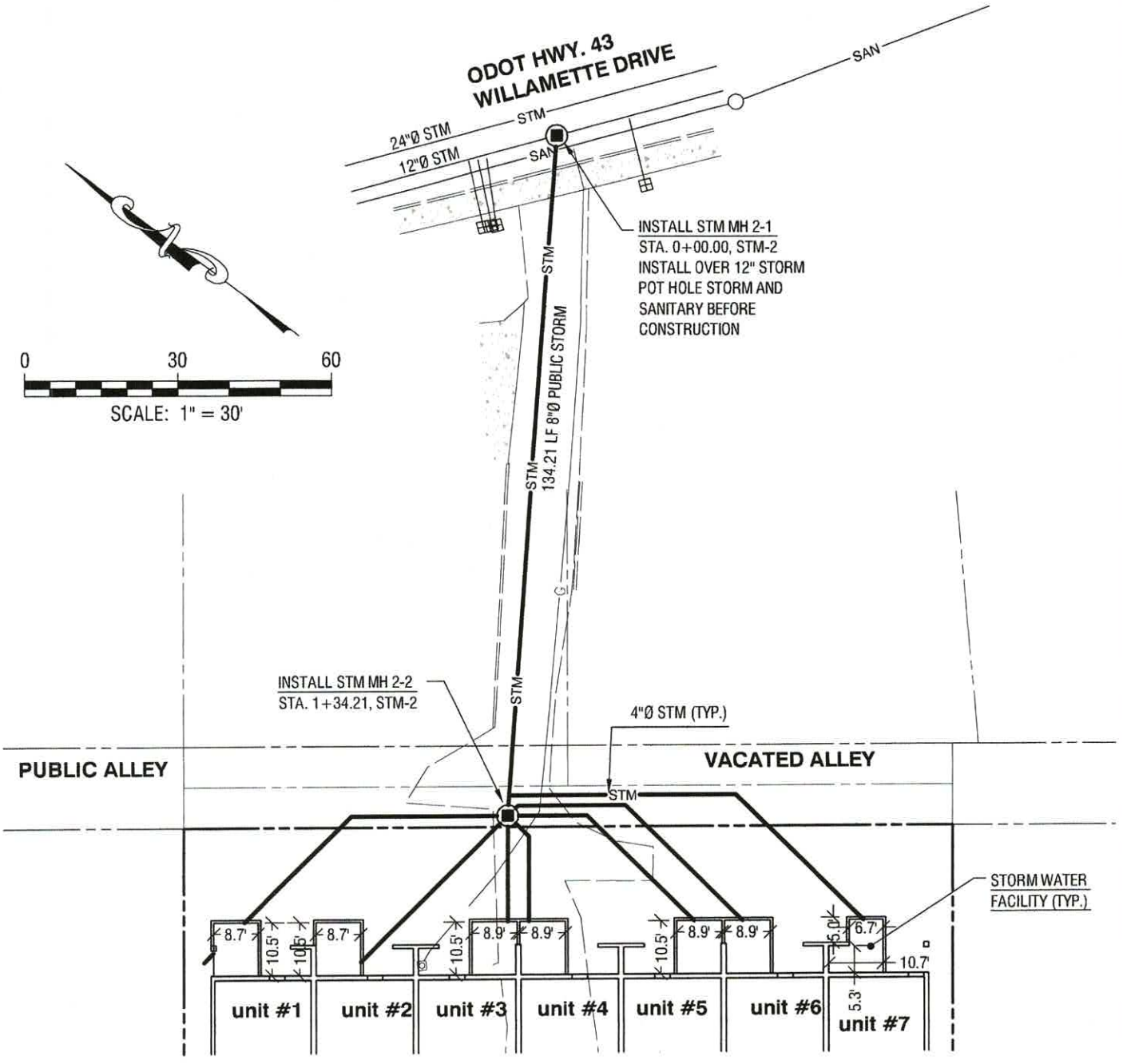
10
R/D FACILITY DESIGN ROUTINE
SPECIFY TYPE OF R/D FACULTY
1 - POND 4 - INFILTRATION POND
2 - TANK 5 - INFILTRATION TANK
3 -VAULT 6 - GRAVEL TRENCH/BED
3
ENTER: EFFECTIVE STORAGE DEPTH (ft) BRFORE OVERFLOW
3.5
ENTER [d:][path]filename[.ext] OF PRIMARY DESIGN INFLOW HYDROGRAPH:
C:25BPX
PRELIMINARY DESIGN INFLOW PEAK = 0.03 CFS
ENTER PRIMARY DESIGN RELEASE RATE(cfs)
0.02
ENTER NUMBER OF INFLOW HYDROGRAPHS TO BE TESTED FOR PERFORMANCE (5 MAXIMUM)
3
ENTER [d:][path] filename[.ext] OF HYDROGRAPH 1:
C:10BPX
ENTER TARGET RELEASE RATE (cfs)
0.02
ENTER [d:][path] filename[.ext] OF HYDROGRAPH 2:
C:5BPX
ENTER TARGET RELEASE RATE (cfs)
0.02
ENTER [d:][path] filename[.ext] OF HYDROGRAPH 3:
C:2BPX
ENTER TARGET RELEASE RATE (cfs)
0.01

ENTER; NUMBER OF ORIFICES, RISER-HEAD (ft), RISER-DIAMETER(in)
1,3.5,6
RISER OVERFLOW DEPTH FOR PRIMARY PEAK INFLOW = .03 FT
SPECIFY ITERATION DISPLAY: Y - YES, N – NO
N
SPECIFY: R - REVIEW/REVISE INPUT, C – CONTINUE
C
INITIAL STORAGE VALUE FOR ITERATION PURPOSES: 165 CU-FT
SINGLE ORIFICE RESTRICTOR : DIA = ..63
\

PERFORMANCE:	INFLOW	TARGET-OUTFLOW	ACTUAL-OUTFLOW	PK-STAGE	STORAGE
DESIGN HYD:	.03	.02	.02	3.50	27
TEST HYD: 1	.03	.02	.02	3.50	20
TEST HYD: 2	.03	.02	.02	2.72	20
TEST HYD: 3	.02	.01	.01	1.78	10

CONCLUSION

All the units are the same size. Placing a restrictor orifice to control the outward flow releases the storm water at the predeveloped rate for the 25,10,5 and 2 events. Even though the City recommends the minimum orifice size at 1" a 0.63 diameter (5/8") orifice is recommended and ½" is the minimum size accepted in many other jurisdictions. Water quality is sized per the City of Portland simplified approach.



2018-276

STORM DRAINAGE REPORT

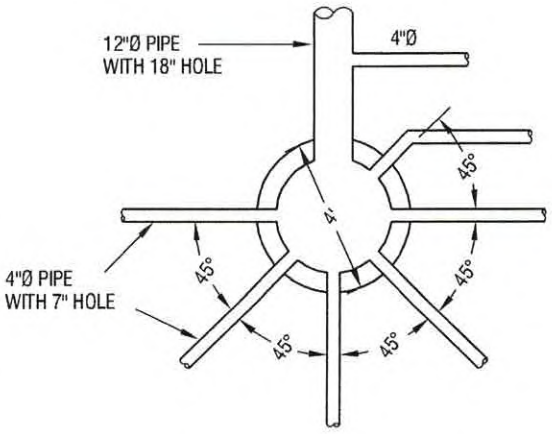
Theta, llc

ENGINEERING - SURVEYING - PLANNING

PO Box 1345
Lake Oswego, Oregon 97035

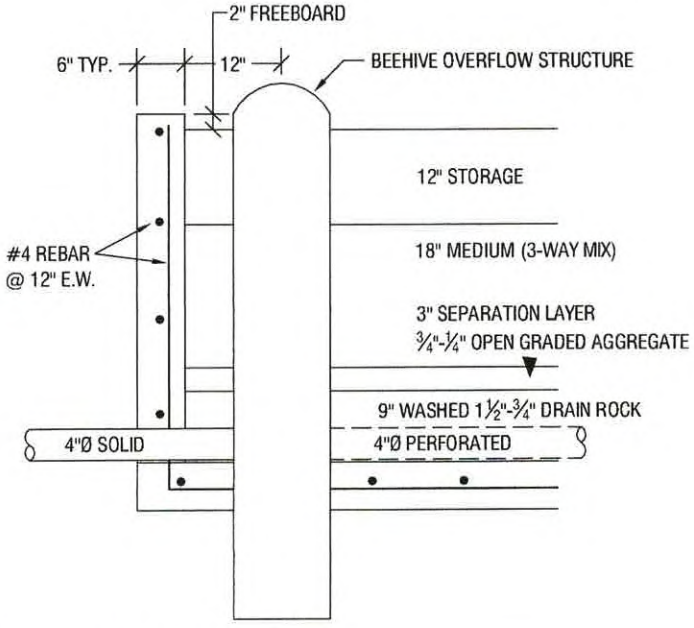
503-481-8822
email: thetaeng@comcast.net

5769 5759 5749 Broadway Street
Map 2S, 2E, 30CB
West Linn, Oregon



STM MH 2-2
MANHOLE DETAIL

SCALE: 1" = 5'



PLANTER SECTION

SCALE: 1" = 2'

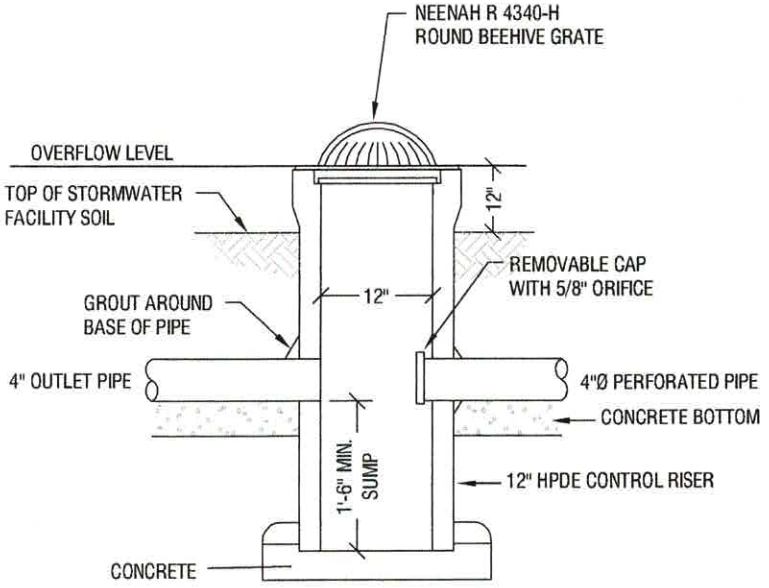
Theta, llc

ENGINEERING - SURVEYING - PLANNING

PO Box 1345
Lake Oswego, Oregon 97035

503-481-8822
email: thetaeng@comcast.net

5769 5759 5749 Broadway Street
Map 2S, 2E, 30CB
West Linn, Oregon



BEEHIVE OVERFLOW STRUCTURE

SCALE: NTS

PLANTER

SPECIES	SPACING & SIZE
JUNCUS TENUIS (SLENDER RUSH)	12", 10" DEEP CONTAINER
CAREX DENSAI (DENSE SEDGE)	12", 10" DEEP CONTAINER
DESCHAMPSIA CESPITOSA (TUFFED HAIRGRASS)	12", 10" DEEP CONTAINER
SCRIPTUS AMERICANUS (AMERICAN BULLRUSH)	12", 10" DEEP CONTAINER
POLYPODIUM MUITUM (SWORD FERN)	24", 1 GAL.

Theta, llc

ENGINEERING - SURVEYING - PLANNING

PO Box 1345
Lake Oswego, Oregon 97035

503-481-8822
email: thetaeng@comcast.net

5769 5759 5749 Broadway Street
Map 2S, 2E, 30CB
West Linn, Oregon

REDMOND GEOTECHNICAL SERVICES

Geotechnical Investigation

and

Geologic Landslide Hazards Study Services

Proposed Single-Family Residential Home Development Project

Tax Lot No's. 1800 and 1900

21765 Willamette Drive

Lake Oswego (Clackamas County), Oregon

for

DreamBuilder Custom Homes

Project No. 1098.023.G
August 3, 2018

LEGEND

TH-#2 Indicates approximate location of exploratory test hole

FITH-#1 Indicates approximate location of field infiltration test

N

GRAPHIC SCALE

SITE EXPLORATION PLAN

TAX LOT NO'S. 1800 AND 1900
21765 WILLAMETTE DRIVE

Project No. 1098.023.G

Figure No. 2

INFILTRATION TESTING

We performed one (1) field infiltration test at the site on June 29, 2018. The infiltration test was performed in field infiltration test hole FITH-#1 at a depth of between three (3) and four (4) feet beneath the existing site and/or surface grades. The subgrade soils encountered in the infiltration test hole consisted of sandy, clayey silt. The infiltration testing was performed in general conformance with current EPA and/or Clackamas County Encased Falling Head test method which consisted of advancing a 6-inch diameter PVC pipe approximately 6 inches into the exposed soil horizon at each test location. Using a steady water flow, water was discharged into the pipe and allowed to penetrate and saturate the subgrade soils. The water level was adjusted over a two (2) hour period and allowed to achieve a saturated subgrade soil condition consistent with the bottom elevation of the surrounding test pit excavation. Following the required saturating period, water was again added into the PVC pipe and the time and/or rate at which the water level dropped was monitored and recorded. Each measurable drop in the water level was recorded until a consistent infiltration rate was observed and/or repeated.

Based on the results of the field infiltration testing at the site, we have found that the native sandy, clayey silt subgrade soil deposits posses an ultimate infiltration rate on the order of about 0.6 inches per hour (in/hr).

LABORATORY TESTING

Representative samples of the on-site subsurface soils were collected at selected depths and intervals from the test pit excavations and returned to our laboratory for further examination and testing and/or to aid in the classification of the subsurface soils as well as to help evaluate and identify their engineering strength and compressibility characteristics. The laboratory testing consisted of visual and textural sample inspection, moisture content determinations, maximum dry density and optimum moisture content, Atterberg Limits and gradation analyses as well as direct shear strength tests. Results of the various laboratory tests are presented in the Appendix, Figure No's. A-5 through A-8.

SEISMICITY AND EARTHQUAKE SOURCES

The seismicity of the southwest Washington and northwest Oregon area, and hence the potential for ground shaking, is controlled by three (3) separate fault mechanisms. These include the Cascadia Subduction Zone (CSZ), the mid-depth intraplate zone, and the relatively shallow crustal zone. Descriptions of these potential earthquake sources are presented below.

The CSZ is located offshore and extends from northern California to British Columbia. Within this zone, the oceanic Juan de Fuca Plate is being subducted beneath the continental North American Plate to the east. The interface between these two (2) plates is located at a depth of approximately 15 to 20 kilometers (km). The seismicity of the CSZ is subject to several uncertainties, including the maximum earthquake magnitude and the recurrence intervals associated with various magnitude earthquakes.

CITY OF PORTLAND
Stormwater Management Manual

SIMPLIFIED APPROACH FORM

PROJECT INFORMATION WORKSHEET

Project/Permit Number: _____

Land Use Case Number: _____

Contact Name: _____

Phone: _____

Email: _____

Site Address/R Number(s) for all parcels:
21765 Willamette Drive
West Linn

Project Description: 7-Town Homes.

Existing impervious area: 0 ft²

Total NEW impervious area: 1422 Est

SITE CHARACTERISTICS

S.1 Do slopes exceed 20% anywhere within the project area? ☐ Yes ☐ No

S.2 Are there springs, seeps, or a high groundwater table within the project area? ☐ Yes ☐ No

S.3 Geotech Report? ☐ Yes ☐ No

S.4 Infiltration Test? ☐ Yes ☐ No

See back of form for required certifications.

SIMPLE PIT INFILTRATION TEST PROCEDURE

The person performing this test does not need a professional credential.

Test instructions:

1. Conduct the test in and/or near the location of the proposed infiltration facility.
2. Excavate a 2' by 2' pit to a depth of: 2' below grade for facilities less than 2' deep or 3' below grade for facilities greater than 2' deep. Check for standing water or hardpan soil preventing excavation. If either is present, document conditions on this form and **do not** proceed with the test.
3. Fill the pit with at least 12 inches of water and record the initial water depth and the time when the test starts. Check the water depth at regular intervals until all of the water has been absorbed or for 1 hour, whichever occurs first. Record the time and final water depth at the end of the test.
4. Repeat the process two more times for a total of three rounds. Conduct the tests in succession to accurately characterize the soil's infiltration rates at different levels of saturation. The third test provides the best measure of the infiltration rate when saturated.
5. Record infiltration test data in the table below and certify the results. Uncertified test results will not be accepted.

Required Infiltration Testing

Date of Test: Aug 2018

Depth of Excavation (ft): 3-4 FT.

Depth of Proposed Facility: _____

	TEST 1	TEST 2	TEST 3
A. Time *(of day)*			
B. Duration *(minutes; 1 hour maximum)*			
C. Initial Water Depth *(inches)*			
D. Final Water Depth *(inches)*			
E. Infiltration Rate* *(inches/hour)*			.06

*Infiltration Rate = Initial Depth *(in)* – Final Depth *(in)* / Duration of Test *(hours)*. *hours = minutes/60*

Test Pit Location (site plan sketch)

Key information to include: 1) Site or parcel; 2) Adjacent road(s) or cross street(s); 3) Test pit location with dimensions

north

SIMPLIFIED APPROACH FORM
PROPOSED STORMWATER FACILITIES

Proposed Stormwater Facilities

Please note: Each individual tax lot is required to manage the stormwater runoff it generates on the same lot to the maximum extent feasible (for new construction or redevelopment). The following table includes accepted Simplified Approach facilities **as described in Chapters 2 & 3 of the *2020 Stormwater Management Manual***. Copies of the manual are available online at www.portlandoregon.gov/bes/SWMM.

STORMWATER FACILITY TYPE	AREA DRAINING TO FACILITY (SF)	FACILITY SIZING FORMULA	FACILITY SIZE (surface area of facility)
Ecoroof		Area x 1 (1:1 ratio)	
Pervious Pavement		Area x 1 (1:1 ratio)	
Rain garden		Area x 0.10	
Basin		Area x 0.09	
Planter	1422	Area x 0.06	85
Filter Strip		See sizing table in SWMM Section 3.3.2.1	
Driveway Center Strip		Min. width is 3 ft; max. length is 50 ft if slope is 10-15% (max. slope is 15%).	
Drywell		See Maximum Catchment Area Managed by a Single Drywell Table below	(Drywell diameter, depth number)
Soakage Trench		25 ft² of soakage trench for every 500 ft² of impervious area. (Depth = 1.5 ft; width & length vary)	
Surface Sand Filter		Area x 0.06	
TOTAL IMPERVIOUS AREA (Managed, new, and redeveloped)		Total impervious area must equal the total **NEW AND REDEVELOPED** impervious area being proposed.	

Maximum Catchment Area Managed by a Single Drywell (ft²)

MATERIAL Ring Diameter	PLASTIC 24 inches	CONCRETE 28 inches	CONCRETE 48 inches
2 ft deep	500 ft²	NA	NA
5 ft deep	NA	1,000 ft²	2,500 ft²
10 ft deep	NA	2,500 ft²	4,500 ft²
15 ft deep	NA	3,500 ft²	5,000 ft²

No more than 2 plastic drywells allowed per catchment area.

Required Certifications

SIMPLE PIT TEST

Redmond Geotechnical
Name of Tester

Signature of Tester

Date

PERSON RESPONSIBLE FOR APPLICATION ACCURACY

Bruce Goldson
Contact Name–Printed

Bruce Goldson
Signature

May 12, 2023
Date

6_SITE PLAN-R2

SITE RELATED NOTES:

STORMWATER DESIGN LOCATED WEST OF RESIDENCE. SEE CIVIL ENGINEERING SHEETS.

DRIVEWAY TO BE 6" CONCRETE SLAB (3500 P.S.I.) ON 4" MIN. OF 2-3 INCH ROCK ON COMPACTED FILL

LOT COVERAGE
DOES NOT APPLY TO TOWNHOUSES

FLOOR AREA RATIO (FAR)
DOES NOT APPLY TO TOWNHOUSES

IMPERVIOUS

DRIVE / WALK	1,698 SQ. FT.
ROOF	9,083 SQ. FT.
TOTAL AREA	10,871 SQ. FT.
LOT AREA	16,203 SQ. FT.
PERCENTAGE	66.5 %

UNDERGROUND WATER
UNDERGROUND GAS LINE
SANITARY SEWER LINE
STORM LINE

EXISTING GRADES
PROPOSED GRADES

DRIVEWAY SLOPE
FRONT YARDS WILL BE BACKFILLED FROM SIDEWALK TO FRONT BUILDING WALLS UNITS STEP TWO FEET WITH STREET GRADE. SEE ELEVATION IN BUILDING FOOTPRINT. DRIVEWAY SHOULD SLOPE APPROXIMATELY 6" DOWN FROM SIDEWALK TO GARAGE. SEE EACH DRIVEWAY FOR SLOPE CALCULATION

SITE PLAN / GRADING

SCALE 1" = 20'-0"

JOB No: 22086
DATE: 5-1-2023
SITE

SITE INFORMATION:
CONSTRUCTION LOCATION:
TAX LOTS 1800-1900 / TAX MAP 2S, 2E, 30CB
LOCATED IN THE S.W. 1/4 SEC. 30, T.2S, R.2E, W.M.
5760 BROADWAY STREET CITY OF WEST LINN
CLACKAMAS COUNTY

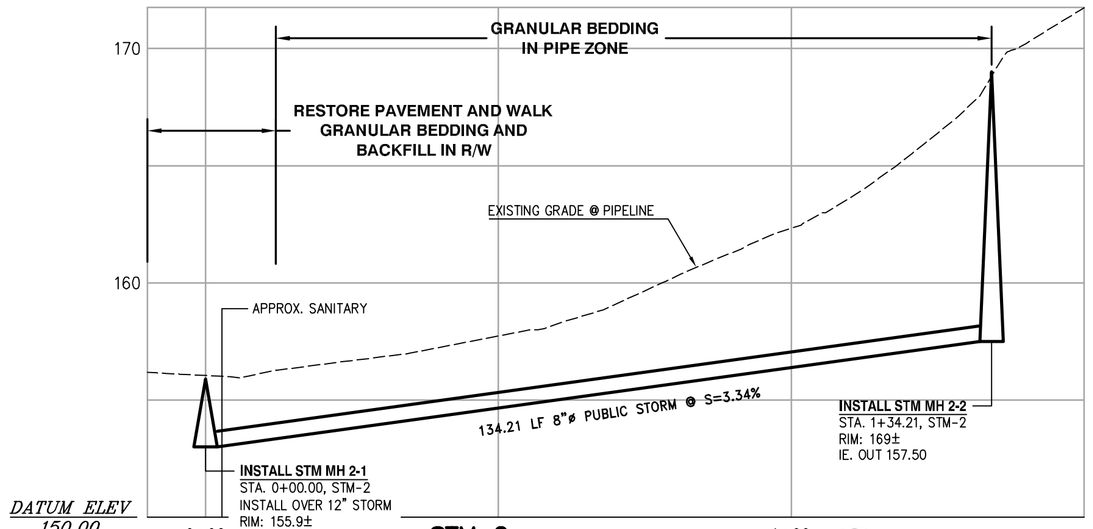
REVISED 9-26-2023
REVISED 10-4-2024

PROJECT: NEW CONSTRUCTION - TOWNHOUSE

BUILDER:
DreamBuilder Custom Homes, Inc.
TIM WALKER 503.880.7132
tim@dreambuildercustomhome.com

WATTON DESIGN WORKS, Inc.
1880 Willamette Falls Drive Suite 200A
West Linn, Or. 97068

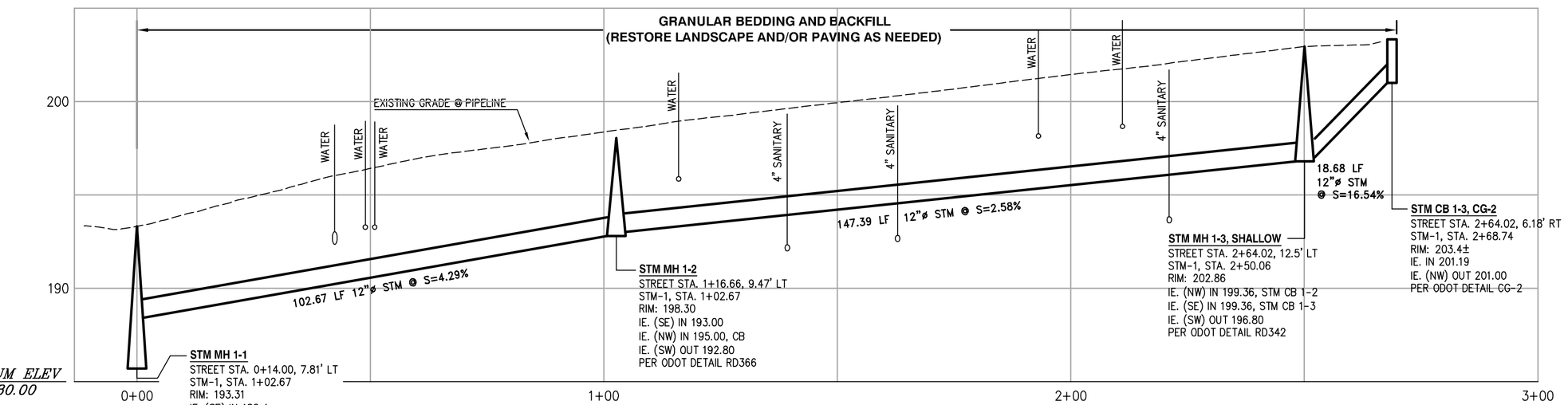
7_Broadway Street Civil3 Utility (1) (19) (3)



STM 2
STORM DRAINAGE PROFILE

SCALE: 1" = 20' HORIZONTAL
1" = 5' VERTICAL

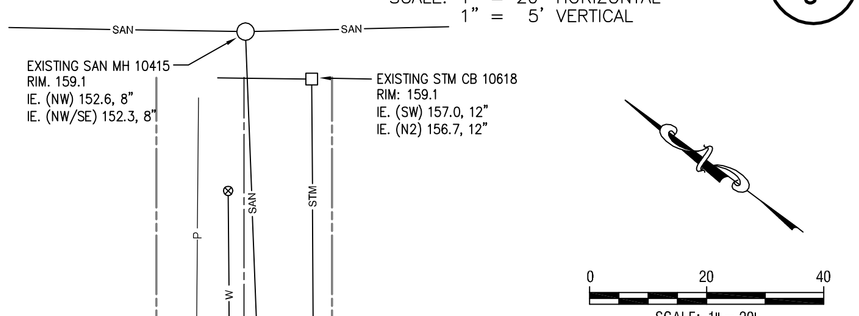
3/5

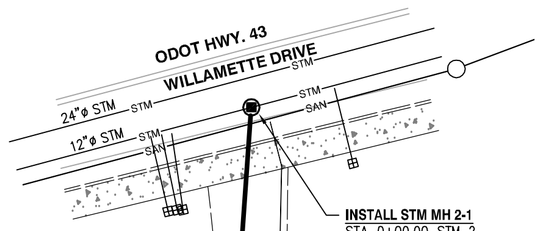


STM 1
STORM DRAINAGE PROFILE

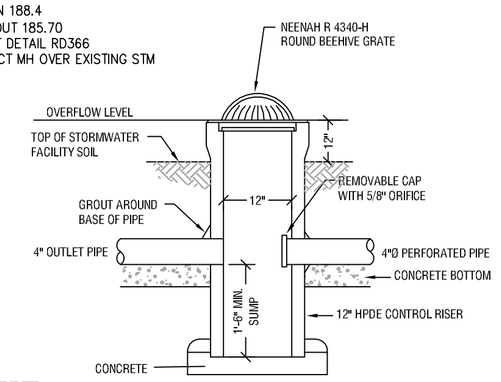
SCALE: 1" = 20' HORIZONTAL
1" = 5' VERTICAL

1/5





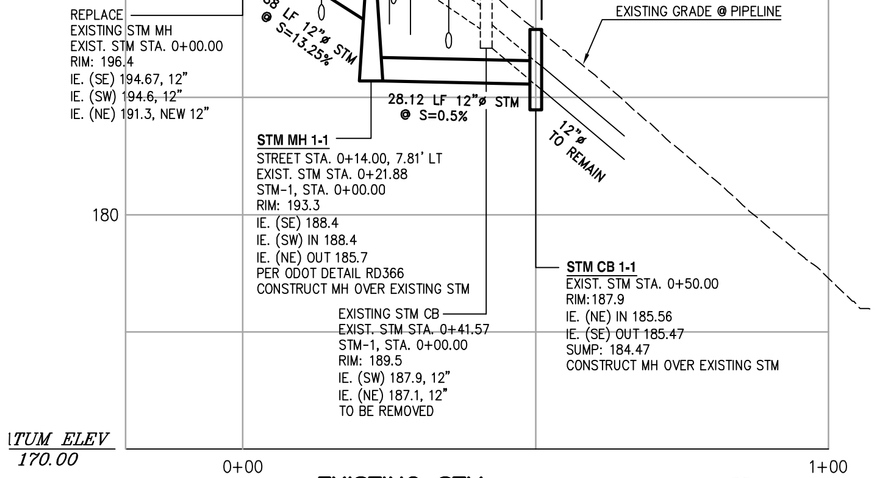
NOTE:
THE BUILDINGS AND STORM SYSTEM ARE ONLY PART OF THE BUILDING PERMIT PROCESS AND NOT INCLUDED IN THE PUBLIC IMPROVEMENTS ON BROADWAY.



BEEHIVE
OVERFLOW STRUCTURE

SCALE: NTS

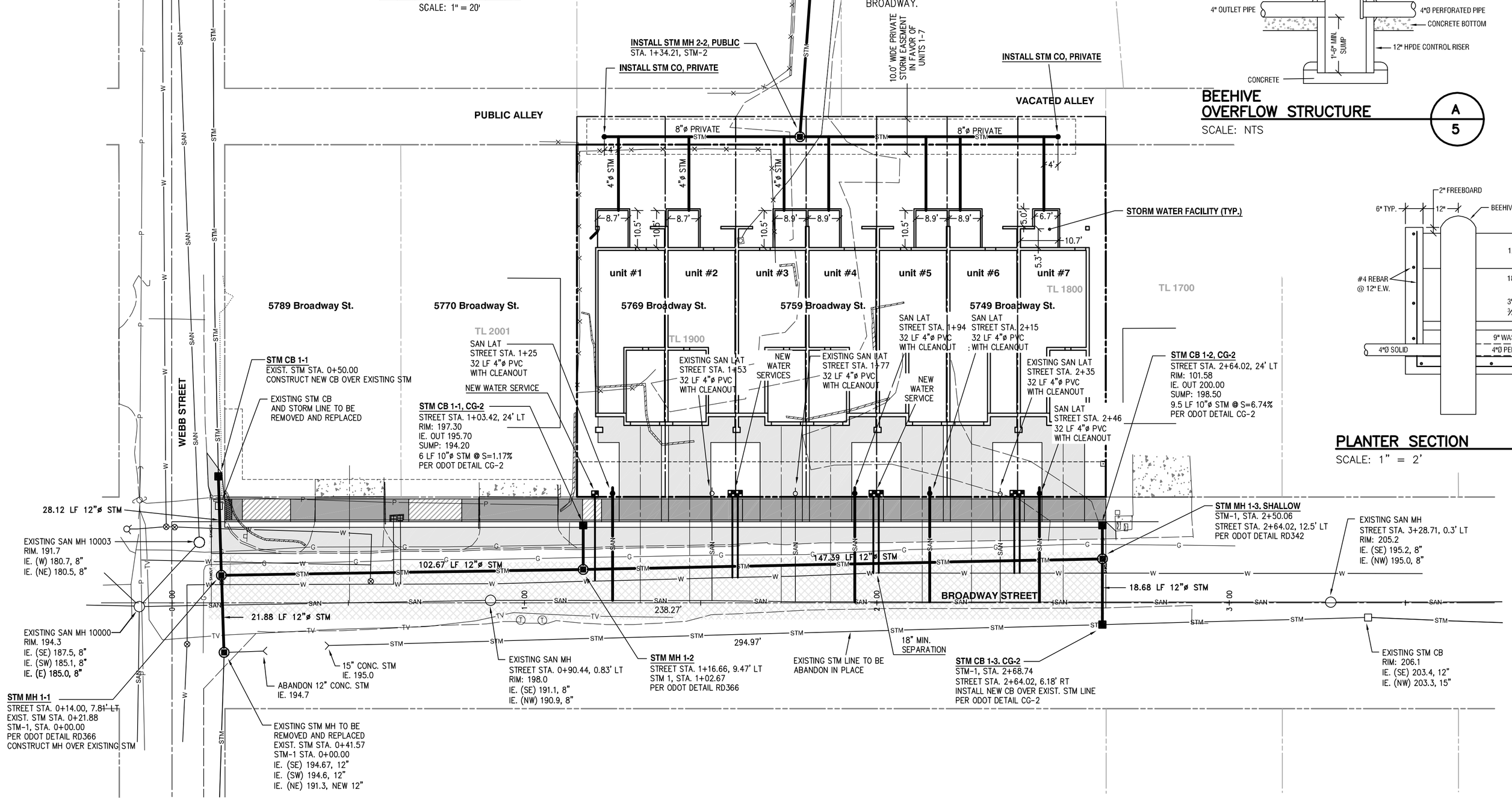
A
5



EXISTING STM
STORM DRAINAGE PROFILE

SCALE: 1" = 20' HORIZONTAL
1" = 5' VERTICAL

2/5



PLANTER SECTION

SCALE: 1" = 2'

B
5

PLANTER

SPECIES	SPACING & SIZE
JUNCUS TENUIS (SLENDER RUSH)	12", 10" DEEP CONTAINER
CAREX DENSAI (DENSE SEDGE)	12", 10" DEEP CONTAINER
DESCHAMPSIA CESPITOSA (TUFFED HAIRGRASS)	12", 10" DEEP CONTAINER
SCRIPTUS AMERICANUS (AMERICAN BULLRUSH)	12", 10" DEEP CONTAINER
POLYPODIUM MUITUM (SWORD FERN)	24", 1 GAL.

UTILITY NOTES:

1. PRESSURE SANITARY SERVICE LINE TO BE ROUTED UNDER WALL.
2. WATER SERVICE LINE FROM METER TO HOUSE TO BE ROUTED UNDER WALL.
3. INSTALLATION OF WATER SERVICE FROM MAIN TO METER WILL BE BY CITY FORCES.

REGISTERED PROFESSIONAL ENGINEER
7126
OREGON
JULY 16, 1971
BRUCE D. GOLDSON
EXPIRES: 06/30/2025
SIGNATURE DATE: 07/09/2023

UTILITY PLAN

2018-276

DESIGNED:	BDG	04/26/2023	5	UPDATE STORM TO HWY. 43
DRAWN:	BJS	01/22/2023	4	ADD WATER AND SANITARY
SCALE:	1" = 20'	05/20/2022	3	ADDED ADJUSTMENTS PER CITY
DATE:	August, 2018	04/07/2022	2	CORRECTIONS BROADWAY STREET IMPROVEMENTS
FILE:	Broadway Street Civil3	07/31/2020	1	UPDATE PER CITY REVIEW
		DATE	NO.	REVISION

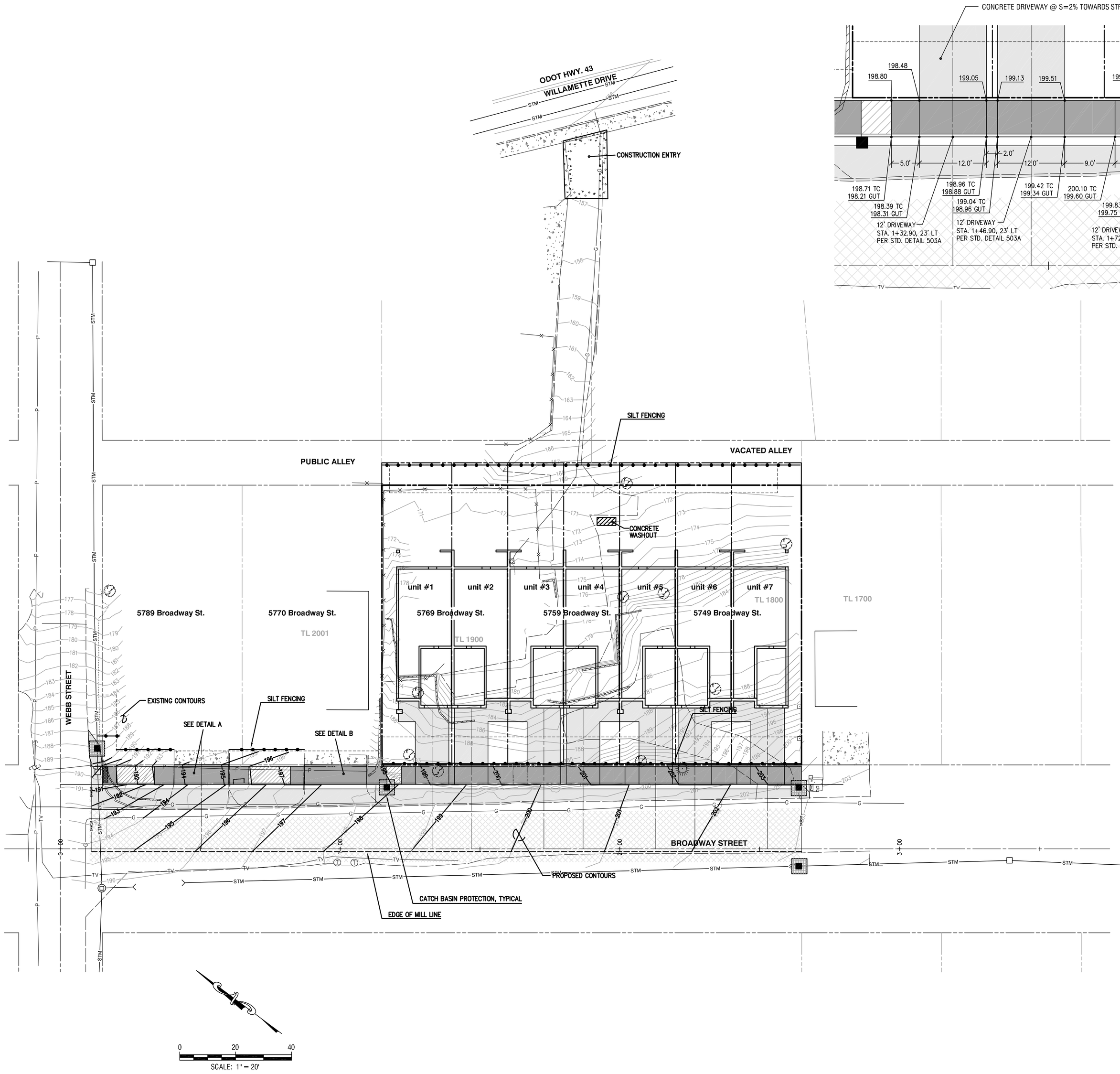
Theta,llc
ENGINEERING - SURVEYING - PLANNING
PO Box 1345
Lake Oswego, Oregon 97035
503/481-8822
email: thetaeng@comcast.net

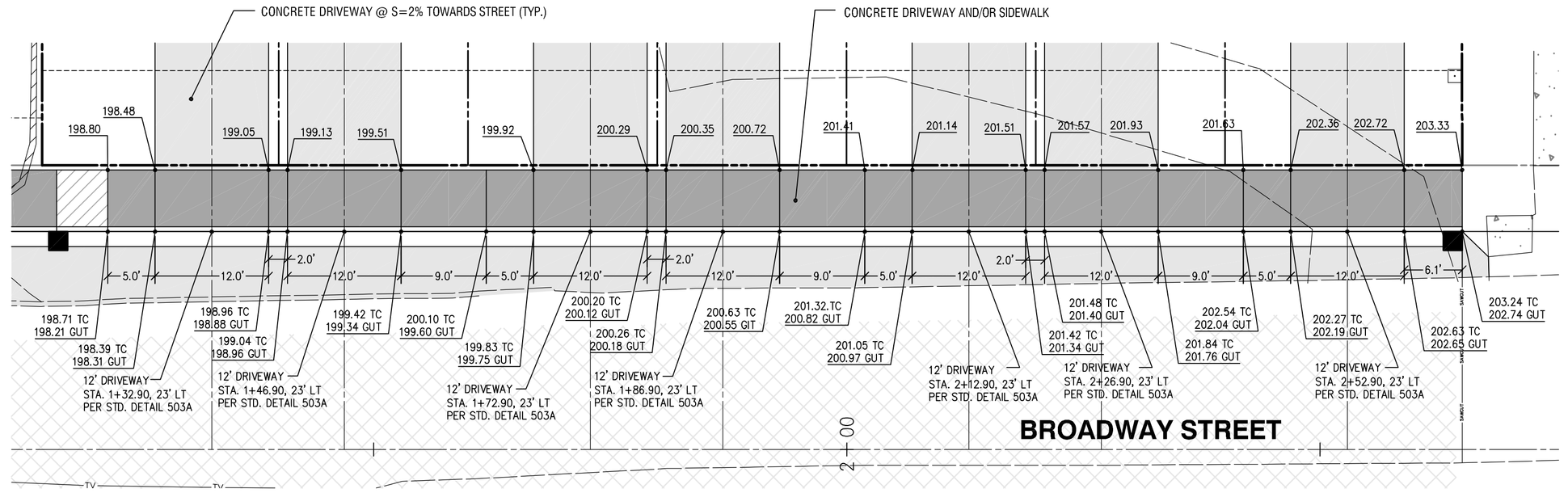
Dream Builder Custom Homes, Inc.
16805 Gassner Lane
Lake Oswego, Oregon 97035

5769 5759 5749 Broadway Street
Map 2S, 2E, 30CB
West Linn, Oregon

SHEET: 5

8_Broadway Street Civil3 Grad (1) (4) (2)

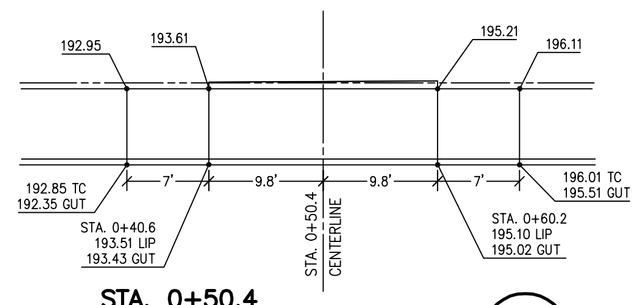




IN FRONT OF PROPERTY DRIVEWAY DETAIL

SCALE: 1" = 10'

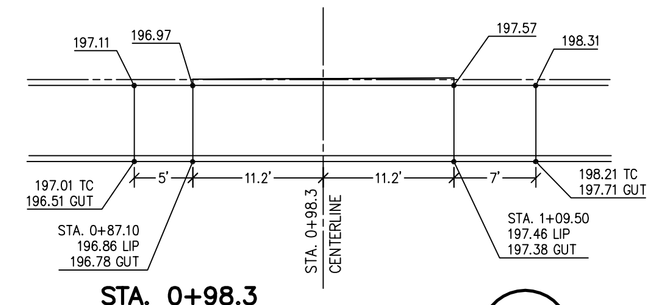
C / 6



STA. 0+50.4 DRIVEWAY DETAIL

SCALE: 1" = 10'

A / 6



STA. 0+98.3 DRIVEWAY DETAIL

SCALE: 1" = 10'

B / 6

REGISTERED PROFESSIONAL ENGINEER
7126
OREGON
JULY 16, 1971
BRUCE D. GOLDSON

EXPIRES: 06/30/2025

SIGNATURE DATE: 07/14/2023

GRADING PLAN

2018-276

DESIGNED:	BDG			
DRAWN:	BJS	01/22/2023	3	DRIVEWAY UPDATE FOR 7 UNITS
SCALE:	1" = 20'	01/22/2023	2	UPDATE DRIVEWAYS
DATE:	August, 2018	05/20/2022	1	ADDED ADJUSTMENTS PER CITY
FILE:	Broadway Street Civil3	DATE	NO.	REVISION

Theta, llc
ENGINEERING - SURVEYING - PLANNING
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Lake Oswego, Oregon 97035
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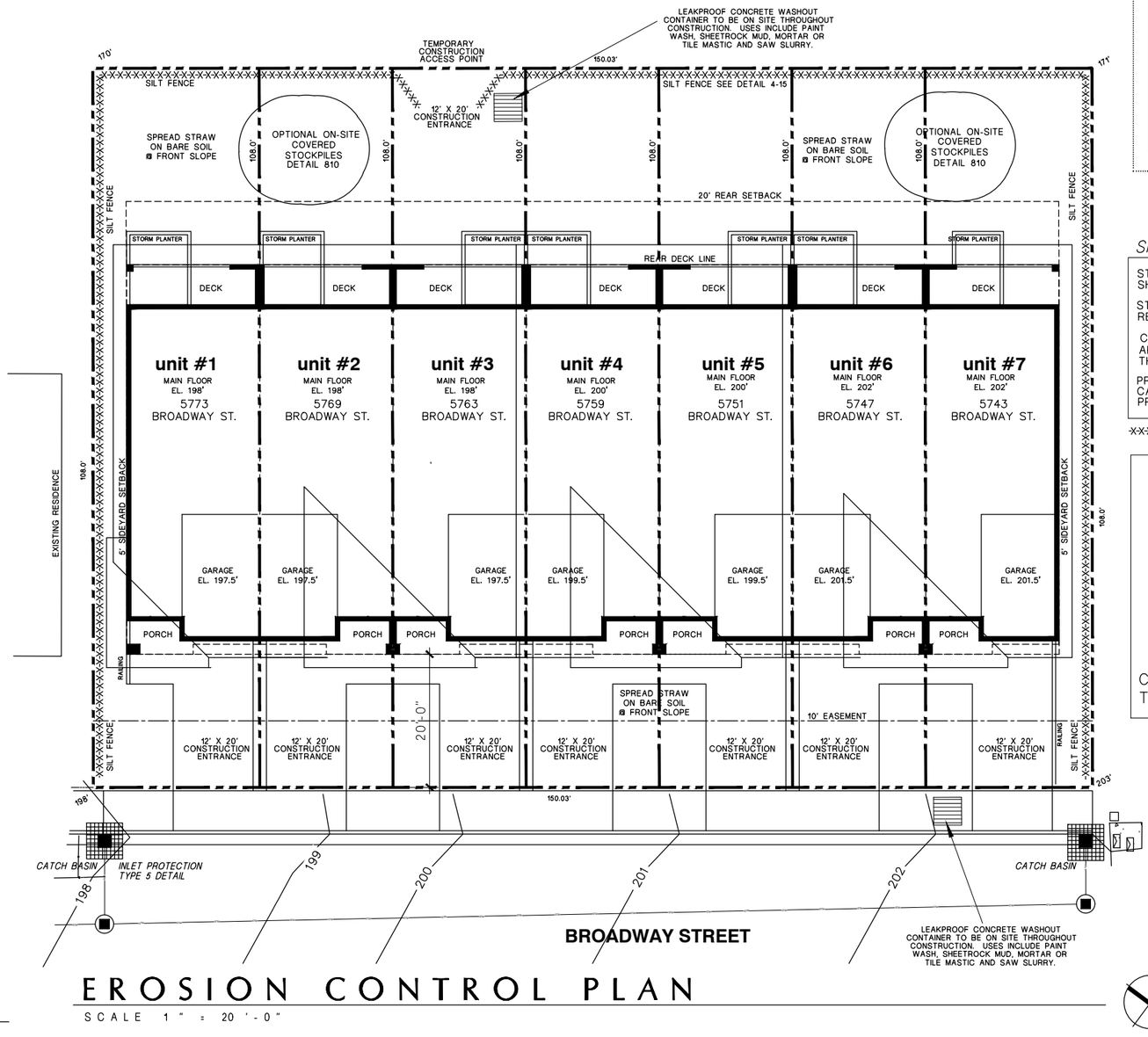
5769 5759 5749 Broadway Street
Map 2S, 2E, 30CB
West Linn, Oregon

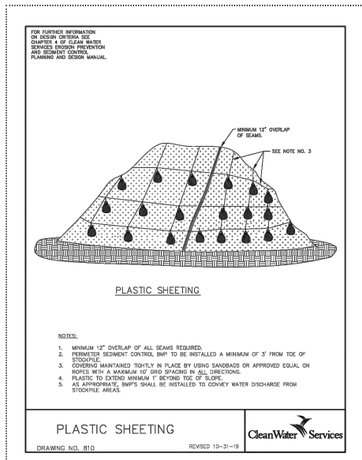
SHEET: 6

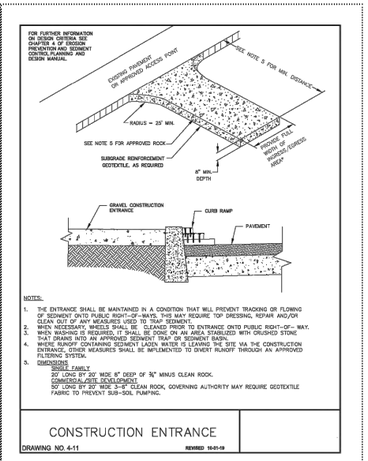
9_EROSION PLAN



EROSION CONTROL PLAN

SCALE 1" = 20'-0"





SITE RELATED NOTES:

STOCK PILE MUST BE COVERED WITH PLASTIC SHEATHING OCT.1 TO MAY 31,

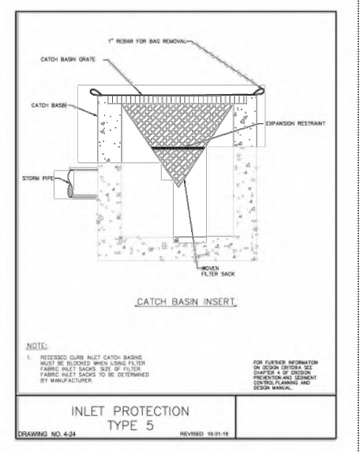
STOCK PILE MAY NEED TO BE OFFSITE AND RETURNED FOR BACKFILL DUE ACCESS & SPACE.

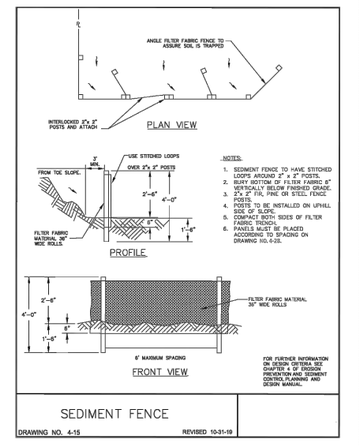
CLEAN WOOD CHIPS, STRAW OR OTHER APPROVED MATERIAL TO BE SPREAD AT THE END OF EACH WORK DAY.

PROTECT DOWNSTREAM STREET STORMWATER. CATCH BASIN LOCATED AT N.W. CORNER OF LOT PROTECT WITH "SILTSACK" PRIOR TO DIG

-x-x-x-x-x-x-x-x-x-x- SILT FENCE

CONSTRUCTION ENTRANCE TYPICAL OF 8 LOCATIONS





JOB No. 22086 DATE 5-1-2023

SITE INFORMATION:

CONSTRUCTION LOCATION:
TAX LOTS 1800-1900 / TAX MAP 2S. 2E., 30CB
LOCATED IN THE S.W. 1/4 SEC. 30, T.2S, R.2E, W.M.
CITY OF WEST LINN
CLACKAMAS COUNTY

EROSION

REVISED 10-4-2024

PROJECT: NEW CONSTRUCTION - TOWNHOUSE

BUILDER:
DreamBuilder Custom Homes, Inc.
TIM WALKER 503.880.7132
tim@dreambuildercustomhome.com

WATTON DESIGN WORKS, Inc.
18511 Willamette Falls Drive
Suite 200-D
West Linn, Or. 97068