

Owner/Applicant:
Icon Construction & Development, LLC
1980 Willamette Falls Drive, Suite 200
West Linn, OR 97068
PH: (503) 657-0406

Legal: 3-2E-7D TL 600, 601 & 701

Water: City of Oregon City

Sewer: City of Oregon City

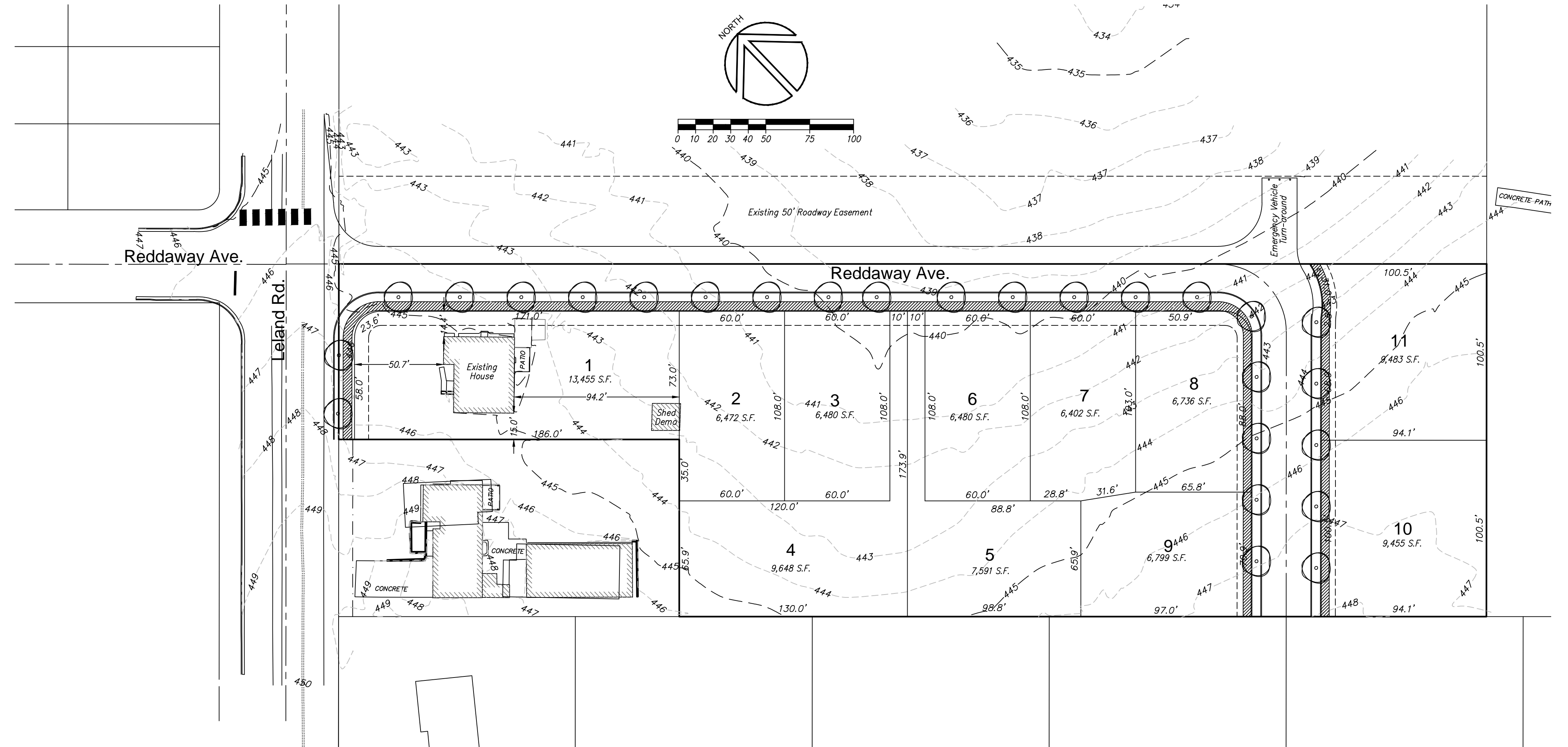
Contours: Field Survey by Centerline Concepts, Inc.

Site Area: 2.57 Acres

Engineer:
Theta Engineering, Inc.
4260 Country Woods Ct.
Lake Oswego, OR 97035
PH: (503) 481-8822

Zoning: R-8

Impervious Areas: Street - 22,209 sq. ft.



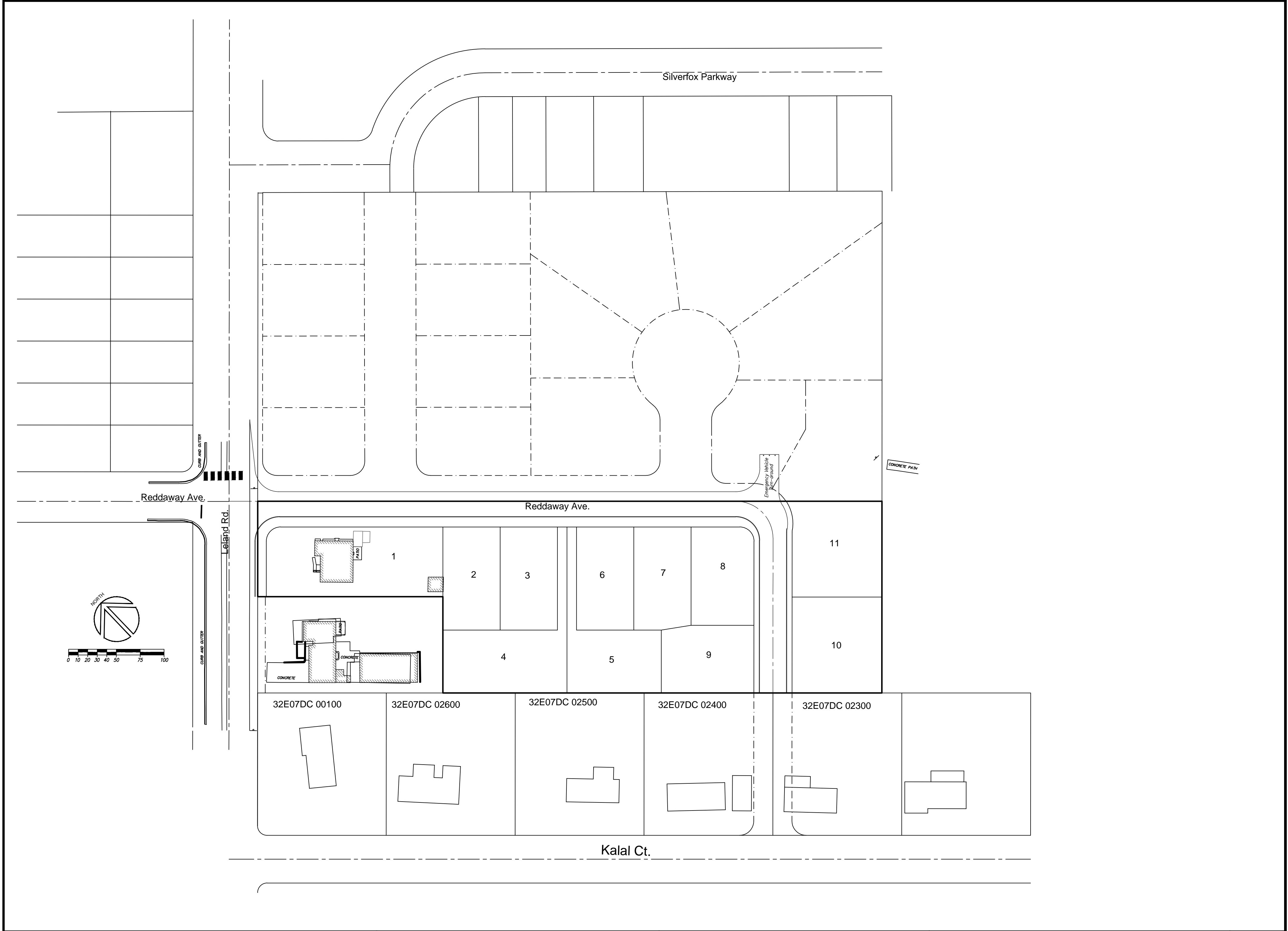
DESIGNED: REG			
DRAWN: REG			
SCALE: 1" = 40'			
DATE: March 2017			
FILE: 14-ICN-103	DATE	NO.	REVISION

Richard E. Givens, Planning Consultant
18680 Sunblaze Dr.
Oregon City, OR 97045
PH: (503) 479-0097

APPLICANT: Icon Construction & Development, LLC
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Parker Knoll
Preliminary Plan

SHEET:
1/1



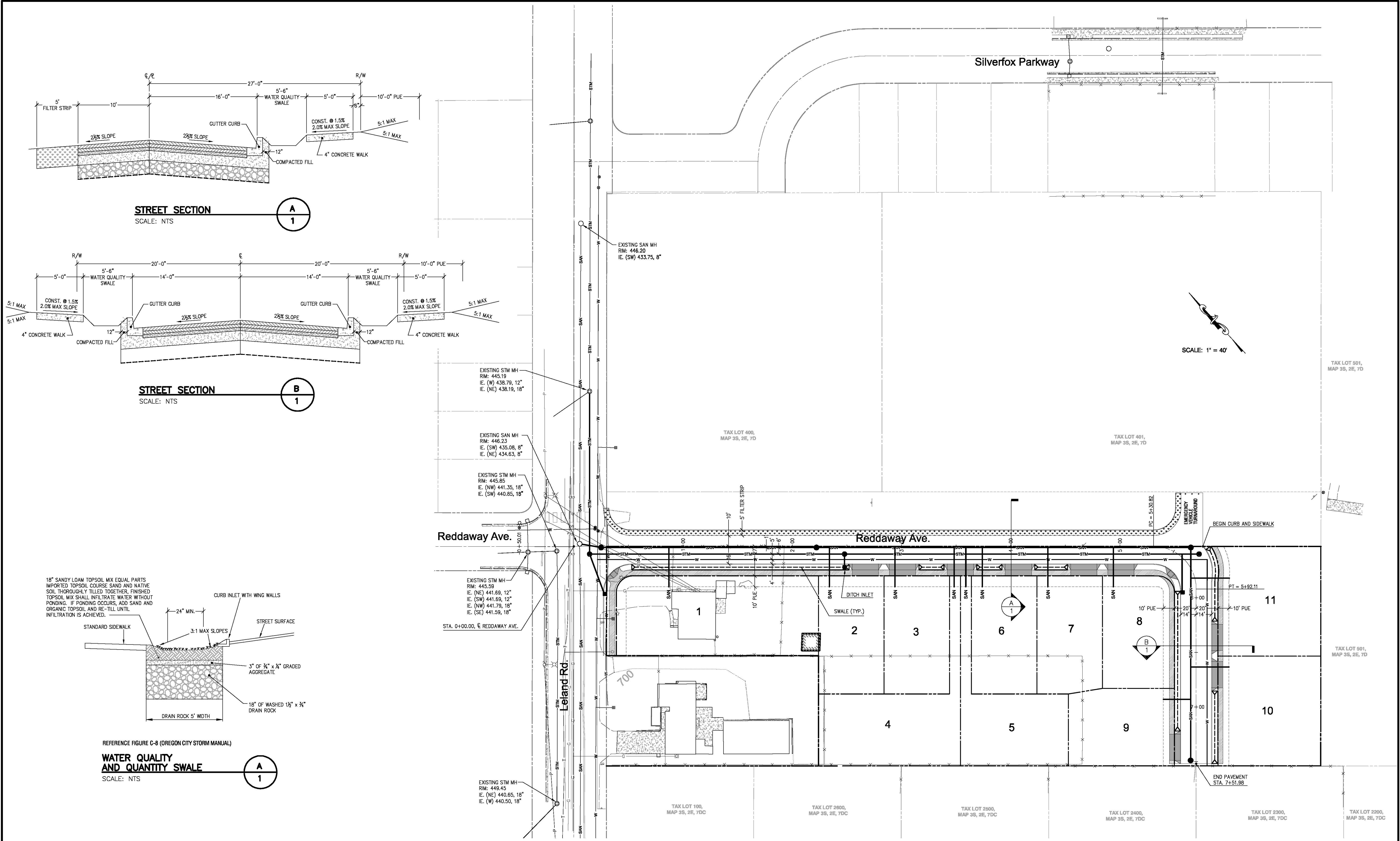
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DATE:	March 2017			
FILE:	14-ICN-103	DATE	NO.	REVISION

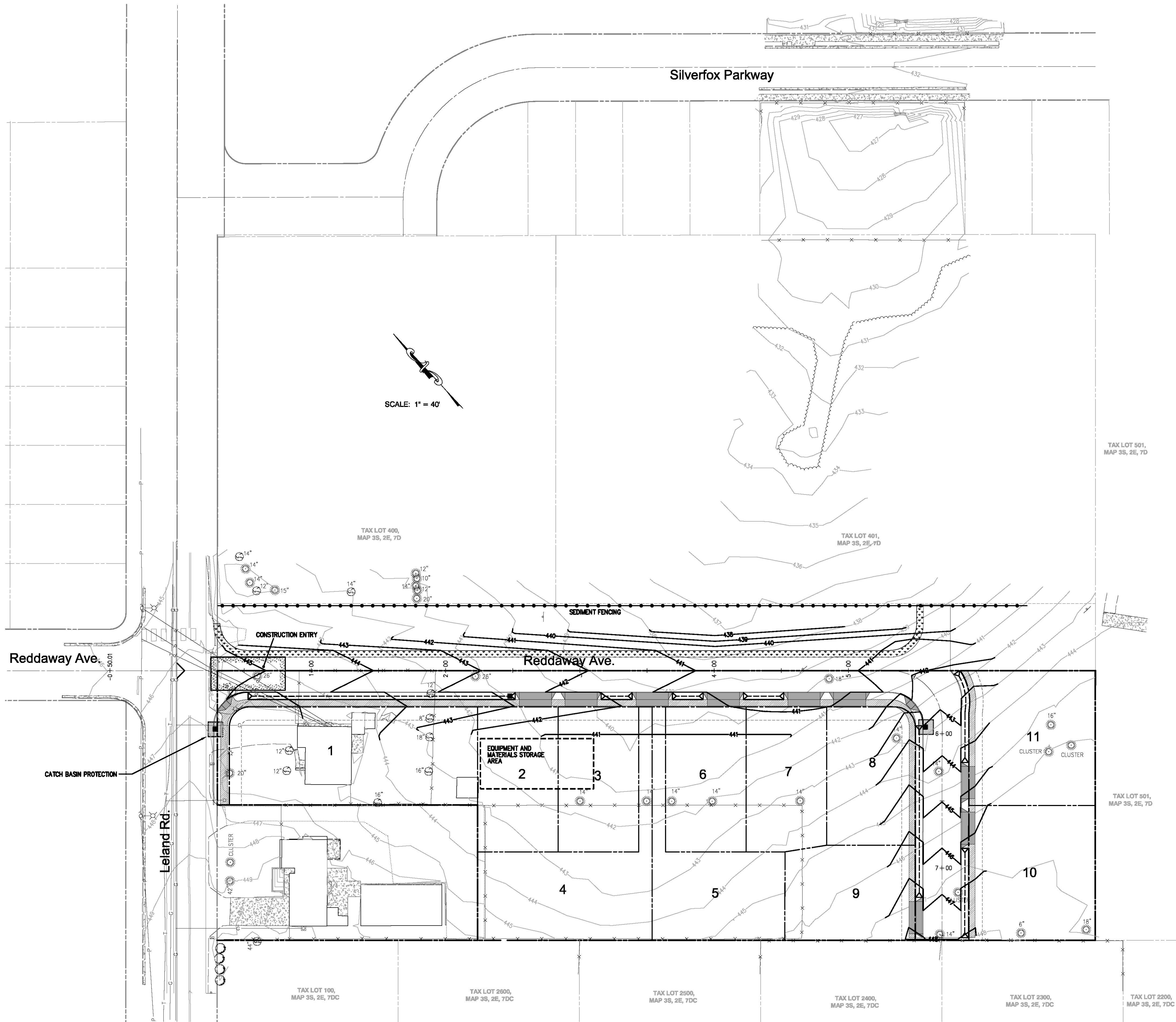
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Parker Knoll
Future Streets Plan

SHEET:
1/1





SCHEDULE 1: TREE MITIGATION CALCS.

SIZE TREE TO BE REMOVED	MITIGATION OUTSIDE OF CONSTRUCTION		MITIGATION WITHIN CONSTRUCTION		REQUIRED TREES TO PLANT
	# Rem.	Multiplier	# Rem.	Multiplier	
6 TO 12"	0	3	1	1	1
13 TO 18"	1	6	10	2	26
19 TO 24"	0	9	2	3	6
25 TO 30"	0	12	2	4	8
31" PLUS	0	15	0	5	0
TOTAL MITIGATION TREES TO BE PLANTED:					41

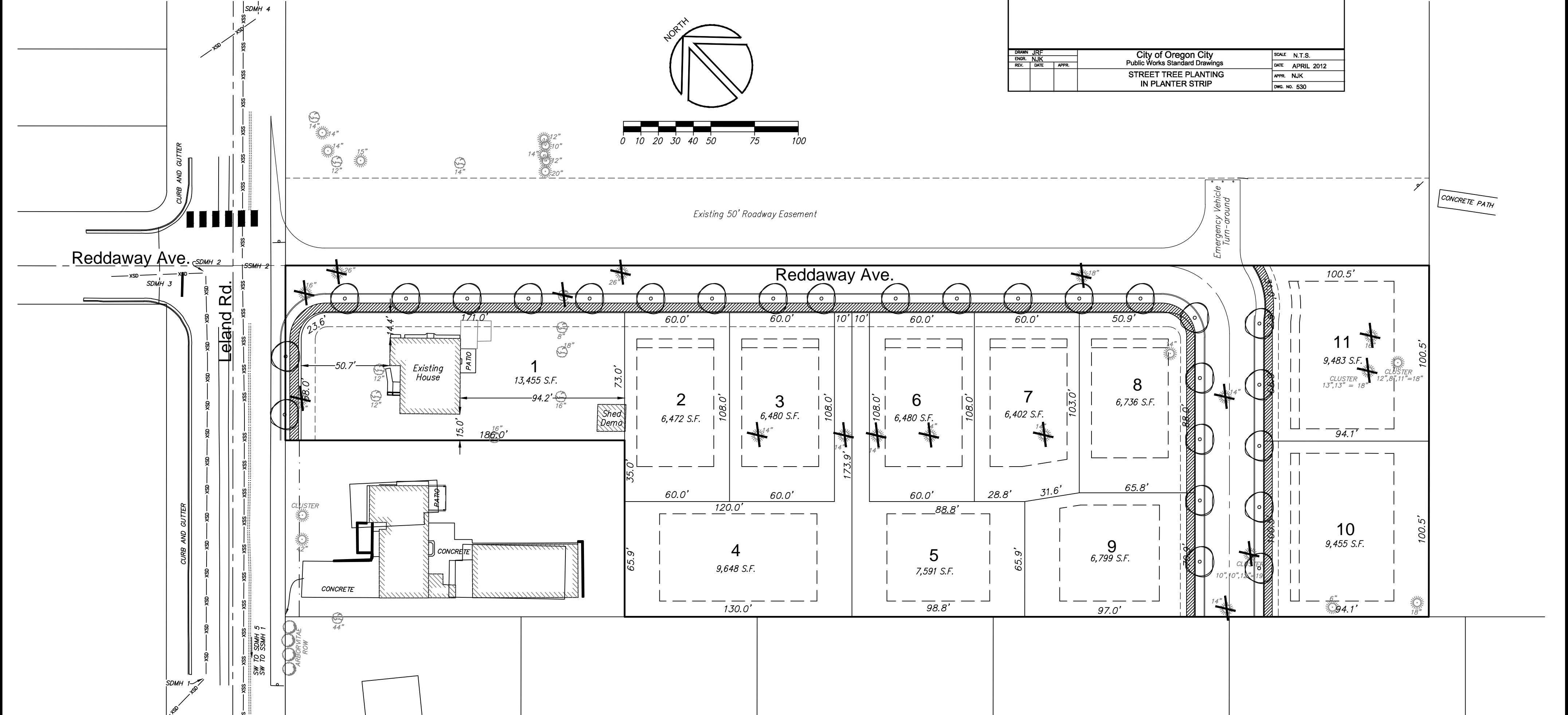
CODE 17.41.060-1
41 mitigation trees will be planted on lots in this subdivision per the following schedule: 3 trees each on Lots 1, 5, and 9; 4 trees each on all other lots.

Note: This plan is preliminary and may be revised when construction plans are prepared. Final plan will be submitted for approval with construction plans.

NOTES

- REMOVE EXCESS SOIL TO EXPOSE ROOT FLARE AND TO ENSURE TOP MOST ROOT IS NO MORE THAN 1-INCH BELOW ROOT BALL SURFACE. SEVER CIRCLING ROOTS WHERE APPROPRIATE. SET TOPMOST ROOT 2 INCHES ABOVE ADJACENT FINISHED GRADE. TRUNK FLARE SHALL BE VISIBLE.
- CUT AND REMOVE WIRE BASKETS FROM SIDES OF ROOT BALL WITHOUT DEFORMING BALL. CUT OFF AND REMOVE BURLAP AND ROPE FROM TOP HALF OF ROOT BALL. COMPLETELY REMOVE SYNTHETIC ROPE AND NON-BIODEGRADABLE BURLAP.

DRAWN: JRE	City of Oregon City		SCALE: N.T.S.
ENGR: NJK	Public Works Standard Drawings		DATE: APRIL 2012
REV. DATE APPR.	STREET TREE PLANTING IN PLANTER STRIP		APPR: NJK
			DWG. NO. 530



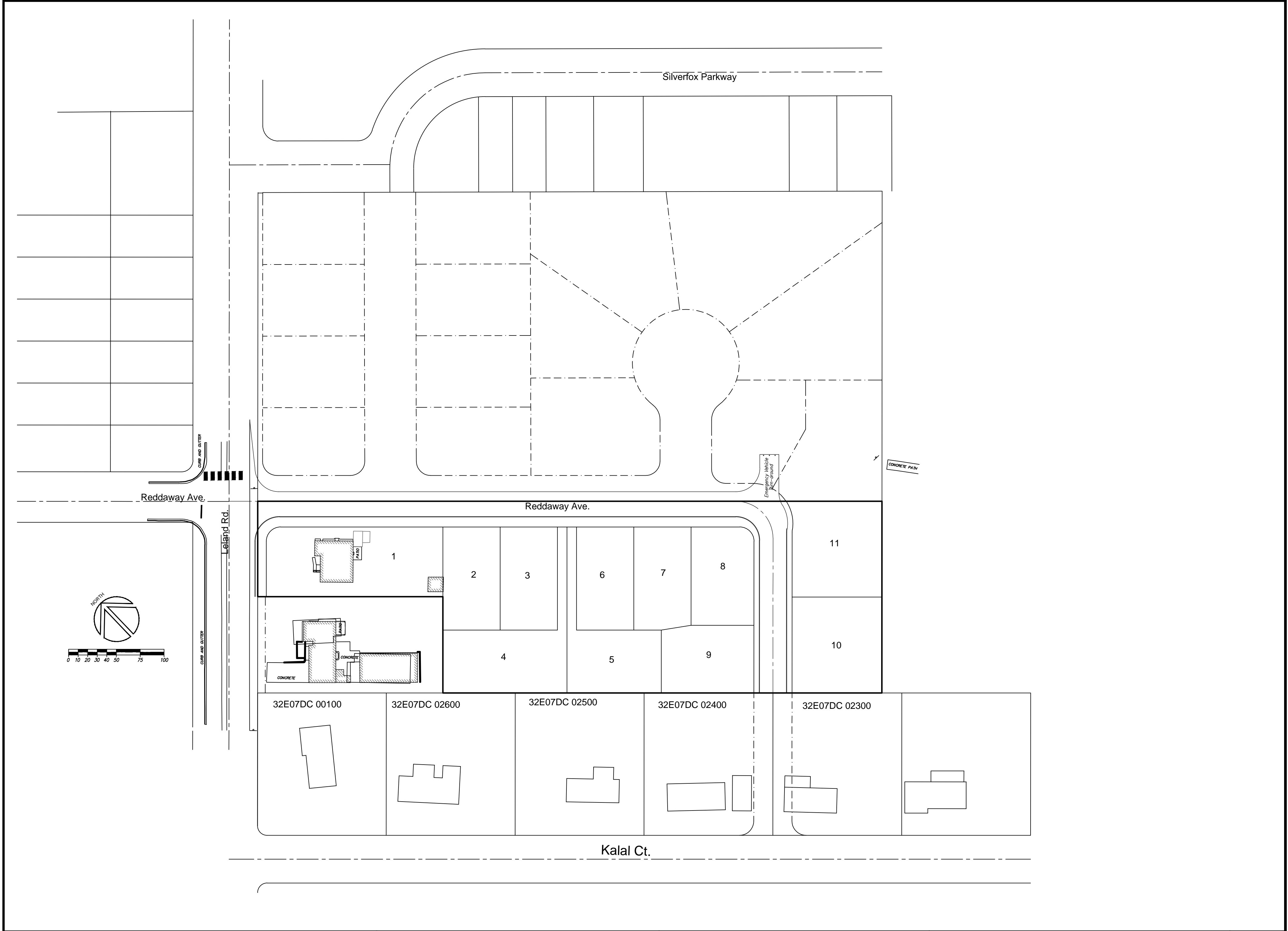
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Parker Knoll
Preliminary Tree Plan

SHEET:
1/1



Parker Knoll
Type II Subdivision Application
Application Narrative

Project Information:

Date: March 2017

Applicant/Owner: Icon Construction and Development, LLC.
1980 Willamette Falls Drive, Suite 200
West Linn, OR 97068
(503) 657-0406

Planning Consultant: Rick Givens
18680 Sunblaze Dr.
Oregon City, OR 97045
(503) 479-0097

Project Engineer: Bruce Goldson, P.E.
Theta Engineering
4260 Country Woods Ct
Lake Oswego, OR 9703
(503) 481-8822

Request: The applicant is requesting approval of an 11-lot subdivision.

Location: The property is located at 19510 Leland Rd.

Legal Description: 3-2E-7D, TL 600, 601, 700, 701, 401.

Site Area: 2.57 Acres

Zoning: R-8

Background Information:

Existing Conditions:

The subject property is located at 19510 Leland Rd., and is adjacent to Wesley Lynn Park along its northeast and southeast borders. To the southwest, the property abuts the Kalal Subdivision No. 2 plat, which consists of single-family homes on approximately one-half acre lots. To the northwest, the Ryan Park and Willow Run Estates subdivision are developed with single-family homes at a higher density per the R-3.5 zoning applied to that area.

The subject property is developed with one single-family home. The rest of the site is vacant. The property is fairly level and is primarily vegetated with grass. There are a few coniferous trees on the rear portion of the property, as well as ornamental trees in the yard area around the existing home.

Proposed Development:

This application proposes the division of the subject property into eleven lots. All of the lots would be used for single-family residences. The development would create a half-street extension of Reddaway Avenue into the subject property. It would bend to the southwest at the rear of the property to provide for a potential future connection through to Kalal Ct. at such time as the owners of the adjoining properties may wish to divide their parcels. One significant feature relating to the property is that it has rights to a 50-foot wide easement for roadway purposes on the Wesley Lynn Park site. This roadway easement predates the annexation of this property to Oregon City and the acquisition of the Wesley Lynn Park site by the City for park purposes. The easement area has twice been the subject of election proposals that would have allowed the dedication of this strip for roadway purposes. Since those elections both were narrowly defeated, the applicant is moving ahead with the project by building the one-half street on the subject property. An additional driving lane will be constructed on the 50-foot roadway easement area, but all utilities will be within the one-half street on the subject property. The use of the easement for roadway purposes is authorized by the easement and does not require voter approval.

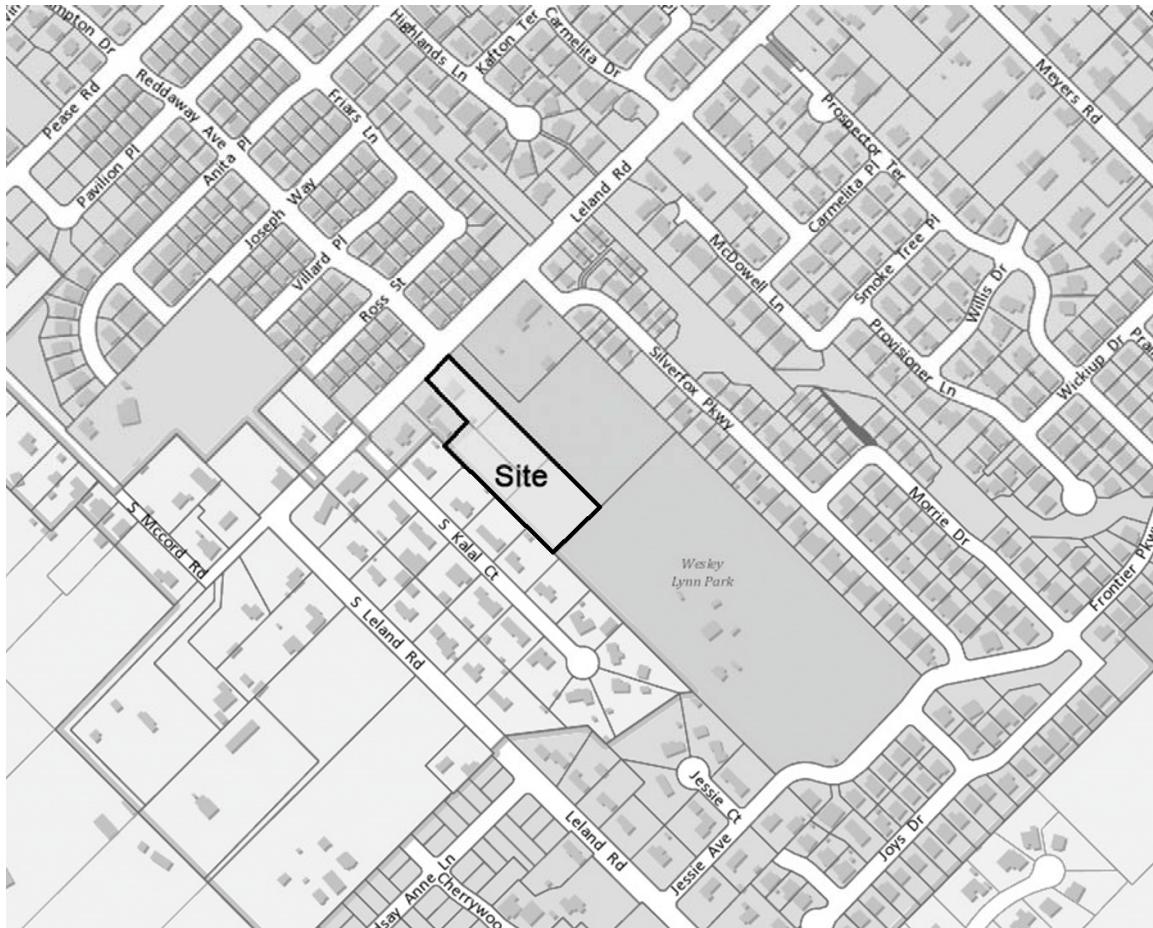


Figure 1- Vicinity Map

Approval Criteria: The relevant approval criteria for this subdivision are as follows:

OCMC 12.04 – Streets, Sidewalks and Public Places
OCMC 12.08 – Public and Street Trees
OCMC 13.12 – Stormwater Management
OCMC 16.08 – Subdivisions – Process and Standards
OCMC 16.12 – Minimum Improvements and Design Standards for Land Divisions
OCMC 17.08 – “R-10” Single-Family Dwelling District
OCMC 17.20 – Residential Design Standards
OCMC 17.50 – Administration and Procedures
OCMC 17.41 – Tree Protection Standards
OCMC 17.44 - US—Geologic Hazards

CHAPTER 17.10 - “R-8” SINGLE-FAMILY DWELLING DISTRICT

17.10.040. A. Minimum lot area, eight thousand square feet;

Applicant’s Response: Within subdivisions, Section 16.12.050 states that lots may be 20% smaller than the minimum lot size of the zoning district as long as the overall average within the subdivision meets the minimum lot size. The proposed subdivision complies with this requirement. See discussion above relating to that section.

17.10.040. B. Minimum lot width, sixty feet;

Applicant’s Response:

17.10.040. C. Minimum lot depth, seventy-five feet;

Applicant’s Response: The minimum lot depth proposed is 94.1 feet.

17.10.040.D. Maximum building height: two and one-half stories, not to exceed thirty-five feet.

Applicant’s Response: All homes to be built on the lots in this subdivision will comply with the maximum height standard. Compliance will be reviewed at the time of building permit application.

17.10.040.E Setbacks if an existing structure is being retained.

- 1. Front yard: fifteen feet minimum depth.*
- 2. Front porch, ten feet minimum setback,*
- 3. Attached and detached garage, twenty feet minimum setback from the public right-of-way where access is taken, except for alleys. Detached garages on an alley shall be setback a minimum of five feet in residential areas.*
- 4. Interior side yard, nine feet minimum setback for at least one side yard; seven feet minimum setback for the other side yard,*
- 5. Corner side yard, fifteen feet minimum setback,*
- 6. Rear yard, twenty-foot minimum setback*
- 7. Rear porch, fifteen-foot minimum setback.*

Applicant’s Response: The existing home on Lot 1 will be retained. The setbacks for the existing home are noted on the preliminary plan. All required dimensions are met

except for the required 15 foot corner setback. The house is located 14.4' from the proposed right-of-way of Reddaway Ave. Because there is no room to shift the road farther to the north, a variance will be required. Please refer to the variance section of this report.

G. Maximum lot coverage: The footprint of all structures two hundred square feet or greater shall cover a maximum of forty percent of the lot area. If an existing structure is being retained.

Applicant's Response: The footprint of the existing home on Lot 1 is 1,582 square feet and the lot area is 13,455 sq. ft., yielding a lot coverage of 11.8%. This standard is met for Lot 1. The homes to be built on the other 10 lots will comply with the forty percent standard. Compliance will demonstrated at the time of building permit application.

CHAPTER 17.39 INSTITUTIONAL DISTRICT

The proposed subdivision does not contain any area within the Institutional District. The proposed roadway use within the existing 50'-wide roadway easement on the Wesley Lynn Park site, however, is zoned Institutional. No other use than the proposed roadway is proposed on the park property. Roads are allowed in the Institutional District. However, since no other uses are proposed, the standards of the Institutional District do not apply.

CHAPTER 16.08 – SUBDIVISIONS PROCESS AND STANDARDS

16.08.010 Purpose and General Provisions.

- A. Applicability. – As noted above, the proposed development is subject to the process and approval standards applicable to subdivisions including Chapters 16.08, 12.04, 16.12, and 17.50 of the Oregon City Municipal Code. Those provisions are addressed in this narrative and will be shown to be satisfied by this application.
- B. Process – Subdivision applications follow a Type II process.
- C. Purpose – The proposed design is consistent with basic design criteria so the use of a master plan provided under Chapter 17.65 or a variance per Chapter 16.60 is not necessary.
- D. Process Overview – This application will follow the normal Type II review process.

16.08.015 Preapplication Conference Required.

Consistent with City procedures, a pre-application conference was held on January 10, 2017 (PA 16-62).

16.08.020 Preliminary Subdivision Plat Application.

The preliminary plat is being submitted within six months of the pre-application conference date. This narrative and the other plans and documents submitted with it, contain the required information that will allow the City to determine compliance with relevant City standards.

16.08.025 Preliminary Subdivision Plat--Required Plans.

Consistent with City requirements, the preliminary plat application includes:

- A. Site Plan
- B. Traffic/Transportation Plan
- C. Natural Features Plan and Topography, Preliminary Grading & Drainage Plan.
- D. Archeological Monitoring Recommendation – The City contacted SHPO regarding archeological sites.

16.08.030 - Preliminary subdivision plat—Narrative statement.

In addition to the plans required in the previous section, the applicant shall also prepare and submit a narrative statement that addresses the following issues:

A. Subdivision Description. A detailed description of the proposed development, including a description of proposed uses, number and type of residential units, allocation and ownership of all lots, tracts, streets, and public improvements, the structure of any homeowner's association, and each instance where the proposed subdivision will vary from some dimensional or other requirement of the underlying zoning district. For each such variance, a separate application will be required pursuant to Chapter 17.60, Variances;

Applicant's Response: This narrative contains the information required by this section.

B. Timely Provision of Public Services and Facilities. The applicant shall explain in detail how and when each of the following public services or facilities is, or will be, adequate to serve the proposed development by the time construction begins:

1. Water,

Applicant's Response: There is an existing City 12-inch ductile iron water main within Leland Road. Water service to the development will be provided from this 12-inch water main. There is also an 8-inch Clackamas River Water (CRW) water main along the south side of Leland Road. This water main will not service this project but will be protected throughout construction. There is an existing fire hydrant across Leland Road at the intersection of Leland Road and Reddaway Avenue. New fire hydrants will be located within the proposed development per the requirements and direction of Clackamas Fire District No. 1.

2. Sanitary sewer,

Applicant's Response: There is an existing 8-inch PVC gravity sanitary sewer main within Leland Road. There is an existing sanitary sewer manhole at the intersection of Leland Road and Reddaway Avenue.

3. Storm sewer and stormwater drainage,

Applicant's Response: The Preliminary Street and Utility Plan indicates that stormwater on east side of proposed Reddaway Avenue will drain through a filter strip before sheet flowing through the park. The west side of proposed Reddaway Avenue is proposed to drain to roadside swales and drain to the existing storm sewer line in Leland Road. Reddaway Avenue will be filled at the natural low point to allow storm sewer to drain to the existing storm line in Leland Road. Please refer to the storm report prepared by Theta Engineering, Inc. submitted with this narrative.

4. Parks and recreation,

Applicant's Response: The subject property abuts Wesley Lynn Park, which will provide for the park and recreation needs of future residents of the subdivision. The future construction of homes within the development will contribute SDCs at the time of building permit application that will be used for parks purposes consistent with the City's parks and recreation plan.

5. Traffic and transportation,

Applicant's Response: Please refer to the Transportation Impact Analysis prepared by Lancaster Engineering, Inc., attached to this application.

6. Schools,

Applicant's Response: The subject property is served with public schools by Oregon City Public Schools. Students from this subdivision will attend Gaffney Lane Elementary School, Gardiner Middle School, and Oregon City High School. Discussions with District staff indicate that there is adequate capacity in these schools.

7. Fire and police services;

Where adequate capacity for any of these public facilities and services is not demonstrated to be currently available, the applicant shall describe how adequate capacity in these services and facilities will be financed and constructed before recording of the plat;

Applicant's Response: Fire protection services are provided by Clackamas Fire District #1. Station #16, located at 19340 S. Molalla Avenue, is only 1.7 miles from the site. Oregon City Police Department provides police protection services. The site is 1.5 miles from the police station on Warner-Milne Road. Both police and fire protection services are adequate to accommodate the proposed development.

D. Drafts of the proposed covenants, conditions and restrictions (CC&Rs), maintenance agreements, homeowner association agreements, dedications, deeds easements, or reservations of public open spaces not dedicated to the city, and related documents for the subdivision;

Applicant's Response: Draft CC&Rs will be submitted for review prior to the recording of the final plat for the subdivision.

E. A description of any proposed phasing, including for each phase the time, acreage, number of residential units, amount of area for nonresidential use, open space, development of utilities and public facilities;

Applicant's Response: The project will be built in a single phase.

F. Overall density of the subdivision and the density by dwelling type for each.

Applicant's Response: The net site area is 89,009 square feet and the subdivision proposes 11 lots. This equates to a net site density of 5.38 units per acre. All lots will be used for single-family detached homes.

16.08.045 - Building site—Frontage width requirement.

Each lot in a subdivision shall abut upon a cul-de-sac or street other than an alley for a width of at least twenty feet.

Applicant's Response: As shown on the site plan, all lots with the exception of 4 and 5, comply with the frontage width standard. Lots 4 and 5 are flag lots and comply with the access requirements of OCMC 16.08.050 B through E.

16.08.050 - Flag lots in subdivisions.

Flag lots shall not be permitted within subdivisions except as approved by the community development director and in compliance with the following standards.

A. Where the applicant can show that the existing parcel configuration, topographic constraints or where an existing dwelling unit is located so that it precludes a land division that meets the minimum density, lot width and/or depth standards of the underlying zone.

Applicant's Response: Roadway access to the site is dictated by the location of the existing home on the property and the alignment of Reddaway Street on the opposite side of Leland Road. There is insufficient width to swing the street to the center of the property and have a lot on either side of the street and the lot depth is too great for a single-loaded configuration. As a result, the use of flag lots is the only feasible means to provide for the development of the property in a manner consistent with the R-8 zoning applicable to this site.

B. If a flag lot is created, a joint accessway shall be provided unless the location of the existing dwelling unit prevents a joint accessway. A perpetual reciprocal access easement and maintenance agreement shall be recorded for the joint accessway, in a format acceptable by the city attorney.

Applicant's Response: The two proposed flag lots will share a joint accessway and the required easement and maintenance agreement will be provided with the final plat of the subdivision.

C. The pole portion of the flag lot shall connect to a public street.

Applicant's Response: The pole portion of the flag lots connects to the proposed extension of Reddaway Avenue, which will be a public street.

D. The pole shall be at least 8 feet wide for the entire length.

Applicant's Response: The two pole strips are proposed to each be 10 feet wide, providing for a shared easement width of 20 feet.

E. The pole shall be part of the flag lot and must be under the same ownership as the flag portion of the lot.

Applicant's Response: Lots 4 and 5 will each own the pole section of their respective lots.

CHAPTER 16.12 - MINIMUM IMPROVEMENTS AND DESIGN STANDARDS FOR LAND DIVISIONS

16.12.020 - Blocks—Generally.

The length, width and shape of blocks shall take into account the need for adequate building site size, convenient motor vehicle, pedestrian, bicycle and transit access, control of traffic circulation, and limitations imposed by topography and other natural features.

Applicant's Response: The proposed block layout provides for access to the proposed lots consistent with City standards and the limitations imposed by existing development patterns in this area. The design provides for the option of a future extension of Reddaway Ave. to Kalal Ct. All lots served are suitable for construction of single-family homes per the standards of the R-8 district.

16.12.030 - Blocks—Width.

The width of blocks shall ordinarily be sufficient to allow for two tiers of lots with depths consistent with the type of land use proposed.

Applicant's Response: The location of Reddaway Avenue on the other side of Leland Rd. and the existing home on the subject property establish the alignment of Reddaway Avenue in this development. Because the abutting property is park land, it is not feasible for lots to be located on the northeast side of the street. Where Reddaway Avenue bends through the subject property, lots are provided on both sides of the street, consistent with this section.

16.12.045 - Building sites—Minimum density.

All subdivision layouts shall achieve at least eighty percent of the maximum density of the base zone for the net developable area as defined in Chapter 17.04.

Applicant's Response: The net site area is 89,009 square feet. Dividing the net site area by 8,000 sq. ft. per unit yields a maximum density of 11 lots. Eighty percent of 11 would require a minimum of 9 lots to be developed on the site. The proposed plan provides for 11 lots. This standard is met.

16.12.050 - Calculations of lot area.

A subdivision in the R-10, R-8, R-6, R-5, or R-3.5 dwelling district may include lots that are up to twenty percent less than the required minimum lot area of the applicable zoning designation provided the entire subdivision on average meets the minimum site area requirement of the underlying zone. The average lot area is determined by calculating the total site area devoted to dwelling units and dividing that figure by the proposed number of dwelling lots.

Accessory dwelling units are not included in this determination nor are tracts created for non-dwelling unit purposes such as open space, stormwater tracts, or access ways.

A lot that was created pursuant to this section may not be further divided unless the average lot size requirements are still met for the entire subdivision.

When a lot abuts a public alley, an area equal to the length of the alley frontage along the lot times the width of the alley right-of-way measured from the alley centerline may be added to the area of the abutting lot in order to satisfy the lot area requirement for the abutting lot. It may also be used in calculating the average lot area.

Applicant's Response: The subject property is zoned R-8, meaning that the average lot size must be at least 8,000 sq. ft. The net site area is 89,009 sq. ft. and dividing this area by the 11 lots proposed yields an average lot size of 8,092 sq. ft. This standard is met.

16.12.055 - Building site—Through lots.

Through lots and parcels shall be avoided except where they are essential to provide separation of residential development from major arterials or to overcome specific disadvantages of topography of existing development patterns. A reserve strip may be required. A planting screen restrictive covenant may be required to separate residential development from major arterial streets, adjacent nonresidential development, or other incompatible use, where practicable. Where practicable, alleys or shared driveways shall be used for access for lots that have frontage on a collector or minor arterial street, eliminating through lots.

Applicant's Response: No through lots are proposed.

16.12.060 - Building site—Lot and parcel side lines.

The lines of lots and parcels, as far as is practicable, shall run at right angles to the street upon which they face, except that on curved streets they shall be radial to the curve.

Applicant's Response: The proposed side lot lines are perpendicular to the streets on which they front.

16.12.070 - Building site—Setbacks and building location.

This standard ensures that lots are configured in a way that development can be oriented toward streets to provide a safe, convenient and aesthetically pleasing environment for pedestrians and bicyclists. The objective is for lots located on a neighborhood collector, collector or minor arterial street locate the front yard setback on and design the most architecturally significant elevation of the primary structure to face the neighborhood collector, collector or minor arterial street.

A. The front setback of all lots located on a neighborhood collector, collector or minor arterial shall be orientated toward the neighborhood collector, collector or minor arterial street.

Applicant's Response: All lots proposed provide for the homes that will be built to face the street on which they front. The existing home on Lot 1 faces onto Leland Road, a minor arterial street.

B. The most architecturally significant elevation of the house shall face the neighborhood collector, collector or minor arterial street.

Applicant's Response: The front of the home on Lot 1, which is the most architecturally significant elevation, faces onto Leland Road.

C. On corner lots located on the corner of two local streets, the main façade of the dwelling may be oriented towards either street.

Applicant's Response: This section will apply to Lot 8. The main façade will most probably be oriented towards the northeast.

D. All lots proposed with a driveway and lot orientation on a collector or minor arterial shall combine driveways into one joint access per two or more lots unless the city engineer determines that:

- 1. No driveway access may be allowed since the driveway(s) would cause a significant traffic safety hazard; or*
- 2. Allowing a single driveway access per lot will not cause a significant traffic safety hazard.*

Applicant's Response: The driveway to the existing home will be reconfigured to access the lot from Reddaway Ave.

16.12.075 - Building site—Division of lots.

Where a tract of land is to be divided into lots or parcels capable of redivision in accordance with this chapter, the community development director shall require an arrangement of lots, parcels and streets which facilitates future redivision. In such a case, building setback lines may be required in order to preserve future right-of-way or building sites.

Applicant's Response: No lots are proposed that are large enough to be re-divided.

16.12.085 - Easements.

The following shall govern the location, improvement and layout of easements:

A. Utilities. Utility easements shall be required where necessary as determined by the city engineer. Insofar as practicable, easements shall be continuous and aligned from block-to-block within the land division and with adjoining subdivisions or partitions. Specific utility easements for water, sanitary or storm drainage shall be provided based on approved final engineering plans.

Applicant's Response: The proposed location of utility easements is depicted on the Preliminary Plan. The easements are situated where necessary to accommodate proposed utilities and where required adjacent to streets per City standards.

B. Unusual Facilities. Easements for unusual facilities such as high voltage electric transmission lines, drainage channels and stormwater detention facilities shall be adequately sized for their intended purpose, including any necessary maintenance roads. These easements shall be shown to scale on the preliminary and final plats or maps. If the easement is for drainage channels, stormwater detention facilities or related purposes, the easement shall comply with the requirements of the Public Works Stormwater and Grading Design Standards.

Applicant's Response: No easements for unusual facilities are proposed or necessary.

D. Access. When easements are used to provide vehicular access to lots within a land division, the construction standards, but not necessarily width standards, for the easement shall meet city specifications. The minimum width of the easement shall be twenty feet. The easements shall be improved and recorded by the applicant and inspected by the city engineer. Access easements may also provide for utility placement.

Applicant's Response: The shared easement serving Lots 4 and 5 is 20 feet in width. The private driveway will be designed to city specifications.

16.12.095 - Minimum improvements—Public facilities and services.

The following minimum improvements shall be required of all applicants for a land division under Title 16, unless the decision-maker determines that any such improvement is not proportional to the impact imposed on the city's public systems and facilities:

A. Transportation System. Applicants and all subsequent lot owners shall be responsible for improving the city's planned level of service on all public streets, including alleys within the land division and those portions of public streets adjacent to but only partially within the land division. All applicants shall execute a binding agreement to not remonstrate against the formation of a local improvement district for street improvements that benefit the applicant's property. Applicants are responsible for designing and providing adequate vehicular, bicycle and pedestrian access to their developments and for accommodating future access to neighboring undeveloped properties that are suitably zoned for future development. Storm drainage facilities shall be installed and connected to off-site natural or man-made drainageways. Upon completion of the street improvement survey, the applicant shall reestablish and protect monuments of the type required by ORS 92.060 in monument boxes with covers at every public street intersection and all points of curvature and points of tangency of their center line, and at such other points as directed by the city engineer.

Applicant's Response: The street frontage on Leland Road, a County Road, will be improved per Clackamas County specifications. The proposed street system will provide for required access to the proposed lots, consistent with city standards. The road will be stubbed to the southeast so that a future connection to Kalal Ct. can be made when and if the adjoining lots are further subdivided.

B. Stormwater Drainage System. Applicants shall design and install drainage facilities within land divisions and shall connect the development's drainage system to the appropriate downstream storm drainage system as a minimum requirement for providing services to the applicant's development. The applicant shall obtain county or state approval when appropriate. All applicants shall execute a binding agreement to not remonstrate against the formation of a local improvement district for stormwater drainage improvements that benefit the applicant's property. Applicants are responsible for extending the appropriate storm drainage system to the development site and for providing for the connection of upgradient properties to that system. The applicant shall design the drainage facilities in accordance with city drainage master plan requirements, Chapter 13.12 and the Public Works Stormwater and Grading Design Standards.

Applicant's Response: The proposed storm drainage system provides for collection, detention and treatment of storm water consistent with city standards. The storm sewer system will drain to the existing storm sewer in Leland Road, as shown on the Preliminary Utility Plan. Please refer to the attached storm report prepared by Theta Engineering.

C. Sanitary Sewer System. The applicant shall design and install a sanitary sewer system to serve all lots or parcels within a land division in accordance with the city's sanitary sewer design standards, and shall connect those lots or parcels to the city's sanitary sewer system, except where connection is required to the county sanitary sewer system as approved by the county. All applicants shall execute a binding agreement to not remonstrate against the formation of a local improvement district for sanitary sewer improvements that benefit the applicant's property. Applicants are responsible for extending the city's sanitary sewer system to the development site and through the applicant's property to allow for the future connection of neighboring undeveloped properties that are suitably zoned for future development. The applicant shall obtain all required permits and approvals from all affected jurisdictions prior to final approval and prior to commencement of construction. Design shall be approved by the city engineer before construction begins.

Applicant's Response: As shown on the Preliminary Utility Plan, all lots are proposed to be served with city sanitary sewer service. The sewer system will connect to the existing sanitary sewer system within Leland Road abutting the property.

D. Water System. The applicant shall design and install a water system to serve all lots or parcels within a land division in accordance with the city public works water system design standards, and shall connect those lots or parcels to the city's water system. All applicants shall execute a binding agreement to not remonstrate against the formation of a local improvement district for water improvements that benefit the applicant's property. Applicants are responsible for extending the city's water system to the development site and through the applicant's property to allow for the future connection of neighboring undeveloped properties that are suitably zoned for future development.

Applicant's Response: The proposed development will extend city water service from the existing water line in Leland Road to serve all lots within the subdivision.

G. Street Name Signs and Traffic Control Devices. The applicant shall install street signs and traffic control devices as directed by the city engineer. Street name signs and traffic control devices shall be in conformance with all applicable city regulations and standards.

Applicant's Response: Reddaway Avenue will be extended through the subdivision. No new street names are proposed.

H. Street Lights. The applicant shall install street lights which shall be served from an underground source of supply. Street lights shall be in conformance with all city regulations.

Applicant's Response: Required street lights will be provided.

J. Bench Marks. At least one bench mark shall be located within the subdivision boundaries using datum plane specified by the city engineer.

Applicant's Response: The required bench mark will be provided per the requirements of this section.

K. Other. The applicant shall make all necessary arrangements with utility companies or other affected parties for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting and cable television, shall be placed underground.

Applicant's Response: The applicant will coordinate with the utility companies serving this area of the city to insure the underground installation of required services.

L. Oversizing of Facilities. All facilities and improvements shall be designed to city standards as set out in the city's facility master plan, public works design standards, or other city ordinances or regulations. Compliance with facility design standards shall be addressed during final engineering. The city may require oversizing of facilities to meet standards in the city's facility master plan or to allow for orderly and efficient development. Where oversizing is required, the applicant may request reimbursement from the city for oversizing based on the city's reimbursement policy and funds available, or provide for recovery of costs from intervening properties as they develop.

M. Erosion Control Plan—Mitigation. The applicant shall be responsible for complying with all applicable provisions of Chapter 17.47 with regard to erosion control.

Applicant's Response: All facilities and improvements will be designed to city standards. The services will only serve the proposed development and no oversizing is required.

CHAPTER 12.04 - STREETS SIDEWALKS AND PUBLIC PLACES

12.04.007 - Modifications.

The review body may consider modification of this standard resulting from constitutional limitations restricting the city's ability to require the dedication of property or for any other reason, based upon the criteria listed below and other criteria identified in the standard to be modified. All modifications shall be

processed through a Type II Land Use application and may require additional evidence from a transportation engineer or others to verify compliance. Compliance with the following criteria is required:

Applicant's Response: Modifications are proposed to the block spacing standards of section 12.04.195 and to the right-of-way and pavement width standards for local streets as set in Table 12.04.180 Street Design. Additionally, a modification is being requested to allow the use of a filter strip as treatment for storm water flowing off of the 10 foot strip of paving on the existing 50' easement on the park property. The maximum block spacing standard of 530 feet is proposed to be increased to 570 feet. Further, the requirement for a pedestrian pathway at a 300 foot interval is requested to be waived as the existing development pattern along Kalal Ct. precludes any realistic opportunity for a through-connection to Kalal Ct. The right-of-way width of 54' and pavement width of 32 feet is proposed to be reduced 40 feet and 28 feet, respectively, for the section of Reddaway Ave. that bends to the southwest to provide for a future connection to Kalal Ct.

A. The modification meets the intent of the standard;

Applicant's Response:

1. Block Spacing: The intent of the block length standard is to provide for an efficient lotting pattern and to ensure connectivity that reduces out-of-direction traffic and which encourages pedestrian and bicycle modes of transportation. In this instance, the reason for increasing the spacing is to provide for the alignment of Reddaway Ave. to be centered on an existing property line where its extension can occur in the future such that adjoining tax lots 2300 and 2400 on Map 32E07DC can be divided with lots facing onto the new street. Centering the right-of-way in this manner increases the likelihood of the eventual connection being made to Kalal Ct., which promotes the connectivity objective of this provision. Moving the alignment to the common lot lines between Tax Lots 2400 and 2500 or 2500 and 2600, while meeting the block spacing standard, would not result in a reasonable lotting pattern on the subject property. Placing it between Lots 2400 and 2500 leaves an area on the rear of the subject property that is 230 feet deep. This would be too deep for a single tier of lots and would necessitate three flag lots, which the Code discourages in subdivisions. Placing the street so it would align on the property line between Tax Lots 2500 and 2600 would leave a useless strip to the rear of Lot 2 and would necessitate Reddaway Ave. ending in a cul-de-sac that would be longer than the 200 foot maximum set in OCMC 12.04.225. The final option would be to provide two street stubs; one at the proposed location and a second between Tax Lots 2500 and 2600. This would be an undue burden on the applicant given the relatively minor discrepancy between the proposed spacing of 570 feet and the maximum standard of 530 feet.

2. Right-of-way/Paving Width: The proposed 40 foot right-of-way with a 28 foot paved street width achieves the purpose of providing for safe traffic flow and adequate parking. Traffic volumes are going to be extremely low on this block given that it serves only 11 homes and does not provide for through-traffic.

Sidewalks would be placed in easements on the adjoining lots, thereby providing for pedestrian traffic and allowing room for a park strip. Given the need to allow for the adjoining Tax Lots to be divided into two lots in order for there to be any incentive for this future connection to be made, the proposed width is necessary in order to achieve the desired connectivity.

3. Filter Strip: At the present time, City standards do not include provisions for the use of a filter strip to meet storm detention requirements. This design has been used effectively in other jurisdictions and is a reasonable solution in this instance in order to provide for the needed treatment/detention and for the water to flow in the natural, non-point source, sheet flow onto the park property.

B. The modification provides safe and efficient movement of pedestrians, motor vehicles, bicyclists and freight;

Applicant's Response:

1. Block Spacing: The proposed spacing would have no impact upon safety of motor vehicle or bicycle traffic because the difference between the proposed spacing and the standard is so small. Forty feet is insignificant to such modes of transportation. The fact that the street stub is being placed in a location where future extension is at least potentially practicable serves the public interest in safety and efficiency by allowing for connectivity. As for pedestrian traffic, it should be noted that degree of modification is lessened somewhat by the fact that Leland Road is an arterial street with a half-street width of 39 feet, rather than the 27 feet of a local street; meaning that the sidewalk is 12 feet closer than it would be for the same centerline spacing between local streets. The proposed sidewalk will provide for a safe and efficient means for pedestrians to move to and from Leland Road into the proposed subdivision. The future connectivity would provide for safe and efficient traffic to Kalal Ct.

2. Right-of-way/Paving Width: The proposed paving width of 28 feet has been used in many places in the City where there are constrained conditions. Parking would be limited to one side of the street, providing for two travel lanes. This provides for safe and efficient movement of vehicular traffic. The proposed sidewalks would be on easements on the adjoining lots and would provide for safe and efficient pedestrian traffic.

3. Filter Strip: There are no impacts from the use of the proposed filter strip upon the movement of all forms of traffic.

C. The modification is consistent with an adopted plan; and

Applicant's Response:

To the applicant's knowledge there are no Comprehensive Plan policies that would be inconsistent with the proposed standards. The fact that a future street connection to Kalal Ct. would result in a looped street pattern, rather than two cul-de-sac streets, is consistent with the TSP.

D. The modification is complementary with a surrounding street design; or, in the alternative;

Applicant's Response:

1. Block Spacing: The proposed spacing is complementary with the existing street design in that it aligns in a location where through-connection to Kalal Ct. is feasible based on the existing development pattern.

2. Right-of-way/Paving Width: The proposed reduction in pavement and right-of-way width is a short section of the street and provides for a standard that can reasonably be implemented given the existing lot pattern.

3. Filter Strip: The proposed use of a filter strip allows for the development of the subject property. This design option is consistent with providing for treatment and detention without causing significant impacts on the park property that would result from other standard options which would result in a single point of discharge onto the park.

E. If a modification is requested for constitutional reasons, the applicant shall demonstrate the constitutional provision or provisions to be avoided by the modification and propose a modification that complies with the state or federal constitution. The city shall be under no obligation to grant a modification in excess of that which is necessary to meet its constitutional obligations.

Applicant's Response: Not applicable. The applicant is not claiming a constitutional basis for the requested modifications.

12.04.025 - Street design—Driveway curb cuts.

A. One driveway shall be allowed per frontage. In no case shall more than two driveways be allowed on any single or two-family residential property with multiple frontages.

B. With the exception of the limitations identified in 12.04.025.C, all driveway curb cuts shall be limited to the following dimensions.

<i>Property Use</i>	<i>Minimum Driveway Width at sidewalk or property line</i>	<i>Maximum Driveway Width at sidewalk or property line</i>
<i>Single or two-family dwelling with one car garage/parking space</i>	<i>10 feet</i>	<i>12 feet</i>
<i>Single or two-family dwelling with two car garage/parking space</i>	<i>12 feet</i>	<i>24 feet</i>
<i>Single or two-family dwelling with three or more car garages/parking space</i>	<i>18 feet</i>	<i>30 feet</i>
<i>Nonresidential or multi-family residential driveway access</i>	<i>15 feet</i>	<i>40 feet</i>

Applicant's Response: Curb cuts for driveways will conform to these standards for single-family dwellings. Driveway plans will be reviewed at the time of building permit submittal.

12.04.032 - Required sidewalk repair.

A. When the public works director determines that repair of a sidewalk is necessary he or she shall issue a notice to the owner of property adjacent to the sidewalk.

B. The notice shall require the owner of the property adjacent to the defective sidewalk to complete the repair of the sidewalk within ninety days after the service of notice. The notice shall also state that if the repair is not made by the owner, the city may do the work and the cost of the work shall be assessed against the property adjacent to the sidewalk.

C. The public works director shall cause a copy of the notice to be served personally upon the owner of the property adjacent to the defective sidewalk, or the notice may be served by registered or certified mail, return receipt requested. If after diligent search the owner is not discovered, the public works director shall cause a copy of the notice to be posted in a conspicuous place on the property, and such posting shall have the same effect as service of notice by mail or by personal service upon the owner of the property.

D. The person serving the notice shall file with the city recorder a statement stating the time, place and manner of service or notice.

Applicant's Response: Sidewalks will be provided along all public street frontages. The home owners will be responsible for maintenance of the sidewalks per this section of City code.

12.04.050 - Retaining walls—Required.

Every owner of a lot within the city, abutting upon an improved street, where the surface of the lot or tract of land is above the surface of the improved street and where the soil or earth from the lot, or tract of land is liable to, or does slide or fall into the street or upon the sidewalk, or both, shall build a retaining wall, the outer side of which shall be on the line separating the lot, or tract of land from the improved street, and the wall shall be so constructed as to prevent the soil or earth from the lot or tract of land from falling or sliding into the street or upon the sidewalk, or both, and the owner of any such property shall keep the wall in good repair.

Applicant's Response: No retaining walls are proposed. Site grading will ensure that no streets are impacted by slope movement from adjoining lots.

12.04.175 - Street design—Generally.

The location, width and grade of street shall be considered in relation to: existing and planned streets, topographical conditions, public convenience and safety for all modes of travel, existing and identified future transit routes and pedestrian/bicycle accessways, overlay districts, and the proposed use of land to be served by the streets. The street system shall assure an adequate traffic circulation system with intersection angles, grades, tangents and curves appropriate for the traffic to be carried considering the terrain. To the extent possible, proposed streets shall connect to all existing or approved stub streets that abut the development site. The arrangement of streets shall either:

A. Provide for the continuation or appropriate projection of existing principal streets in the surrounding area and on adjacent parcels or conform to a plan for the area approved or adopted by the city to meet a particular situation where topographical or other conditions make continuance or conformance to existing streets impractical;

B. Where necessary to give access to or permit a satisfactory future development of adjoining land, streets shall be extended to the boundary of the development and the resulting dead-end street (stub) may be approved with a temporary turnaround as approved by the city engineer. Notification that the street is planned for future extension shall be posted on the stub street until the street is extended and shall inform the public that the dead-end street may be extended in the future. Access control in accordance with [Chapter] 12.04 shall be required to preserve the objectives of street extensions.

Applicant's Response: As shown on the site plan and the Future Street Plan, the proposed street design provides for the efficient development of this site and the potential for serving adjacent lands should they redevelop from present uses in the future.

12.04.180 - Street design.

All development regulated by this chapter shall provide street improvements in compliance with the standards in Figure 12.04.180 depending on the street classification set forth in the Transportation System Plan and the Comprehensive Plan designation of the adjacent property, unless an alternative plan has been adopted. The standards provided below are maximum design standards and may be reduced with an alternative street design which may be approved based on the modification criteria in [Section] 12.04.007. The steps for reducing the maximum design below are found in the Transportation System Plan.

Table 12.04.180 Street Design

To read the table below, select the road classification as identified in the Transportation System Plan and the Comprehensive Plan designation of the adjacent properties to find the maximum design standards for the road cross section. If the Comprehensive Plan designation on either side of the street differs, the wider right-of-way standard shall apply.

Road Classification	Comprehensive Plan Designation	Right-of-Way Width	Pavement Width	Public Access	Sidewalk	Landscape Strip	Bike Lane	Street Parking	Travel Lanes	Median
Minor Arterial	Mixed Use, Commercial or Public/Quasi Public	116 ft.	94 ft.	0.5 ft.	10.5 ft. sidewalk including 5 ft. x 5 ft. tree wells		6 ft.	8 ft.	(5) 12 ft. Lanes	6 ft.
	Industrial	118 ft.	86 ft.	0.5 ft.	5 ft.	10.5 ft.	6 ft.	7 ft.	(5) 12 ft. Lanes	N/A
	Residential	100 ft.	68 ft.	0.5 ft.	5 ft.	10.5 ft.	6 ft.	7 ft.	(3) 12 ft. Lanes	6 ft.

Road Classification	Comprehensive Plan Designation	Right-of-Way Width	Pavement Width	Public Access	Sidewalk	Landscape Strip	Bike Lane	Street Parking	Travel Lanes	Median
Local	Mixed Use, Commercial or Public/Quasi Public	62 ft.	40 ft.	0.5 ft.	10.5 ft. sidewalk including 5 ft. x 5 ft. tree wells		N/A	8 ft.	(2) 12 ft. Lanes	N/A
	Industrial	60 ft.	38 ft.	0.5 ft.	5 ft.	5.5 ft.	(2) 19 ft. Shared Space			N/A
	Residential	54 ft.	32 ft.	0.5 ft.	5 ft.	5.5 ft.	(2) 16 ft. Shared Space			N/A

1. Pavement width includes, bike lane, street parking, travel lanes and median.
2. Public access, sidewalks, landscape strips, bike lanes and on-street parking are required on both sides of the street in all designations. The right-of-way width and pavement widths identified above include the total street section.
3. A 0.5 foot curb is included in landscape strip or sidewalk width.

4. *Travel lanes may be through lanes or turn lanes.*
5. *The 0.5 foot public access provides access to adjacent public improvements.*
6. *Alleys shall have a minimum right-of-way width of twenty feet and a minimum pavement width of sixteen feet. If alleys are provided, garage access shall be provided from the alley.*

Applicant's Response: The half-street improvement on the Parker Knoll site will be consistent with the City's standard for a local residential street. The half-street right-of-way proposed is 27 feet with a 16' paved section, sidewalk and planter strip. The 10' driving lane in the easement on the park property will be developed per the cross sectional requirements for local streets with respect to gravel and paving. The eventual dedication of the other half of the right-of-way will be dependent upon future approval by a vote of the people. Where Reddaway turns towards Kalal Ct., we are proposing a 28' wide street in a 40' wide right-of-way with sidewalk easements. A modification is being requested to allow this reduced standard, as discussed above under Section 12.04.007.

12.04.185 - Street design—Access control.

A. A street which is dedicated to end at the boundary of the development or in the case of half-streets dedicated along a boundary shall have an access control granted to the city as a city controlled plat restriction for the purposes of controlling ingress and egress to the property adjacent to the end of the dedicated street. The access control restriction shall exist until such time as a public street is created, by dedication and accepted, extending the street to the adjacent property.

B. The city may grant a permit for the adjoining owner to access through the access control.

C. The plat shall contain the following access control language or similar on the face of the map at the end of each street for which access control is required: "Access Control (See plat restrictions)."

D. Said plats shall also contain the following plat restriction note(s): "Access to (name of street or tract) from adjoining tracts (name of deed document number[s]) shall be controlled by the City of Oregon City by the recording of this plat, as shown. These access controls shall be automatically terminated upon the acceptance of a public road dedication or the recording of a plat extending the street to adjacent property that would access through those Access Controls."

Applicant's Response: Access control will be provided at the end of Reddaway Avenue per City requirements.

12.04.190 - Street design—Alignment.

The centerline of streets shall be:

A. Aligned with existing streets by continuation of the centerlines; or

B. Offset from the centerline by no more than five (5) feet, provided appropriate mitigation, in the judgment of the city engineer, is provided to ensure that the offset intersection will not pose a safety hazard.

Applicant's Response: The centerline of Reddaway Avenue aligns with the existing centerline on the opposite side of Leland Road.

12.04.194 - Traffic sight obstructions.

All new streets shall comply with the Traffic Sight Obstructions in Chapter 10.32.

Applicant's Response: The street will be designed to conform to the specifications of Chapter 10.32.

12.04.195 - Spacing standards.

A. All new streets shall be designed as local streets unless otherwise designated as arterials and collectors in Figure 8 in the transportation system plan. The maximum block spacing between streets is five hundred thirty feet and the minimum block spacing between streets is one hundred fifty feet as measured between the right-of-way centerlines. If the maximum block size is exceeded, pedestrian accessways must be provided every three hundred thirty feet. The spacing standards within this section do not apply to alleys.

B. All new development and redevelopment shall meet the minimum driveway spacing standards identified in Table 12.04.195.B.

Table 12.04.195.B Minimum Driveway Spacing Standards

<i>Street Functional Classification</i>	<i>Minimum Driveway Spacing Standards</i>	<i>Distance</i>
<i>Major Arterial Streets</i>	<i>Minimum distance from a street corner to a driveway for all uses and Minimum distance between driveways for uses other than single and two-family dwellings</i>	<i>175 ft.</i>
<i>Minor Arterial Streets</i>	<i>Minimum distance from a street corner to a driveway for all uses and Minimum distance between driveways for uses other than single and two-family dwellings</i>	<i>175 ft.</i>
<i>Collector Streets</i>	<i>Minimum distance from a street corner to a driveway for all uses and Minimum distance between driveways for uses other than single and two-family dwellings</i>	<i>100 ft.</i>
<i>Local Streets</i>	<i>Minimum distance from a street corner to a driveway for all uses and Minimum distance between driveways for uses other than single and two-family dwellings</i>	<i>25 ft.</i>

The distance from a street corner to a driveway is measured along the right-of-way from the edge of the intersection right-of-way to the nearest portion of the driveway and the distance between driveways is measured at the nearest portions of the driveway at the right-of-way.

Applicant's Response: Modification of the block spacing standards is requested. Please see the discussion above under Section 12.04.007.

12.04.199 - Pedestrian and bicycle accessways.

Pedestrian/bicycle accessways are intended to provide direct, safe and convenient connections between residential areas, retail and office areas, institutional facilities, industrial parks, transit streets, neighborhood activity centers, rights-of-way, and pedestrian/bicycle accessways which minimize out-of-direction travel, and transit-orientated developments where public street connections for automobiles, bicycles and pedestrians are unavailable.

Pedestrian/bicycle accessways are appropriate in areas where public street options are unavailable, impractical or inappropriate. Pedestrian and bicycle accessways are required through private property or as right-of-way connecting development to the right-of-way at intervals not exceeding three hundred thirty feet of frontage; or where the lack of street continuity creates inconvenient or out of direction travel patterns for local pedestrian or bicycle trips.

A. Entry points shall align with pedestrian crossing points along adjacent streets and with adjacent street intersections.

Applicant's Response: No pedestrian or bicycle accessways are proposed. The existing development pattern precludes connection through to Kalal Ct.

B. Accessways shall be free of horizontal obstructions and have a nine-foot, six-inch high vertical clearance to accommodate bicyclists. To safely accommodate both pedestrians and bicycles, accessway right-of-way widths shall be as follows:

- 1. Accessways shall have a fifteen-foot-wide right-of-way with a seven-foot wide paved surface between a five-foot planter strip and a three-foot planter strip.*
- 2. If an accessway also provides secondary fire access, the right-of-way width shall be at least twenty-three feet wide with a fifteen-foot paved surface a five-foot planter strip and a three-foot planter strip.*

Applicant's Response: Not applicable. No accessways are proposed.

C. Accessways shall be direct with at least one end point of the accessway always visible from any point along the accessway. On-street parking shall be prohibited within fifteen feet of the intersection of the accessway with public streets to preserve safe sight distance and promote safety.

Applicant's Response: Not applicable. No accessways are proposed.

D. To enhance pedestrian and bicycle safety, accessways shall be lighted with pedestrian-scale lighting. Accessway lighting shall be to a minimum level of one-half-foot-candles, a one and one-half foot-candle average, and a maximum to minimum ratio of seven-to-one and shall be oriented not to shine upon adjacent properties. Street lighting shall be provided at both entrances.

Applicant's Response: Not applicable. No accessways are proposed.

E. Accessways shall comply with Americans with Disabilities Act (ADA).

Applicant's Response: Not applicable. No accessways are proposed.

F. The planter strips on either side of the accessway shall be landscaped along adjacent property by installation of the following:

- 1. Within the three-foot planter strip, an evergreen hedge screen of thirty to forty-two inches high or shrubs spaced no more than four feet apart on average;*
- 2. Ground cover covering one hundred percent of the exposed ground. No bark mulch shall be allowed except under the canopy of shrubs and within two feet of the base of trees;*
- 3. Within the five-foot planter strip, two-inch minimum caliper trees with a maximum of thirty-five feet of separation between the trees to increase the tree canopy over the accessway;*
- 4. In satisfying the requirements of this section, evergreen plant materials that grow over forty-two inches in height shall be avoided. All plant materials shall be selected from the Oregon City Native Plant List.*

Applicant's Response: Not applicable. No accessways are proposed.

G. Accessways shall be designed to prohibit unauthorized motorized traffic. Curbs and removable, lockable bollards are suggested mechanisms to achieve this.

Applicant's Response:

H. Accessway surfaces shall be paved with all-weather materials as approved by the city. Pervious materials are encouraged. Accessway surfaces shall be designed to drain stormwater runoff to the side or sides of the accessway. Minimum cross slope shall be two percent.

Applicant's Response: Not applicable. No accessways are proposed.

I. In parks, greenways or other natural resource areas, accessways may be approved with a five-foot wide gravel path with wooden, brick or concrete edgings.

Applicant's Response: Not applicable. No accessways are proposed.

K. Ownership, liability and maintenance of accessways. To ensure that all pedestrian/bicycle accessways will be adequately maintained over time, the hearings body shall require one of the following:

- 1. Dedicate the accessways to the public as public right-of-way prior to the final approval of the development; or*
- 2. The developer incorporates the accessway into a recorded easement or tract that specifically requires the property owner and future property owners to provide for the ownership, liability and maintenance of the accessway.*

Applicant's Response: Not applicable. No accessways are proposed.

12.04.205 - Mobility standards.

Development shall demonstrate compliance with intersection mobility standards. When evaluating the performance of the transportation system, the City of Oregon City requires all intersections, except for the facilities identified in subsection D below, to be maintained at or below the following mobility standards during the two-hour peak operating conditions. The first hour has the highest weekday traffic

volumes and the second hour is the next highest hour before or after the first hour. Except as provided otherwise below, this may require the installation of mobility improvements as set forth in the transportation system plan or as otherwise identified by the city transportation engineer.

A. For intersections within the regional center, the following mobility standards apply:

1. During the first hour, a maximum v/c ratio of 1.10 shall be maintained. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.
2. During the second hour, a maximum v/c ratio of 0.99 shall be maintained at signalized intersections. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.
3. Intersections located on the Regional Center boundary shall be considered within the Regional Center.

B. For intersections outside of the Regional Center but designated on the Arterial and Throughway Network, as defined in the Regional Transportation Plan, the following mobility standards apply:

1. During the first hour, a maximum v/c ratio of 0.99 shall be maintained. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.
2. During the second hour, a maximum v/c ratio of 0.99 shall be maintained at signalized intersections. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.

C. For intersections outside the boundaries of the Regional Center and not designated on the Arterial and Throughway Network, as defined in the Regional Transportation Plan, the following mobility standards apply:

1. For signalized intersections:
 - a. During the first hour, LOS "D" or better will be required for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of the critical movements.
 - b. During the second hour, LOS "D" or better will be required for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of the critical movements.
2. For unsignalized intersections outside of the boundaries of the Regional Center:
 - a. For unsignalized intersections, during the peak hour, all movements serving more than twenty vehicles shall be maintained at LOS "E" or better. LOS "F" will be tolerated at movements serving no more than twenty vehicles during the peak hour.

D. Until the city adopts new performance measures that identify alternative mobility targets, the city shall exempt proposed development that is permitted, either conditionally, outright, or through detailed development master plan approval, from compliance with the above-referenced mobility standards for the following state-owned facilities:

I-205/OR 99E Interchange
I-205/OR 213 Interchange
OR 213/Beavercreek Road

State intersections located within or on the Regional Center Boundaries

1. In the case of conceptual development approval for a master plan that impacts the above references intersections:

a. The form of mitigation will be determined at the time of the detailed development plan review for subsequent phases utilizing the Code in place at the time the detailed development plan is submitted; and

b. Only those trips approved by a detailed development plan review are vested.

2. Development which does not comply with the mobility standards for the intersections identified in [Section] 12.04.205.D shall provide for the improvements identified in the Transportation System Plan (TSP) in an effort to improve intersection mobility as necessary to offset the impact caused by development. Where required by other provisions of the Code, the applicant shall provide a traffic impact study that includes an assessment of the development's impact on the intersections identified in this exemption and shall construct the intersection improvements listed in the TSP or required by the Code.

Applicant's Response: The requirements of this section are met. Please refer to the attached TAL prepared by Lancaster Engineering, Inc.

12.04.210 - Street design—Intersection angles.

Except where topography requires a lesser angle, streets shall be laid out to intersect at angles as near as possible to right angles. In no case shall the acute angles be less than eighty degrees unless there is a special intersection design. An arterial or collector street intersecting with another street shall have at least one hundred feet of tangent adjacent to the intersection unless topography requires a lesser distance. Other streets, except alleys, shall have at least fifty feet of tangent adjacent to the intersection unless topography requires a lesser distance. All street intersections shall be provided with a minimum curb return radius of twenty-five feet for local streets. Larger radii shall be required for higher street classifications as determined by the city engineer. Additional right-of-way shall be required to accommodate curb returns and sidewalks at intersections. Ordinarily, intersections should not have more than two streets at any one point.

Applicant's Response: The proposed intersection of Reddaway Street with Leland Road has been designed at a right angle.

12.04.215 - Street design—Off-site street improvements.

During consideration of the preliminary plan for a development, the decision maker shall determine whether existing streets impacted by, adjacent to, or abutting the development meet the city's applicable planned minimum design or dimensional requirements. Where such streets fail to meet these requirements, the decision-maker shall require the applicant to make proportional improvements sufficient to achieve conformance with minimum applicable design standards required to serve the proposed development.

Applicant's Response: No off-site improvements are proposed.

12.04.220 - Street design—Half street.

Half streets, while generally not acceptable, may be approved where essential to the development, when in conformance with all other applicable requirements, and where it will not create a safety hazard. When approving half streets, the decision maker must first determine that it will be practical to require the dedication of the other half of the street when the adjoining property is divided or developed. Where the decision maker approves a half street, the applicant must construct an additional ten feet of pavement width so as to make the half street safe and usable until such time as the other half is constructed. Whenever a half street is adjacent to property capable of being divided or developed, the other half of the street shall be provided and improved when that adjacent property divides or develops.

Access control may be required to preserve the objectives of half streets.

When the remainder of an existing half-street improvement is made it shall include the following items: dedication of required right-of-way, construction of the remaining portion of the street including pavement, curb and gutter, landscape strip, sidewalk, street trees, lighting and other improvements as required for that particular street. It shall also include at a minimum the pavement replacement to the centerline of the street. Any damage to the existing street shall be repaired in accordance with the city's "Moratorium Pavement Cut Standard" or as approved by the city engineer.

Applicant's Response: The half-street design is the only option available for the development of this site. Proposals that would have allowed the developer to construct a full street utilizing a portion of the park property were defeated twice by the voters. The present proposal provides for a half-street on the subject property and an additional 10 feet of pavement on the existing roadway easement on the park property.

12.04.225 - Street design—Cul-de-sacs and dead-end streets.

The city discourages the use of cul-de-sacs and permanent dead-end streets except where construction of a through street is found by the decision maker to be impracticable due to topography or some significant physical constraint such as geologic hazards, wetland, natural or historic resource areas, dedicated open space, existing development patterns, arterial access restrictions or similar situation as determined by the community development director. When permitted, access from new cul-de-sacs and permanent dead-end streets shall be limited to a maximum of twenty-five dwelling units and a maximum street length of two hundred feet, as measured from the right-of-way line of the nearest intersecting street to the back of the cul-de-sac curb face. In addition, cul-de-sacs and dead end roads shall include pedestrian/bicycle accessways as required in this chapter. This section is not intended to preclude the use of curvilinear eyebrow widening of a street where needed.

Where approved, cul-de-sacs shall have sufficient radius to provide adequate turn-around for emergency vehicles in accordance with fire district and city adopted street standards. Permanent dead-end streets other than cul-de-sacs shall provide public street right-of-way/easements sufficient to provide turn-around space with appropriate no-parking signs or markings for waste disposal, sweepers, and other long vehicles in the form of a hammerhead or other design to

be approved by the decision maker. Driveways shall be encouraged off the turnaround to provide for additional on-street parking space.

Applicant's Response: No cul-de-sac streets are proposed. Reddaway Street will dead-end at the property's boundary until such time as redevelopment of property along Kalal Ct. allows for its extension. A turn-around has been provided, as shown on the site plan.

12.04.230 - Street design—Street names.

Except for extensions of existing streets, no street name shall be used which will duplicate or be confused with the name of an existing street. Street names shall conform to the established standards in the city and shall be subject to the approval of the city.

Applicant's Response: The proposed street will be the extension of the existing Reddaway Street. No new street names are proposed.

12.04.235 - Street design—Grades and curves.

Grades and center line radii shall conform to the standards in the city's street design standards and specifications.

Applicant's Response: As shown on the preliminary engineering drawings submitted with this application, the proposed grades and centerline radii conform to City standards.

12.04.240 - Street design—Development abutting arterial or collector street.

Where development abuts or contains an existing or proposed arterial or collector street, the decision maker may require: access control; screen planting or wall contained in an easement or otherwise protected by a restrictive covenant in a form acceptable to the decision maker along the rear or side property line; or such other treatment it deems necessary to adequately protect residential properties or afford separation of through and local traffic. Reverse frontage lots with suitable depth may also be considered an option for residential property that has arterial frontage. Where access for development abuts and connects for vehicular access to another jurisdiction's facility then authorization by that jurisdiction may be required.

Applicant's Response: Leland Road is a minor arterial street. The existing home on Lot 1 fronts onto this street. Access to this lot will be reconfigured with a driveway onto the extension of Reddaway Street. There is no need for screen planting or a wall as the existing home sets back a considerable distance from the street.

12.04.245 - Street design—Pedestrian and bicycle safety.

Where deemed necessary to ensure public safety, reduce traffic hazards and promote the welfare of pedestrians, bicyclists and residents of the subject area, the decision maker may require that local streets be so designed as to discourage their use by nonlocal automobile traffic.

All crosswalks shall include a large vegetative or sidewalk area which extends into the street pavement as far as practicable to provide safer pedestrian crossing opportunities. These curb extensions can increase the visibility of pedestrians and provide a shorter crosswalk distance as well as encourage motorists to drive slower. The decision maker may approve an alternative design that achieves the same standard for constrained sites or where deemed unnecessary by the city engineer.

Applicant's Response: The applicant does not believe that any special design features are necessary to discourage use of the street by non-local traffic. The street does not continue beyond the limits of the project. The side of the street adjacent to the park should be designated "NO PARKING" in order to discourage parking for park purposes. The existing crosswalk on Leland Rd. is adequate and no new crosswalks are proposed.

12.04.255 - Street design—Alleys.

Public alleys shall be provided in the following districts R-5, R-3.5, R-2, MUC-1, MUC-2 and NC zones unless other permanent provisions for private access to off-street parking and loading facilities are approved by the decision maker. The corners of alley intersections shall have a radius of not less than ten feet.

Applicant's Response: Not applicable. No alleys are proposed.

12.04.260 - Street design—Transit.

Streets shall be designed and laid out in a manner that promotes pedestrian and bicycle circulation. The applicant shall coordinate with transit agencies where the application impacts transit streets as identified in [Section] 17.04.1310. Pedestrian/bicycle access ways shall be provided as necessary in Chapter 12.04 to minimize the travel distance to transit streets and stops and neighborhood activity centers. The decision maker may require provisions, including easements, for transit facilities along transit streets where a need for bus stops, bus pullouts or other transit facilities within or adjacent to the development has been identified.

Applicant's Response: Not applicable. The proposed development does not contain or abut any transit streets.

12.04.265 - Street design—Planter strips.

All development shall include vegetative planter strips that are five feet in width or larger and located adjacent to the curb. This requirement may be waived or modified if the decision maker finds it is not practicable. The decision maker may permit constrained sites to place street trees on the abutting private property within ten feet of the public right-of-way if a covenant is recorded on the title of the property identifying the tree as a city street tree which is maintained by the property owner. Development proposed along a collector, minor arterial, or major arterial street may use tree wells with root barriers located near the curb within a wider sidewalk in lieu of a planter strip, in which case each tree shall have a protected area to ensure proper root growth and reduce potential damage to sidewalks, curbs and gutters.

To promote and maintain the community tree canopy adjacent to public streets, trees shall be selected and planted in planter strips in accordance with Chapter 12.08, Street Trees. Individual abutting lot owners shall be legally responsible for maintaining healthy and attractive trees and vegetation in the planter strip. If a homeowners' association is created as part of the development, the association may assume the maintenance obligation through a legally binding mechanism, e.g., deed restrictions, maintenance agreement, etc., which shall be reviewed and approved by the city attorney. Failure to properly maintain trees and vegetation in a planter strip shall be a violation of this code and enforceable as a civil infraction.

Applicant's Response: Consistent with the requirements of this section, proposed street improvements include the provision of planter strips that will accommodate street trees

Chapter 12.08 - PUBLIC AND STREET TREES

12.08.015 - Street tree planting and maintenance requirements.

All new construction or major redevelopment shall provide street trees adjacent to all street frontages. Species of trees shall be selected based upon vision clearance requirements, but shall in all cases be selected from the Oregon City Street Tree List or be approved by a certified arborist. If a setback sidewalk has already been constructed or the Development Services determines that the forthcoming street design shall include a setback sidewalk, then all street trees shall be installed with a planting strip. If existing street design includes a curb-tight sidewalk, then all street trees shall be placed within the front yard setback, exclusive of any utility easement.

Applicant's Response: Street trees are proposed to be planted consistent with this section, as shown on the plans submitted with this application.

A. One street tree shall be planted for every thirty-five feet of property frontage. The tree spacing shall be evenly distributed throughout the total development frontage. The community development director may approve an alternative street tree plan if site or other constraints prevent meeting the placement of one street tree per thirty-five feet of property frontage.

Applicant's Response: Street trees are proposed to be planted consistent with this section, as shown on the plans submitted with this application.

B. The following clearance distances shall be maintained when planting trees:

- 1. Fifteen feet from streetlights;*
- 2. Five feet from fire hydrants;*
- 3. Twenty feet from intersections;*
- 4. A minimum of five feet (at mature height) below power lines.*

Applicant's Response: The preliminary layout of street trees is shown on plans submitted with this application. Final locations showing full compliance with these standards will be submitted with construction plans.

C. All trees shall be a minimum of two inches in caliper at six inches above the root crown and installed to city specifications.

Applicant's Response: Street trees to be planted will comply with this section, as noted on plans submitted with this application.

D. All established trees shall be pruned tight to the trunk to a height that provides adequate clearance for street cleaning equipment and ensures ADA complaint clearance for pedestrians.

Applicant's Response: Any trees remaining near street rights-of-way will be pruned in accordance with this section.

12.08.020 - Street tree species selection.

The community development director may specify the species of street trees required to be planted if there is an established planting scheme adjacent to a lot frontage, if there are obstructions in the planting strip, or if overhead power lines are present.

Applicant's Response: There is no established planting scheme in this area.

12.08.035 - Public tree removal.

Existing street trees shall be retained and protected during construction unless removal is specified as part of a land use approval or in conjunction with a public facilities construction project, as approved by the community development director. A diseased or hazardous street tree, as determined by a registered arborist and verified by the City, may be removed if replaced. A non-diseased, non-hazardous street tree that is removed shall be replaced in accordance with the Table 12.08.035.

All new street trees will have a minimum two-inch caliper trunk measured six inches above the root crown. The community development director may approve off-site installation of replacement trees where necessary due to planting constraints. The community development director may additionally allow a fee in-lieu of planting the tree(s) to be placed into a city fund dedicated to planting trees in Oregon City in accordance with Oregon City Municipal Code 12.08.

Table 12.08.035

<i>Replacement Schedule for Trees Determined to be Dead, Diseased or Hazardous by a Certified Arborist</i>		<i>Replacement Schedule for Trees Not Determined to be Dead, Diseased or Hazardous by a Certified Arborist</i>	
<i>Diameter of tree to be Removed (Inches of diameter at 4-ft height)</i>	<i>Number of Replacement Trees to be Planted</i>	<i>Diameter of tree to be Removed (Inches of diameter at 4-ft height)</i>	<i>Number of Replacement Trees to be Planted</i>
<i>Any Diameter</i>	<i>1 Tree</i>	<i>Less than 6"</i>	<i>1 Tree</i>
		<i>6" to 12"</i>	<i>2 Trees</i>
		<i>13" to 18"</i>	<i>3 Trees</i>
		<i>19" to 24"</i>	<i>4 Trees</i>

		25" to 30"	5 Trees
		31" and over	8 Trees

Applicant's Response: Not applicable. No trees are proposed to be removed within publicly owned lands.

COMPLIANCE WITH CHAPTER 13.12 – STORMWATER MANAGEMENT

13.12.050 - Applicability and exemptions.

This chapter establishes performance standards for stormwater conveyance, quantity and quality.

Pursuant to each of the subsections below, proposed activities may be required to meet the performance standards for stormwater conveyance, stormwater quantity or stormwater quality.

Comment: The proposed subdivision is subject to the stormwater conveyance, stormwater quantity control, and stormwater quality control provisions of this chapter.

13.12.080 - Submittal requirements.

A. Timing and Scope of Required Submittal.

1. *Applications subject to the stormwater conveyance requirements of this chapter shall include an engineered drainage plan and design flow calculation report submitted prior to, or contemporaneous with, submittal of an application for a building, land use or other city issued permit.*
2. *Applications subject to the stormwater quantity and/or Category A quality requirements of this chapter shall include an engineered drainage plan and an engineered drainage report submitted prior to, or contemporaneous with, submittal of an application for a building, land use or other city issued permit.*
3. *Applications subject to Category B water quality special management practices shall demonstrate compliance with the additional management practices for commercial, industrial and multi-unit dwelling land uses of the Public Works Stormwater and Grading Design Standards as part of the site plan and design review process.*
4. *Applications subject to Category C water quality requirements for the Clackamas River Watershed are subject to OAR 340-41-470 (Three Basin Rule). No new discharges will be approved until a copy of a current DEQ permit, or written statement from DEQ that none is required, is on file with the city.*

B. Required engineered drainage plans, drainage reports, and design flow calculation reports, which contain methods and proposed facilities to manage stormwater conveyance, quantity and/or quality, shall be prepared in compliance with the submittal requirements of the Public Works Stormwater and Grading Design Standards.

- C. *Each project site, which may be composed of one or more contiguous parcels of land, shall have a separate valid city approved plan and report before proceeding with construction.*

Comment: A storm drainage report and preliminary storm drainage plan have been prepared for this proposed subdivision and are included in the application submittal package. These documents have been prepared in accordance with city standards.

13.12.090 - Approval criteria for engineered drainage plans and drainage report.

An engineered drainage plan and/or drainage report shall be approved only upon making the following findings:

- A. *The plan and report demonstrate how the proposed development and stormwater management facilities will accomplish the purpose statements of this chapter;*
B. *The plan and report meet the requirements of the Public Works Stormwater and Grading Design Standards adopted by resolution under Section 13.12.020*
C. *Unless otherwise exempted by Section 13.12.050(B), the plan and report includes adequate stormwater quantity control facilities, so that when the proposed land development activity takes place, peak rates and volumes of runoff:*
1. *Do not exceed the capacity of receiving drainage conveyance facilities;*
2. *Do not increase the potential for streambank erosion; and*
3. *Do not add volume to an off-site closed depression without providing for mitigation.*

Comment: The plan and report attached to this application demonstrate that the runoff from the public street in the project will be collected and detained in street swales. It will then be directed to the existing storm sewer in Leland Road. Runoff from the 10-foot paved strip in the easement on the park property is proposed to be treated with a filter strip, as shown on the preliminary utility plan submitted with this application.

- D. *Unless otherwise exempted by Section 13.12.050(C), the proposed development includes:*
1. *Adequate stormwater quality control facilities, so that when the proposed land development activity takes place, the temperature and overall pollution level of stormwater runoff is no greater than the water entering. When no water enters a project, then stormwater runoff shall be compared to rain samples; and*
2. *Stormwater quality control facilities which:*
a. *Are in compliance with applicable National Pollutant Discharge Elimination System (NPDES) requirements;*
b. *Minimize the deterioration of existing watercourses, culverts, bridges, dams and other structures; and*
c. *Minimize any increase in nonpoint source pollution.*

Comment: The proposed detention and treatment facilities have been designed in accordance with City standards to accomplish these requirements. Please refer to the storm report attached to this application.

E. The storm drainage design within the proposed development includes provisions to adequately control runoff from all public and private streets and roof, footing, and area drains and ensures future extension of the current drainage system.

Comment: All runoff from roofs, footings and streets will be collected by the storm sewer system, as shown on the attached preliminary storm plan.

F. Streambank erosion protection is provided where stormwater, directly or indirectly, discharges to open channels or streams. The postdevelopment peak stormwater discharge rate from a development site for the two year, twenty-four hour duration storm event shall not exceed fifty percent of the two year, twenty-four hour predevelopment peak runoff rate.

Comment: The proposed storm sewer system will provide for protection of stream channels as required.

G. Specific operation and maintenance measures are proposed that ensure that the proposed stormwater quantity control facilities will be properly operated and maintained.

Comment: The storm water quantity control facilities will be dedicated to, and operated and maintained by, the City of Oregon City.

COMPLIANCE WITH CHAPTER 17.20 – RESIDENTIAL DESIGN AND LANDSCAPING STANDARDS

17.20.015 - Street trees.

All new single or two-family dwellings or additions of twenty-five percent or more of the existing square footage of the home (including the living space and garage(s)) shall install a street tree along the frontage of the site, within the abutting developed right-of-way. Existing trees may be used to meet this requirement. A picture of the planted tree shall be submitted to the planning division prior to issuance of occupancy. Upon approval by the community development director, when a planter strip is not present, a tree may be placed within an easement on the abutting private property within ten feet of the public right-of-way if a covenant is recorded for the property with the Clackamas County Records Office identifying the tree as a city street tree, subject to the standards in Chapter 12.08 of the Oregon City Municipal Code. The street tree shall be a minimum of two-inches in caliper and either selected from the Oregon City Street Tree List or approved by a certified arborist for the planting location.

Comment: Street trees will be provided along the street frontages as required by this section. A preliminary street tree plan is shown on the preliminary plat. Trees will be a minimum of 2" in caliper and will be selected from the Oregon City Street Tree List.

17.20.030 - Residential design options.

Comment: Compliance with the residential design options will be reviewed at the time of building permit application.

17.20.035 - Corner lots and through lots.

Comment: Compliance with these provisions will be reviewed at the time of building permit application.

17.20.040 - Residential design elements.

Comment: Compliance with these provisions will be reviewed at the time of building permit application.

17.20.050 - Main entrances.

Comment: Compliance with these provisions will be reviewed at the time of building permit application.

17.20.060 - Residential yard landscaping.

Comment: Compliance with these provisions will be reviewed at the time of building permit application.

COMPLIANCE WITH CHAPTER 17.41 – TREE PROTECTION STANDARDS

17.41.020 - Tree protection—Applicability.

Comment: The proposed subdivision is subject to the provisions of this chapter.

17.41.050 - Same—Compliance options.

Applicants for review shall comply with these requirements through one or a combination of the following procedures:

- A. Option 1—Mitigation. Retention and removal of trees, with subsequent mitigation by replanting pursuant to Sections 17.41.060 or 17.41.070. All replanted and saved trees shall be protected by a permanent restrictive covenant or easement approved in form by the city.*
- B. Option 2—Dedicated Tract. Protection of trees or groves by placement in a tract within a new subdivision or partition plat pursuant to Sections 17.41.080—17.41.100; or*
- C. Option 3—Restrictive Covenant. Protection of trees or groves by recordation of a permanent restrictive covenant pursuant to Sections 17.41.110—17.41.120; or*
- D. Option 4—Cash-in-lieu of planting pursuant to Section 17.41.130*

A regulated tree that has been designated for protection pursuant to this section must be retained or permanently protected unless it has been determined by a certified arborist to be diseased or hazardous, pursuant to the following applicable provisions.

The community development director, pursuant to a Type II procedure, may allow a property owner to cut a specific number of trees within a regulated grove if preserving those trees would:

- 1. Preclude achieving eighty percent of minimum density with reduction of lot size; or*
- 2. Preclude meeting minimum connectivity requirements for subdivisions.*

Comment: The preliminary Tree Plan shows the trees that are subject to the provisions of this section. This Tree Plan shows a total of sixteen trees that are proposed to be removed to allow for construction. All but one of these trees are located within street rights-of-way and areas that would be impacted by the building of proposed homes and utilities. One tree on Lot 6 that is not within the building envelope is proposed to be removed because it is in a side yard area where foundation excavation and construction activities are likely to impact the roots of the tree.

17.41.060 - Tree removal and replanting—Mitigation (Option 1).

- A. Applicants for development who select this option shall ensure that all healthy trees shall be preserved outside the construction area as defined in Chapter 17.04 to the extent practicable. Compliance with these standards shall be demonstrated in a tree mitigation plan report prepared by a certified arborist, horticulturalist or forester or other environmental professional with experience and academic credentials in forestry or arboriculture. At the applicant's expense, the city may require the report to be reviewed by a consulting arborist. The number of replacement trees required on a development site shall be calculated separately from, and in addition to, any public or street trees in the public right-of-way required under section 12.08—Community Forest and Street Trees.*
- B. The applicant shall determine the number of trees to be mitigated on the site by counting all of the trees six inch DBH (minimum four and one-half feet from the ground) or larger on the entire site and either:*
 - 1. Trees that are removed outside of the construction area, shall be replanted with the number of trees specified in Column 1 of Table 17.41.060-1. Trees that are removed within the construction area shall be replanted with the number of replacement trees required in Column 2; or*
 - 2. Diseased or hazardous trees, when the condition is verified by a certified arborist to be consistent with the definition in Section 17.04.1360, may be removed from the tree replacement calculation. Regulated healthy trees that are removed outside of the construction area, shall be replanted with the number of trees specified in Column 1 of Table 17.41.060-1. Regulated healthy trees*

that are removed within the construction area shall be replanted with the number of replacement trees required in Column 2.

Comment: The applicant proposes to make use of Mitigation Option 1. Trees not identified for removal will be protected outside of the construction area throughout the construction phase of the project. Replacement trees will be planted pursuant to the provisions of this section. Please refer to the preliminary Tree Plan submitted with this application. A final plan will be submitted for review with the construction plans prior to final plat approval.

17.41.070 Planting area priority for mitigation (Option 1).

Development applications which opt for removal of trees with subsequent replanting pursuant to section 17.41.050A. shall be required to mitigate for tree cutting by complying with the following priority for replanting standards below:

- A. First Priority. Replanting on the development site.*
- B. Second Priority. Off-site replacement tree planting locations. If the community development director determines that it is not practicable to plant the total number of replacement trees on-site, a suitable off-site planting location for the remainder of the trees may be approved that will reasonably satisfy the objectives of this section. Such locations may include either publicly owned or private land and must be approved by the community development director.*

Comment: A total of 41 trees are required to be planted as mitigation, based upon trees shown for removal on the preliminary Tree Plan. The applicant is planning to place these mitigation trees on lots within this subdivision, as shown on the preliminary Tree Plan

17.41.080 - Tree preservation within subdivisions and partitions—Dedicated tract (Option 2).

Comment: Not applicable. The applicant does not propose to make use of these provisions.

17.41.110 - Tree protection by restrictive covenant (Option 3).

Comment: Not applicable. The applicant does not propose to make use of these provisions.

17.41.1[25] - Cash-in-lieu of planting (tree bank/fund) (Option 4).

Comment: Not applicable. The applicant does not propose to make use of these provisions.

17.41.130 - Regulated tree protection procedures during construction.

- A. No permit for any grading or construction of public or private improvements may be released prior to verification by the community development director that regulated trees designated for protection or conservation have been protected according to the*

following standards. No trees designated for removal shall be removed without prior written approval from the community development director.

- B. Tree protection shall be as recommended by a qualified arborist or, as a minimum, to include the following protective measures:*
- C. Changes in soil hydrology due to soil compaction and site drainage within tree protection areas shall be avoided. Drainage and grading plans shall include provision to ensure that drainage of the site does not conflict with the standards of this section. Excessive site run-off shall be directed to appropriate storm drainage facilities and away from trees designated for conservation or protection.*

Comment: The required procedures and arborist recommendations will be followed throughout the period of construction activities on the site. Changes in soils hydrology and site drainage within tree protection areas will be avoided.

CHAPTER 15.48 - GRADING, FILLING AND EXCAVATING

15.48.090 Submittal requirements.

An engineered grading plan or an abbreviated grading plan shall be prepared in compliance with the submittal requirements of the Public Works Stormwater and Grading Design Standards whenever a city approved grading permit is required. In addition, a geotechnical engineering report and/or residential lot grading plan may be required pursuant to the criteria listed below.

A. Abbreviated Grading Plan. The city shall allow the applicant to submit an abbreviated grading plan in compliance with the submittal requirements of the Public Works Stormwater and Grading Design Standards if the following criteria are met:

- 1. No portion of the proposed site is within the flood management area overlay district pursuant to Chapter 17.42, the unstable soils and hillside constraints overlay district pursuant to Chapter 17.44, or a water quality resource area pursuant to Chapter 17.49; and*
- 2. The proposed filling or grading activity does not involve more than fifty cubic yards of earth.*

B. Engineered Grading Plan. The city shall require an engineered grading plan in compliance with the submittal requirements of the Public Works Stormwater and Grading Design Standards to be prepared by a professional engineer if the proposed activities do not qualify for abbreviated grading plan.

C. Geotechnical Engineering Report. The city shall require a geotechnical engineering report in compliance with the minimum report requirements of the Public Works Stormwater and Grading Design Standards to be prepared by a professional engineer who specializes in geotechnical work when any of the following site conditions may exist in the development area:

- 1. When any publicly maintained facility (structure, street, pond, utility, park, etc.) will be supported by any engineered fill;*
- 2. When an embankment for a stormwater pond is created by the placement of fill;*
- 3. When, by excavation, the soils remaining in place are greater than three feet high and less than twenty feet wide.*

D. Residential Lot Grading Plan. The city shall require a residential lot grading plan in compliance with the minimum report requirements of the Public Works Stormwater and Grading Design Standards to be prepared by a professional engineer for all land divisions creating new residential building lots or where a public improvement project is

required to provide access to an existing residential lot.

Applicant's Response: A preliminary grading plan has been prepared by the project engineer and is included with the application submittal. Final construction plans will be prepared prior to commencement of site development activities. None of the triggers that would require a geotechnical report are proposed for this site.

CHAPTER 17.47 - EROSION AND SEDIMENT CONTROL

17.47.070 Erosion and sediment control plans.

A. An application for an erosion and sediment control permit shall include an erosion and sediment control plan, which contains methods and interim measures to be used during and following construction to prevent or control erosion prepared in compliance with City of Oregon City public works standards for erosion and sediment control. These standards are incorporated herein and made a part of this title and are on file in the office of the city recorder.

Applicant's Response: The preliminary grading plan submitted with this application includes the preliminary design for erosion and sediment control. The final construction plans will be submitted prior to site development.

PARKER KNOLL
PRELIMINARY STORM DRAINAGE REPORT
OREGON CITY FILE PA 16-04



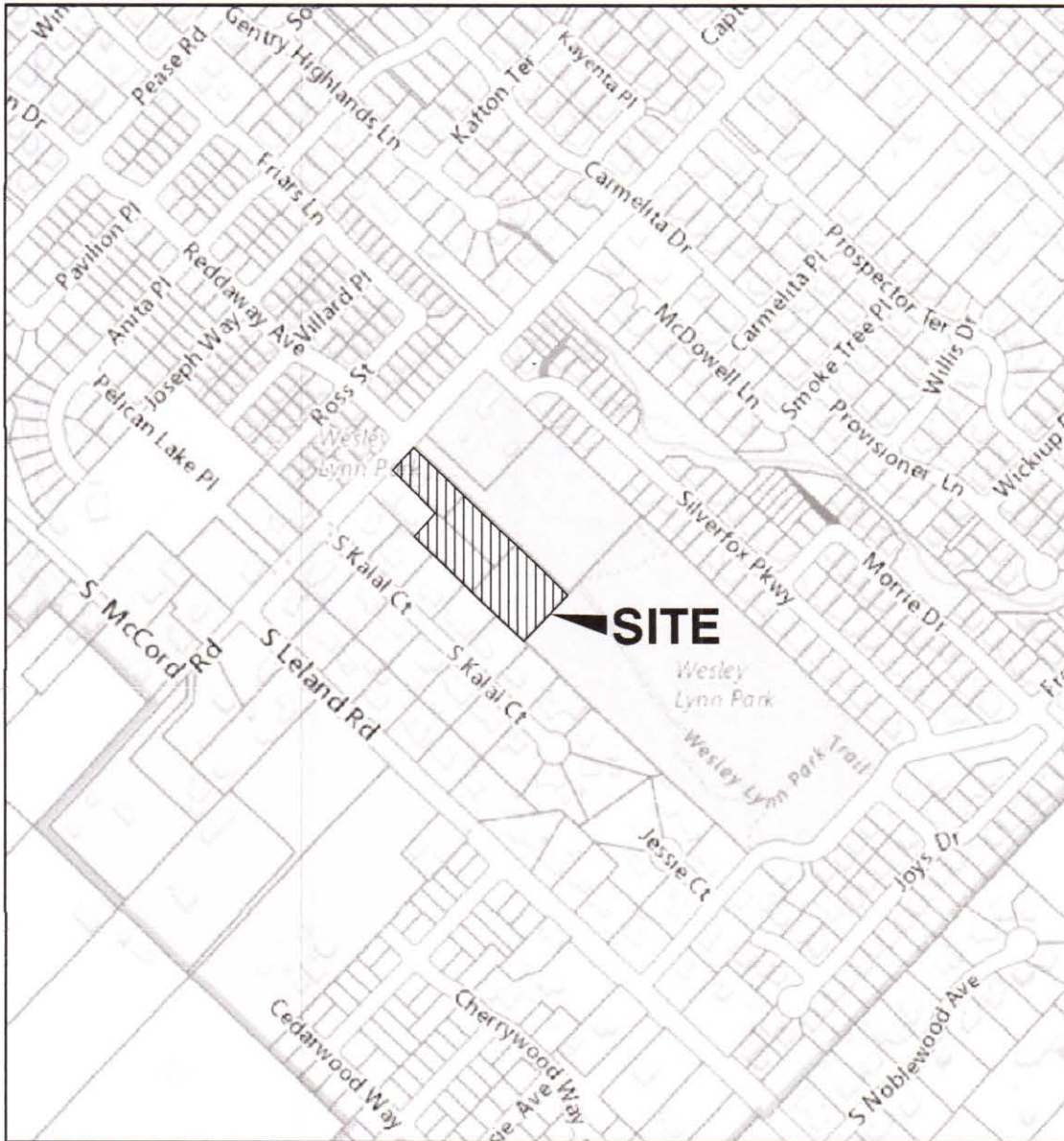
Prepared by: Bruce D. Goldson, PE

March 9, 2017



EXPIRES: 06/30/2017
SIGNATURE DATE: 3/10/17

2013-129G



VICINITY MAP

Owner/Applicant:
 Icon Construction & Development, LLC
 1980 Willamette Falls Drive, Suite 200
 West Linn, OR 97068
 PH: (503) 657-0406

2014-129G

SITE ASSESSMENT

Theta, llc

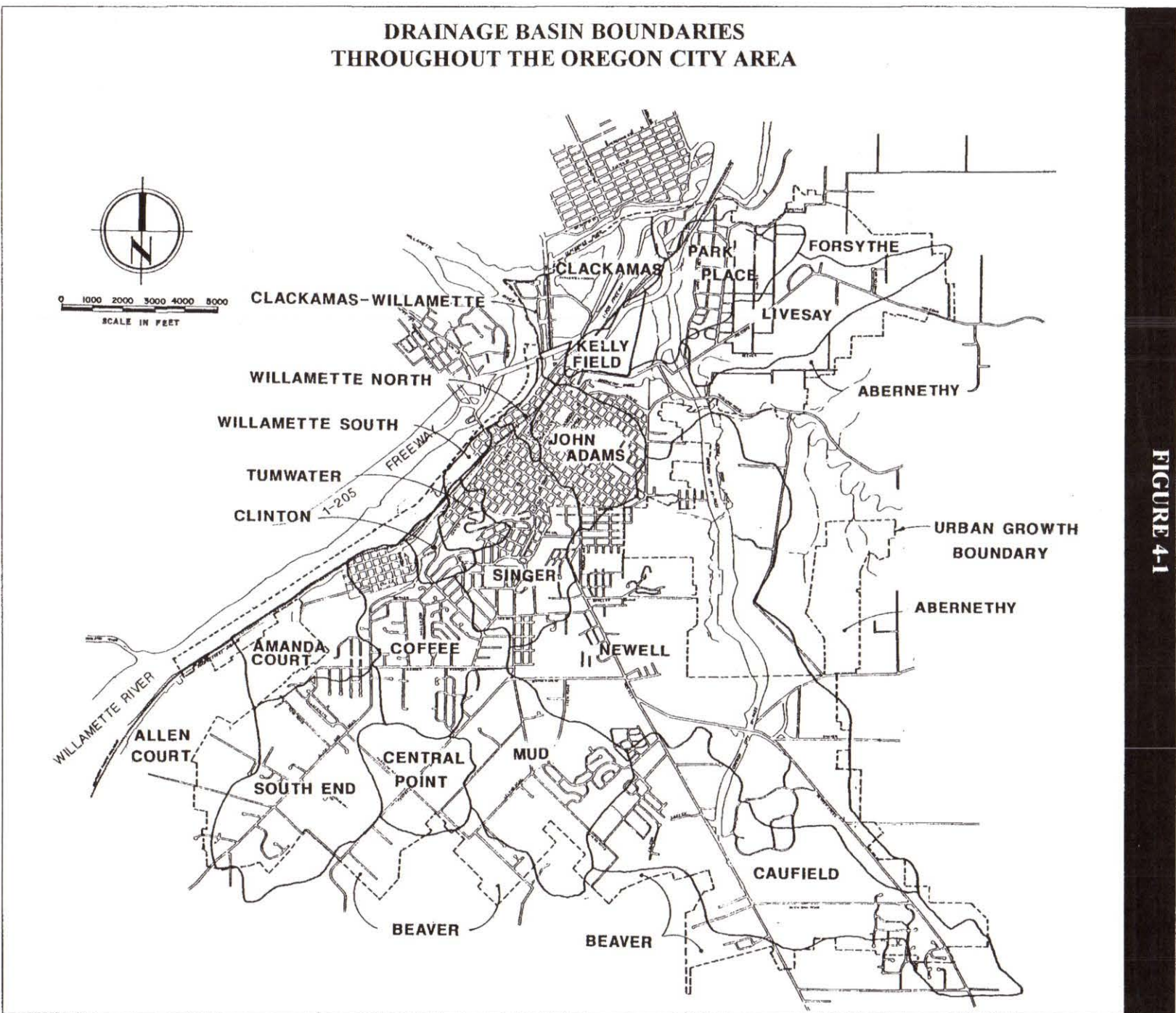
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503/481-8822
 email: thetaeng@comcast.net

Parker Knoll
 T3S, R2E, Section 7
 TL 600, 601, 700, 701
 Clackamas County, Oregon

FIGURE 4-1



PROJECT DESCRIPTION

The subject property is located at 19510 Leland Road adjacent to undeveloped city park property to the north. The subject site slopes to the north easterly direction at approximately 4% maximum. The property to the North and East is park property, and the land to the southwest is an older subdivision. The property is in the City of Oregon City and zoned R-8.

On site is one residential house, which will remain, with the proposed subdivision of the remaining property into 10 additional units, for the total of 11.

Road side swales are proposed for the new roadway with rain gardens for the individual lots. The 10-feet of additional roadway beyond the half street is proposed to be treated with a filter strip.

REQUIRED PERMITS:

No permits are required from Oregon Division of State Lands/Corps of Engineers. A 1200C erosion control permit is required from the DEQ

DRAINAGE BASIN DESCRIPTION:

Using the Oregon City GIS mapping system the approximate drain basin has been outlined (see attached drawings). Storm water collected from the site will continue to be discharged in the same basin. The end of an existing 18-inch storm line would be extended approximately 150-feet to the proposed development. This line appears to collect from a small area in the street until approximately 250-feet downstream a connection is made from the south west with a 12-inch connection and approximate upstream area of 5.5 acres. Continuing on downstream another 2.25 acre area is connected to this 18-inch line, where it changes to a 24-inch pipe and discharges in an open channel for hundreds of feet. Calculations have been made using a 25-year event.

King county Department of Public Works, Hydrograph Programs, version 4.21B

Basin 1 = 5.5 ACRES (See exhibit of the area)

Assume 7 units per area, 56% impervious, 44% pervious

Time of concentration:

$$T_1 = 0.42((0.15)(300))^8 / (2.6^5)(0.03)^4 = 22.3 \text{ minutes}$$

$$T_2 = 200 / (60)(11)(0.03)^5 = 1.7 \text{ minutes}$$

$$T_{\text{total}} = 24. \text{ minutes}$$

XXXXXXXXXXXXXXXXXXXX S.C.S. TYPE-1A DISTRIBUTION XXX

XXXXXXXXXXXX 25-YEAR 24-HOUR STORM xxxx 4.00" TOTAL PRECIP. XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.4,86,3.1,98,24

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
5.5	2.4	86.0	3.1	98.0	24.0
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
3.57	7.83		64237		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH

Basin 2 = 2.25 ACRES (See exhibit of the area)

Assume 1 units per area, 15% impervious, 85% pervious

Time of concentration:

$$T_1 = 0.42((0.15)(300))^8 / (2.6^{-5})(0.03)^4 = 22.3 \text{ minutes}$$

$$T_2 = 300 / (60)(11)(0.03)^5 = 2.6 \text{ minutes}$$

$$T_{\text{total}} = 24.9 \text{ minutes}$$

XXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XX

XXXXXXXXXXXXX 25-YEAR 24-HOUR STORM xxxx 4.00" TOTAL PRECIP. XX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.9,86,0.3,98 24.9

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.2	1.9	86.0	.3	98.0	24.9
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.17	7.83		21532		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH

Basin development = 2.57 ACRES

Assume: 4 units per area, 42% impervious, 58% pervious

Time of concentration:

$$T_1 = 0.42((0.15)(185))^8 / (2.6^{-5})(0.03)^4 = 15.1 \text{ minutes}$$

$$T_2 = 200 / (60)(17)(0.01)^5 = 2.0 \text{ minutes}$$

$$T_3 = 200 / (60)(21)(0.01)^5 = 1.6 \text{ minutes}$$

$$T_{\text{total}} = 18.7 \text{ minutes}$$

XXXXXXXXXXXXXXXXXXXX S.C.S.TYPE-1A DISTRIBUTION XX

XXXXXXXXXXXX 25-YEAR 24-HOUR STORM xxxx 4.00" TOTAL PRECIP. XX

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

1.5,86,1.1,98,18.7

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
2.6	1.5	86.0	1.1	98.0	18.7
PEAK-Q(CFS)	T-PEAK(HRS)		VOL(CU-FT)		
1.73	7.83		28809		

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH

Total estimated flow in existing 18-inch line $3.57 + 1.17 + 1.73 = 6.47$ cfs & capacity is approximately 8.0 cfs

INFILTRATION RATE:

Based on a field test (attached results) the percolation rate is 4.5 inches per hour

PROPOSED STORM WATER MANAGEMENT

Streets: Reddaway (half street) and no-name to have roadside swales, 10-foot street improvement in park property to have filter strip (ODOT Hydraulics Manual)

Individual lot: Rain gardens sized to the impervious area.

WES BMP Sizing Tool used to make preliminary sizing of the facilities

3.0 Filter Strips (Dispersion)

Dispersion is a simple and common method of treating stormwater runoff. It relies on maintaining sheet flow across vegetated and permeable ground which maximizes stormwater contact with soil and vegetation. In arid areas, aggregate may be used instead of vegetation where the soil supports infiltration.

Filter strips are the most common form of dispersion for highways, and can be used as either the sole BMP or as part of a treatment train. They consist of the right-of-way parallel to the road, with a relatively flat cross slope to maintain sheet flow of stormwater runoff over the entire width of the strip. Dispersion areas away from the highway receive collected runoff and use flow spreaders to create shallow, dispersed flow over vegetated slopes. The discussion here will focus on filter strips. Elements particular to other dispersion areas will be specifically called out.

A filter strip removes pollutants from pavement runoff by means of filtration through vegetation, media filtration and infiltration. Treatment mechanisms include physical trapping of particles, density separation (settling) in hydraulic dead zones and absorption, and to a lesser extent biological uptake and decomposition. Factors affecting the ability of filter strips to treat stormwater include vegetation density, slope and soil characteristics.

A filter strip (Figures 6 and 7) is a grassed sloped area located or placed between pavement and a downslope conveyance system. In cases where site conditions are not appropriate for a filter strip, stormwater can be collected and conveyed to a dispersion area.

The low impact approach is to preserve or enhance existing filter strip characteristics by modifying the side slope or incorporating a soil amendment to maintain or improve infiltration or media filtration.

Filter strips may be appropriate where:

- The road is elevated above the landscape on at least one side
- Impervious drainage area longitudinal slope is 4 percent or less
- Lateral slope of the highway (impervious surface) is 5 percent or less
- At least 6 feet of width from the edge of the shoulder is available
- Slope of the filter strip would be 15 percent or less (6:1 or flatter)

Sites that do not meet all of these criteria may still be used as filter strips. Modifications such as soil amendments may compensate for some shortfalls, or the strip may be part of a treatment train. For example, a too narrow filter strip may function as pre-treatment for a biofiltration swale.

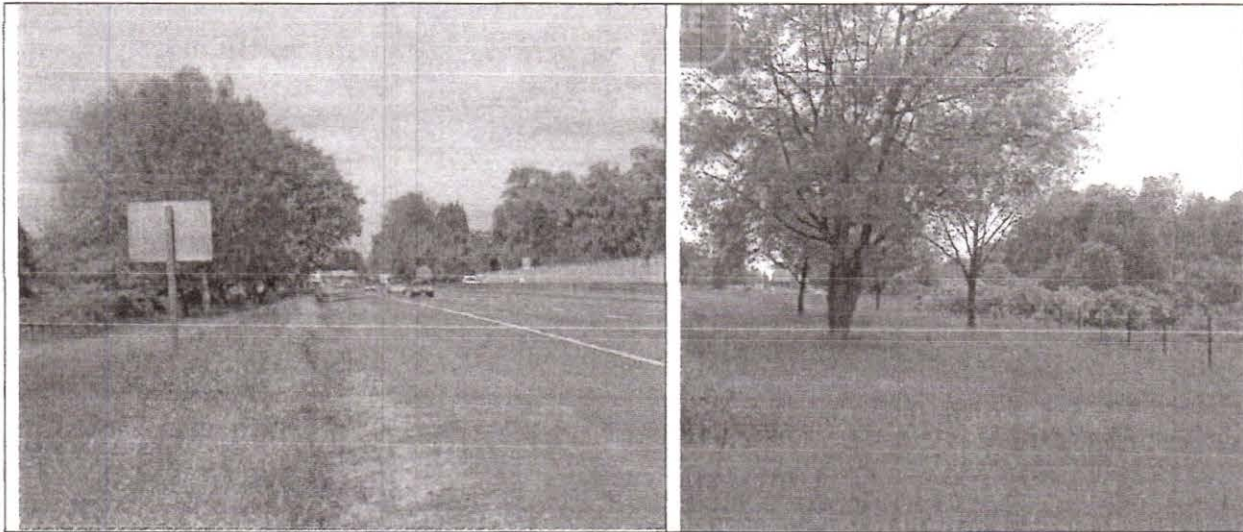


Figure 6 Filter Strip

Filter strips would not be effective and should not be considered when:

- Sheet flow cannot be maintained
- Steep slopes are proposed
- Impervious drainage area longitudinal slope is steeper than 4 percent, or
- Longitudinal slope of filter strip area is greater than 2 percent.
- Impervious drainage area lateral slope is steeper than 5 percent.
- Climate conditions adversely affect the condition of grass and plantings as discussed in Section 14.9.6.3.
- Site conditions affect the condition of grass such as heavily shaded areas. Filter strips require sunlight exposure and moisture to ensure vigorous grass growth

Figure 7 is a typical grassed filter strip configuration. Filter strip width is measured perpendicular to the pavement and filter strip length is measured parallel to the pavement. In addition, the figure defines the longitudinal and lateral slopes.

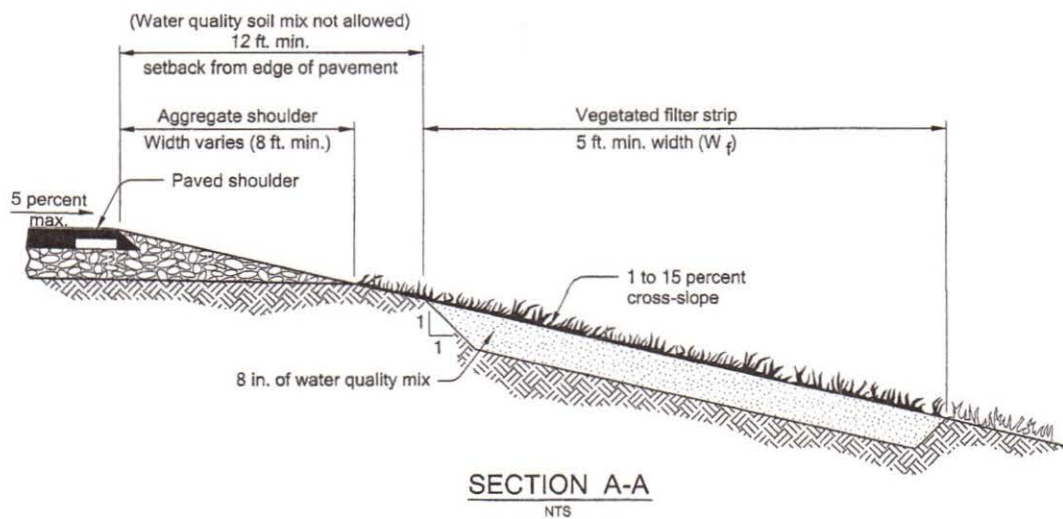
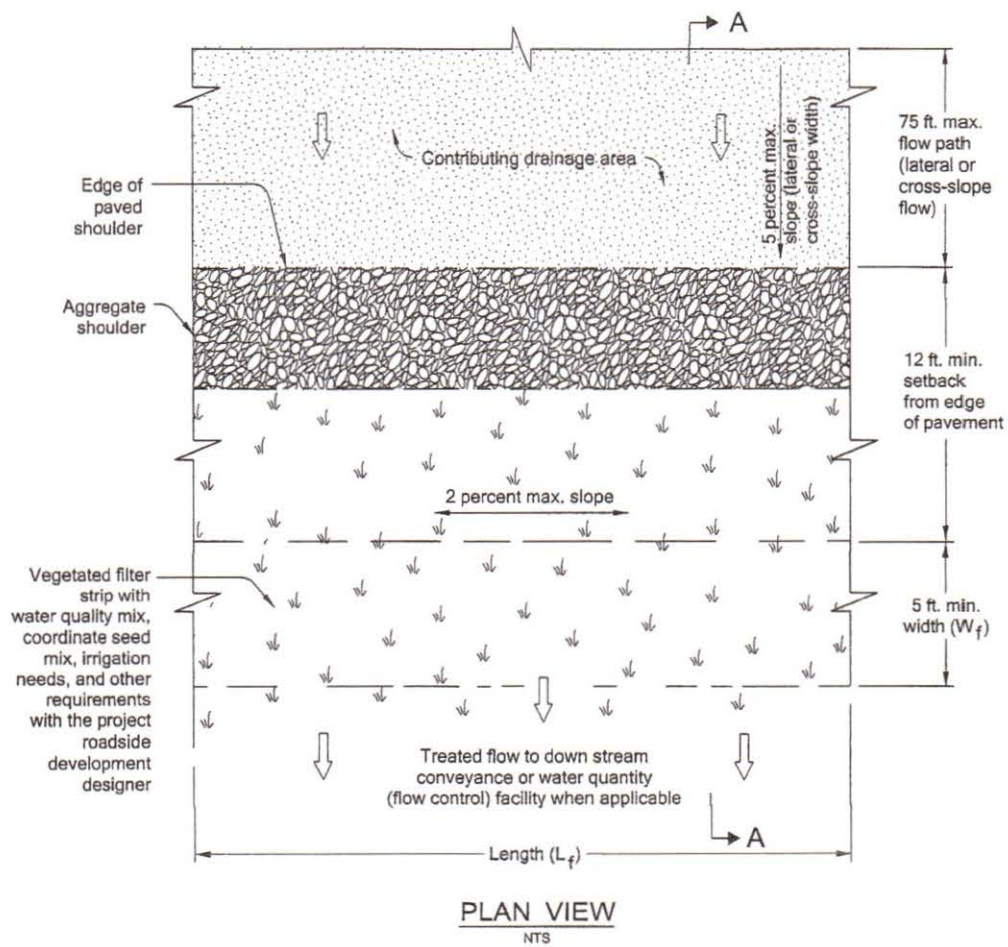


Figure 7 Grassed Filter Strip

3.1 Design Criteria

The design criteria for vegetated filter strips are presented in this section. Also apply the general requirements discussed in Section 14.10.

Site Selection

1. General siting requirements are discussed in Section 14.9. Additional siting criteria that apply specifically to filter strips include:
 - a) The site must be of sufficient size to accommodate filter strips.
 - b) Do not place a filter strip in shady areas. Daily sunlight is needed to maintain adequate vegetation cover.
 - c) Climate conditions that affect the condition of grass and plantings as discussed in Section 14.9.6.3.

Contributing Impervious Area Restrictions

1. The **maximum flow path** across the contributing impervious area to the filter strip must not exceed 75 feet.
2. The **lateral slope of the contributing impervious area** shall be 5 percent or less.
3. The **longitudinal slope of the contributing impervious area** shall be 4 percent or less.

Groundwater

1. Maintain a minimum distance of 3 feet from lowest point of the filter strip to bedrock or seasonally high water table.

Filter Strip Geometry

1. The **flow width** of the filter strip must be equal to or greater than 5 feet.
2. The **length** of filter strips placed parallel to the road must be equal to the length of the contributing impervious or pavement area. The **length** of dispersion areas away from the highway must be the length needed to create a dispersed flow condition equal to the design water depth noted below
3. The **lateral or cross-section** of the filter strip must be equal to or greater than 1 percent and to not exceed 15 percent.

4. The **maximum longitudinal slope** of the filter strip is 2 percent.

5. The flow resistance coefficient is 0.24.

Design Water Depth

1. Shallow non-concentrated flow is the goal. The maximum water depth is 1-inch.

Sizing

1. The **flow width or filter strip width** must be determined using the ratios or table provided below:

- 2% sloped filter strip to treat 4 feet of pavement for every 1 foot of filter strip
- 5% sloped filter strip to treat 3 feet of pavement for every 1 foot of filter strip
- 10% sloped filter strip to treat 2 feet of pavement for every 1 foot of filter strip
- 15% sloped filter strip to treat 1.5 feet of pavement for every 1 foot of filter strip

filter strip slope (%)	filter strip width for 20 ft pavement width	filter strip width for 30 ft pavement width	filter strip width for 40 ft pavement width	filter strip width for 50 ft pavement width	filter strip width for 60 ft pavement width
2	5	8	10	13	15
5	7	10	14	17	20
10	10	15	20	25	30
15	14	20	27	33	40

Table 1 Filter Strip Sizing

Flow Spreader

A **flow spreader** must be used between the roadway pavement and filter strip to ensure runoff is evenly distributed across the filter strip. This function is usually performed by the gravel shoulder.

A **flow spreader** must be used to create a dispersed flow condition equal to the design water depth at the inlet of dispersion areas placed away from the highway.

Water Quality Mix

There are three design options to establish a "Water Quality Mix" that meets criteria for organic content, long term hydraulic conductivity and other soil characteristics. See Appendix E.

Planting Requirements

1. Grass shall be established along the entire treatment area of the filter strip. In arid areas, aggregate may be used instead of vegetation where the soil supports infiltration.
2. Permanent seeding is best performed as follows:
 - West of the Cascades – March 1 through May 15 and September 1 through October 31 if grass areas are watered regularly during the establishment period.
 - East of the Cascades – October 1 through February 1 or March 1 through October 1 if grass areas are watered regularly during the establishment period.

Field Markers

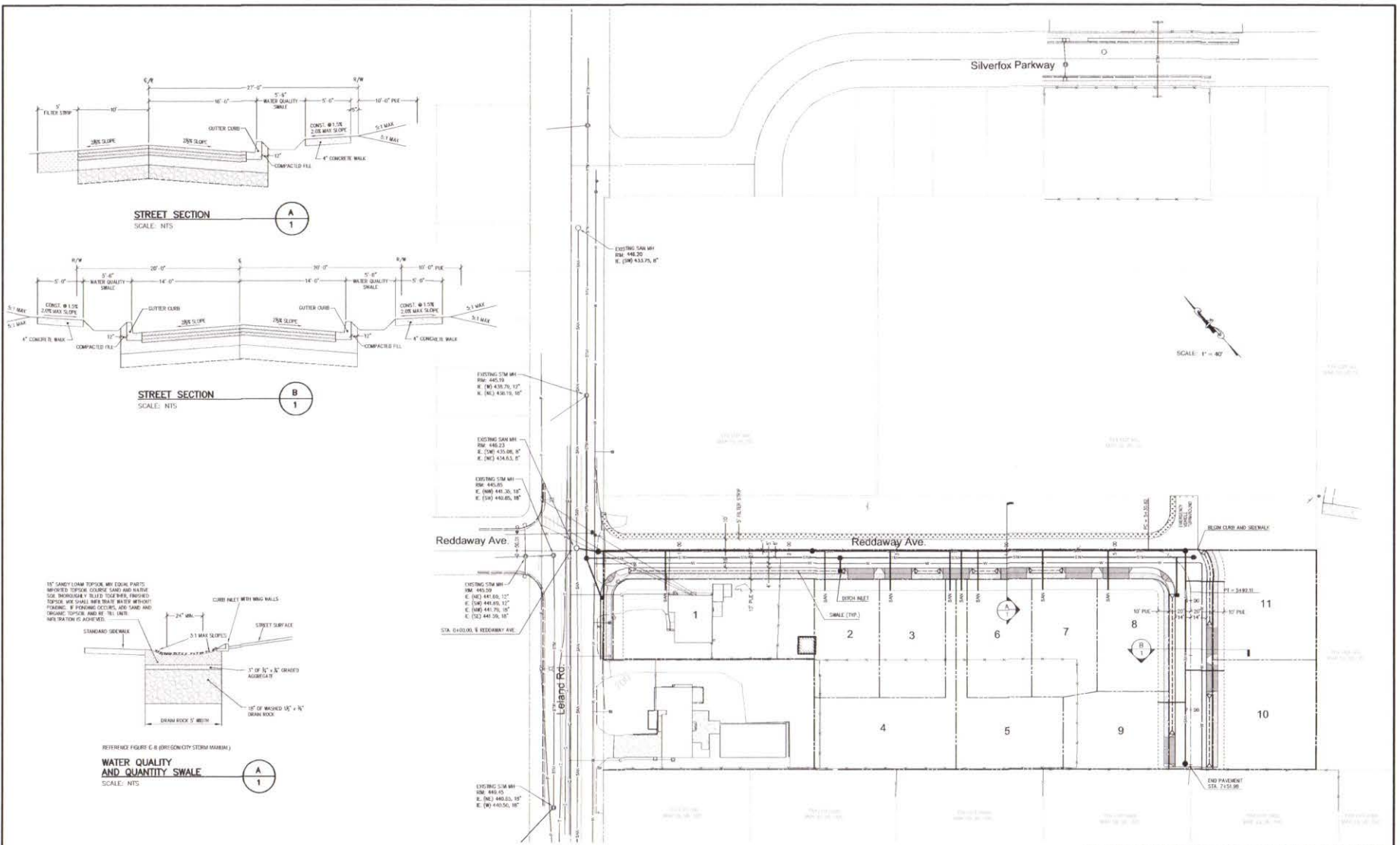
1. Field Markers are required to be installed at the start and end of a facility's maintenance area. Marking guidance is provided in Chapter 17.

3.2 Design Procedure (low impact development approach or new installation)

The following design procedure is for new installation or for determining if an existing vegetated area meets dispersion requirements to treat stormwater runoff.

- Step 1 –** Identify areas within the project limits that will not be paved or gravelled. Areas of interest are vegetated areas or areas that can be modified with vegetation, slopes less than 15 percent, and minimum flow path widths of 5 feet (see site criteria in Section 3.1).
- Step 2 –** Determine the lateral or cross-sectional width of the impervious surface.
- Step 3 –** Determine the average lateral or cross-sectional slope. Use 2 percent for sizing treatment area if the slope is less than 2 percent.
- Step 4 –** Using the sizing table provided in Section 3.1 determine the minimum filter strip width using the information obtained in Steps 2 and 3. Coordinate with the Project Leader and Right-of-Way if additional right-of-way is necessary.
- Step 5 –** Coordinate the following field testing with the project geologist for the areas of interest identified in Step 1:
- Determine the soil type(s). Take at least three samples (one at each end and mid-point of the dispersion area(s)).
 - Determine the depth of the seasonally high water table and bedrock is at least 3 feet below existing ground for the entire limits of the dispersion area(s).

- Step 6 –** Evaluate the soils tests for gradation and organic matter content for each vegetated area identified in Step 1. Go to Appendix E, Section 2 regarding Water Quality Mix. A vegetated area(s) can be utilized as a dispersion area when the soil gradation and organic matter content is met. Alternate option for areas with soils meeting gradation requirements but not meeting the necessary percentage of organic matter is to add compost.
- Step 7 -** Coordinate seed mix, seed establishment irrigation needs, and other requirements with the project roadside development designer or landscape architect. Coordinate temporary and/or permanent erosion control measures with the project erosion control designer.
- Step 8 –** Prepare the Stormwater Design Report and Operations and Maintenance Manual as discussed in Section 14.10.15 and 14.11.
- Step 9 –** Coordinate the installation field markers at the start and end of a facility's maintenance area. Marking guidance is provided in Chapter 17.



14

INFILTRATION TEST DATA TABLE

Location: Parker Knoll	Date: March 12, 2016	Test hole No. # 1 test 1
Depth to bottom of hole: 40"	Diameter of hole: 18X20	Test method: open pit

Tester's Name: Bruce Goldson

Tester's Company: Theta

Tester's Contact Number: 503-481-8822

Depth, feet	Soil texture
0-8" Organic soil with grass roots	Black to dark Brown
8" - 40"	Light brown slit clay, no ground water

	Time interval minutes	Measurement inches	Drop in water level, inches	Percolation rate inches/hour	Remarks
7:45		19"			
7:55	10	20 7/8"	1- 7/8"	11.25	
8:05	10	22 1/4"	1- 3/8"	8.25	
8:15	10	23"	0-3/4"	4.5	
8:25	10	23 3/4"	0-3/4"	4.5	
8:35	10	24 1/2"	0-3/4"	4.5	
8:45	10	25 1/8"	0-5/8"	4.5	

INFILTRATION TEST DATA TABLE

Location: Parker Knoll	Date: March 12, 2016	Test hole No. # 1 test 2
Depth to bottom of hole: 40"	Diameter of hole: 18X20	Test method: open pit

Tester's Name: Bruce Goldson

Tester's Company: Theta

Tester's Contact Number: 503-481-8822

Depth, feet	Soil texture
0-8" Organic soil with grass roots	Black to dark Brown
8" - 40"	Light brown slit clay, no ground water

	Time interval minutes	Measurement inches	Drop in water level, inches	Percolation rate inches/hour	Remarks
8:45		20"			
8:55	10	21 ½"	1- ½"	9.0	
9:05	10	22 3/8"	0-7/8"	5.25	
9:15	10	23"	0-5/8"	3.75	
9:25	10	23 ½"	0-1/2"	3.00	
9:35	10	24 1/8"	0-5/8"	3.75	
9:45	10	24 5/8"	0-3/8"	2.25	

INFILTRATION TEST DATA TABLE

Location: Parker Knoll	Date: March 12, 2016	Test hole No. # 1 test 3
Depth to bottom of hole: 40"	Diameter of hole: 18X20	Test method: open pit

Tester's Name: Bruce Goldson

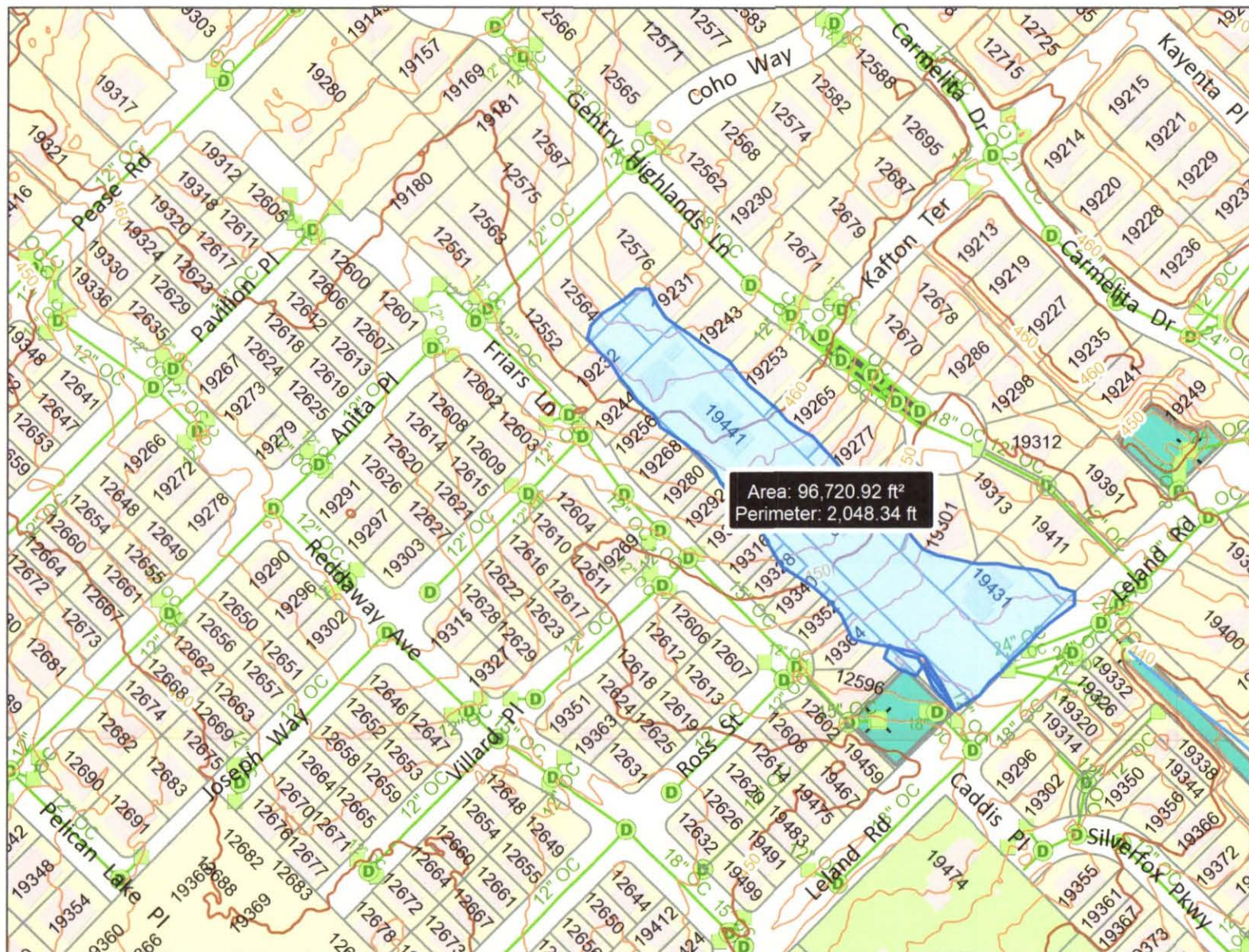
Tester's Company: Theta

Tester's Contact Number: 503-481-8822

Depth, feet	Soil texture
0-8" Organic soil with grass roots	Black to dark Brown
8" - 40"	Light brown slit clay, no ground water

	Time interval minutes	Measurement inches	Drop in water level, inches	Percolation rate inches/hour	Remarks
9:45		20 7/8"			
9:55	10	21 1/2"	0-5/8"	3.75	
10:05	10	22 1/8"	0-5/8"	3.75	
10:15	10	23 1/8"	1-0"	6.00	
10:25	10	23 5/8"	0-1/2"	3.00	
10:35	10	24 "	0-3/8"	2.25	
10:45	10	24 3/4"	0-3/4"	4.50	

Oregon City GIS Map



Legend

- Streams
 - Above Ground
 - Below Ground
- Contours (2ft) - 1,3,600 and closer
 - 10 foot
 - 2 foot
- Taxlots
- Taxlots (Outside UGB)
- Unimproved ROW
- Storm Structures (City Owned)
 - Manhole
 - Inlet
 - Outlet
- Storm Conduits (City Owned)
 - Pipe
 - Culvert
 - Ditch
 - Detention Tank
- Storm Ponds

Notes



The City of Oregon City makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, surveying or navigation purposes. Notification of any errors is appreciated.

Map created 3/9/2017



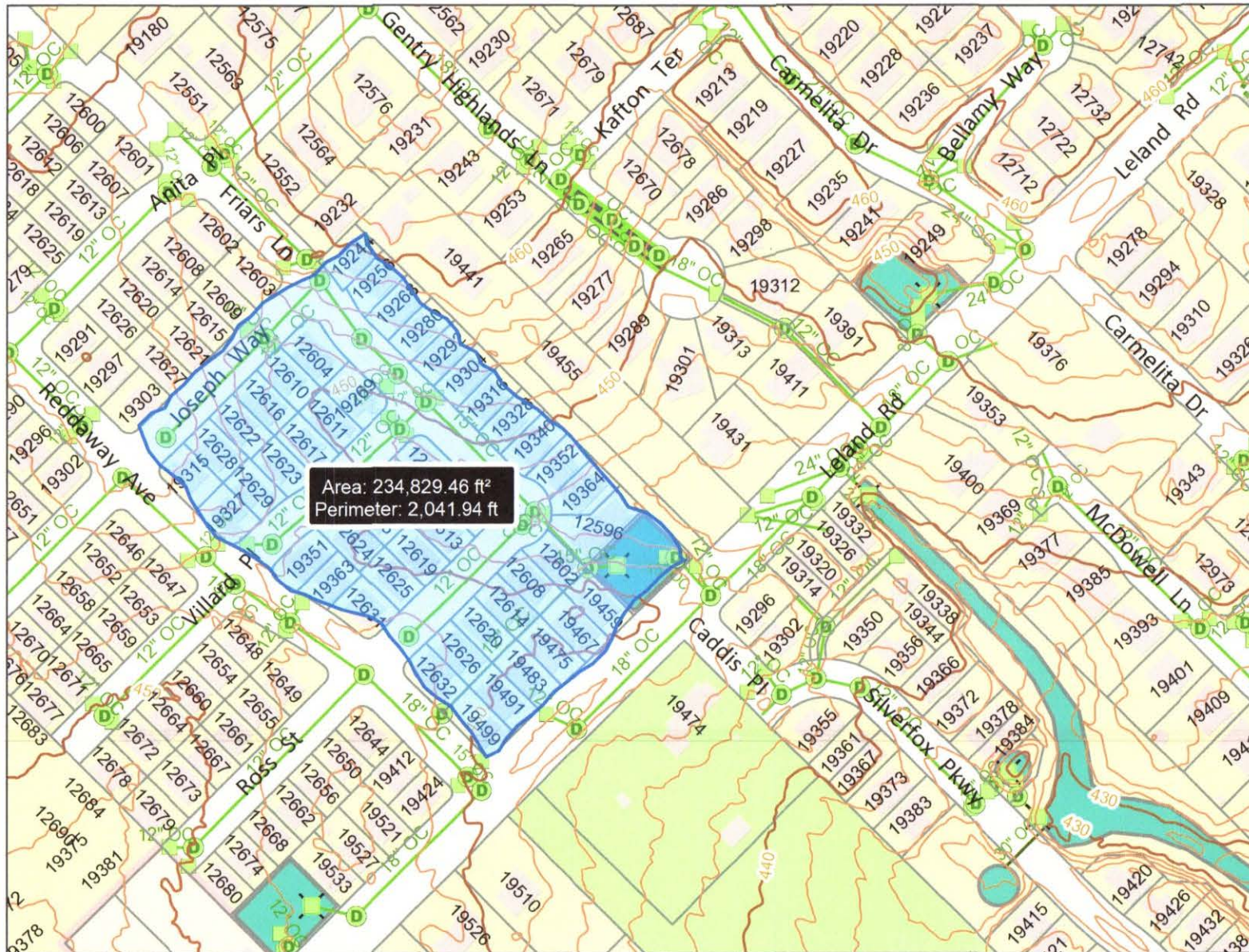
0 200 400 Feet

1: 2,400

City of Oregon City
PO Box 3040
625 Center St
Oregon City
OR 97045
(503) 657-0891
www.orcity.org



Oregon City GIS Map



Legend

- Contours (2ft) - 1:3,600 and closer
 - 10 foot
 - 2 foot
- Taxlots
- Taxlots (Outside UGB)
- Unimproved ROW
- Storm Structures (City Owned)
 - Manhole
 - Inlet
 - Outlet
- Storm Conduits (City Owned)
 - Pipe
 - Culvert
 - Ditch
 - Detention Tank
- Storm Ponds
 - Pond
 - Swale
 - Area Made Wetland

Notes



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0 200 400 Feet

1: 2,400

Map created 3/9/2017

City of Oregon City
 PO Box 3040
 625 Center St
 Oregon City
 OR 97045
 (503) 657-0891
www.orcity.org



WES BMP Sizing Report

Project Information

Project Name	PARKER KNOLL
Project Type	Subdivision
Location	19510 LELAND ROAD, OREGON CITY
Stormwater Management Area	449620
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
REDDAWAY	9,880	Grass	ConventionalCo ncrete	B	REDDAWAY
NO-NAME	6,042	Grass	ConventionalCo ncrete	B	NO NAME
LOT	2,640	Grass	Roofs	B	LOT

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
LOT	FlowControlA ndTreatment	Rain Garden - Infiltration	A1	264.0	264.0	0.0
REDDAWAY	FlowControlA ndTreatment	Vegetated Swale - Infiltration	A1	988.0	988.0	0.0
NO NAME	FlowControlA ndTreatment	Vegetated Swale - Infiltration	A1	604.2	604.2	0.0

Pond Sizing Details

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only
2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).
3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.
4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Table 4-3 MODIFIED CURVE NUMBERS

SCS Western Washington Runoff Curve Numbers					
Runoff curve numbers for selected agricultural, suburban, and urban land use for Type 1A rainfall distribution, 24-hour storm duration. (Published by SCS in 1982)					
LAND USE DESCRIPTION		CURVE NUMBERS BY HYDROLOGIC SOIL GROUP			
		A	B	C	D
Cultivated land ¹	Winter Condition	86	91	94	95
Mountain Open Areas:	Low growing brush and grassland.	74	82	89	92
Meadow or pasture:		65	78	85	89
Wood or forest land:	Undisturbed	42	64	76	81
	Established second growth ²	48	68	78	83
	Young second growth or brush	55	72	81	86
Orchard:	With over crop	81	88	92	94
Open spaces, lawns, parks, golf courses, cemeteries, landscaping					
Good Condition:	Grass cover on > =75% of area	68	80	86	90
Fair Condition:	Grass cover on 50-75% of area	77	85	90	92
Gravel Roads and Parking Lots:		76	85	89	91
Dirt Roads and Parking Lots:		72	82	87	89
Impervious surfaces, pavement, roofs, etc.		98	98	98	98
Open water bodies: Lakes, wetlands, ponds, etc.		100	100	100	100
Single Family Residential ³ :		Select a separate curve number for pervious and impervious portions of the site or basin.			
<u>Dwelling unit/gross acre</u>	<u>% Impervious⁴</u>				
1.0 DU/GA	15				
1.5 DU/GA	20				
2.0 DU/GA	25				
2.5 DU/GA	30				
3.0 DU/GA	34				
3.5 DU/GA	38				
4.0 DU/GA	42				
4.5 DU/GA	46				
5.0 DU/GA	48				
5.5 DU/GA	50				
6.0 DU/GA	52				
6.5 DU/GA	54				
7.0 DU/GA	56				
Planned Unit Developments, condominiums, apartments, commercial businesses & industrial areas ³		Select a separate curve number for pervious and impervious portions of the site or basin.			
% impervious ⁴					
Must be computed					

¹ For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Sec. 4, Hydrology, Chapter 9, August 1972.

² Modified by KCFW, 1995.

³ Assumes roof and driveway runoff is directed into street/storm system.

⁴ The remaining pervious areas (lawn) are considered to be in good condition for these curve numbers.

4.1.2.3 TIME OF CONCENTRATION

The time of concentration (T_c) is the length of time for runoff to travel from the hydraulically most distant point of a watershed to the point of discharge from the watershed. For computation purposes, it is assumed that water moves through the watershed as sheetflow, having a maximum depth of less than one tenth foot (0.1'), as shallow concentrated flow, having a maximum depth exceeding one tenth-foot (0.1'), and as open channel flow. Minimum T_c shall be five minutes.

It is assumed that runoff in a watershed begins as sheetflow. It is also assumed that regardless of site conditions, the maximum distance that runoff will travel in the form of sheetflow will not exceed 300 feet. Where there are no topographic features suggesting channel flow within the first 300 feet of flow, it may be assumed that the first 300 feet of flow is sheetflow and the remaining flow distance until water reaches a channel is shallow concentrated flow.

For further discussion of methods of computing time of concentration, the designer is referred to the Washington State Department of Ecology's Stormwater Management Manual for the Puget Sound Basin.

For computing the travel time of sheetflow, the following formula should be used:

$$T = \frac{0.42 (n_s L)^{0.8}}{(P_2)^{0.5} (S_o)^{0.4}}$$

where T	=	travel time, in minutes
n_s	=	Manning's roughness coefficient.-sheetflow (Table 5-3)
L	=	flow length, in feet
P_2	=	two-year, 24-hour rainfall, in inches
s_o	=	slope of land, in feet per foot

Travel time for shallow concentrated flow and open channel flow is computed using the following formula:

$$T = \frac{L}{60 k \sqrt{s_o}}$$

where T	=	travel time, in minutes
L	=	flow length, in feet
60	=	conversion factor from seconds to minutes
k	=	velocity factor, in feet per second (Table 5-3)
s_o	=	slope of flow path, in feet per foot
V	=	$60 k \sqrt{s_o}$, average velocity, in feet per second

Table 4-4 MANNING'S COEFFICIENTS/"K" FACTORS	
n AND "K" Value Used in Time Calculations for Hydrographs	
n, Sheet Flow Equation Manning's Values (for initial 300 ft. of travel)	n
Smooth surfaces (concrete, asphalt, gravel, or bare hand packed soil)	0.01
Fallow fields or loose soil surface (no residue)	0.05
Cultivated soil with residue cover (s # 0.20 ft/ft)	0.06
Cultivated soil with residue cover (s > 0.20 ft/ft)	0.17
Short prairie grass and lawns	0.15
Dense grasses	0.24
Bermuda grass	0.41
Range (natural)	0.13
Woods or forest with light underbrush	0.40
Woods or forest with dense underbrush	0.80
* Manning values for sheet flow only, from Overton and Meadows 1976 (See SCS's TR-55, 1986) "K" Values Used in Travel Time/Time of Concentration Calculation: Shallow Concentrated Flow (After the initial 300 ft. of sheet flow, R = 0.1)	
	k
1. Forest with heavy ground litter and meadows (n = 0.10)	3
2. Brushy ground with some trees (n = 0.060)	5
3. Fallow or minimum tillage cultivation (n=0.040)	8
4. High grass (n=0.035)	9
5. Short grass, pasture, and lawns (n=0.030)	11
6. Nearly bare ground (n=0.025)	13
7. Paved and gravel areas (n=0.012)	27
** Channel flow (intermittent): (At beginning of visible channels R=0.2)	
	k
1. Forested swale with heavy ground litter (n=0.10)	5
2. Forested drainage course/ravine with defined channel bed (n=0.050)	10
3. Rock-lined waterway (n=0.035)	15
4. Grassed waterway (n=0.030)	17
5. Earth-lined waterway (n=0.025)	20
6. CMP pipe (n=0.024)	21
7. Concrete pipe (0.012)	42
8. Other waterways and pipe $0.508/n$	
Channel flow (Continuous stream, R=0.4)	
	k
9. Meandering stream with some pools (n=0.040)	20
10. Rock-lined stream (n=0.035)	23
11. Grass-lined stream (n=0.030)	27
12. Other streams, man-made channels and pipe $0.807/n$ **	
** See Table 6-3 for additional Mannings "n" values for open channels	

3.0 Filter Strips (Dispersion)

Dispersion is a simple and common method of treating stormwater runoff. It relies on maintaining sheet flow across vegetated and permeable ground which maximizes stormwater contact with soil and vegetation. In arid areas, aggregate may be used instead of vegetation where the soil supports infiltration.

Filter strips are the most common form of dispersion for highways, and can be used as either the sole BMP or as part of a treatment train. They consist of the right-of-way parallel to the road, with a relatively flat cross slope to maintain sheet flow of stormwater runoff over the entire width of the strip. Dispersion areas away from the highway receive collected runoff and use flow spreaders to create shallow, dispersed flow over vegetated slopes. The discussion here will focus on filter strips. Elements particular to other dispersion areas will be specifically called out.

A filter strip removes pollutants from pavement runoff by means of filtration through vegetation, media filtration and infiltration. Treatment mechanisms include physical trapping of particles, density separation (settling) in hydraulic dead zones and absorption, and to a lesser extent biological uptake and decomposition. Factors affecting the ability of filter strips to treat stormwater include vegetation density, slope and soil characteristics.

A filter strip (Figures 6 and 7) is a grassed sloped area located or placed between pavement and a downslope conveyance system. In cases where site conditions are not appropriate for a filter strip, stormwater can be collected and conveyed to a dispersion area.

The low impact approach is to preserve or enhance existing filter strip characteristics by modifying the side slope or incorporating a soil amendment to maintain or improve infiltration or media filtration.

Filter strips may be appropriate where:

- The road is elevated above the landscape on at least one side
- Impervious drainage area longitudinal slope is 4 percent or less
- Lateral slope of the highway (impervious surface) is 5 percent or less
- At least 6 feet of width from the edge of the shoulder is available
- Slope of the filter strip would be 15 percent or less (6:1 or flatter)

Sites that do not meet all of these criteria may still be used as filter strips. Modifications such as soil amendments may compensate for some shortfalls, or the strip may be part of a treatment train. For example, a too narrow filter strip may function as pre-treatment for a biofiltration swale.

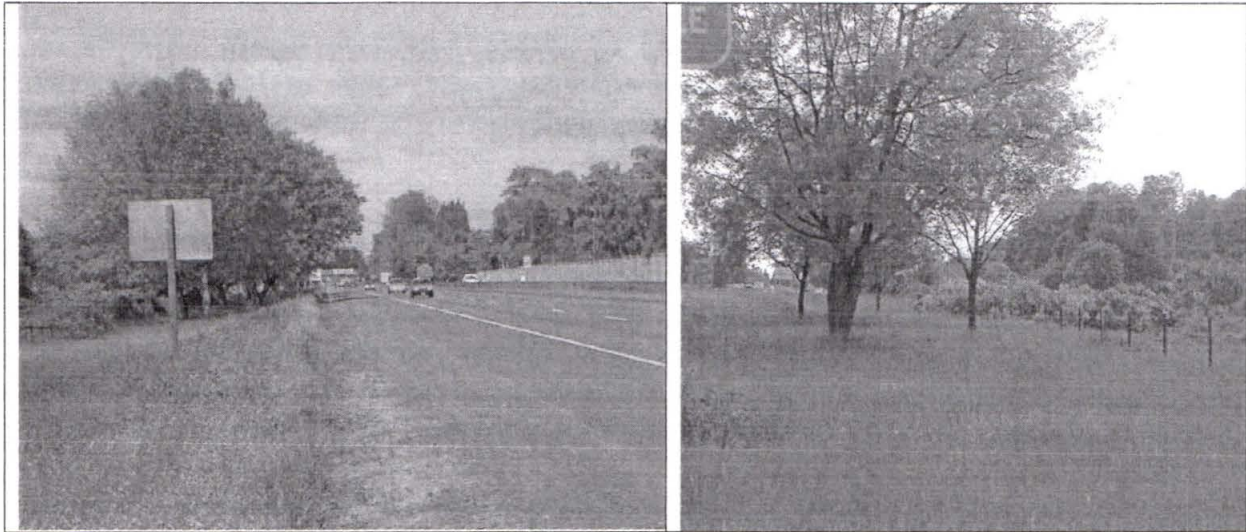


Figure 6 Filter Strip

Filter strips would not be effective and should not be considered when:

- Sheet flow cannot be maintained
- Steep slopes are proposed
- Impervious drainage area longitudinal slope is steeper than 4 percent, or
- Longitudinal slope of filter strip area is greater than 2 percent.
- Impervious drainage area lateral slope is steeper than 5 percent.
- Climate conditions adversely affect the condition of grass and plantings as discussed in Section 14.9.6.3.
- Site conditions affect the condition of grass such as heavily shaded areas. Filter strips require sunlight exposure and moisture to ensure vigorous grass growth

Figure 7 is a typical grassed filter strip configuration. Filter strip width is measured perpendicular to the pavement and filter strip length is measured parallel to the pavement. In addition, the figure defines the longitudinal and lateral slopes.

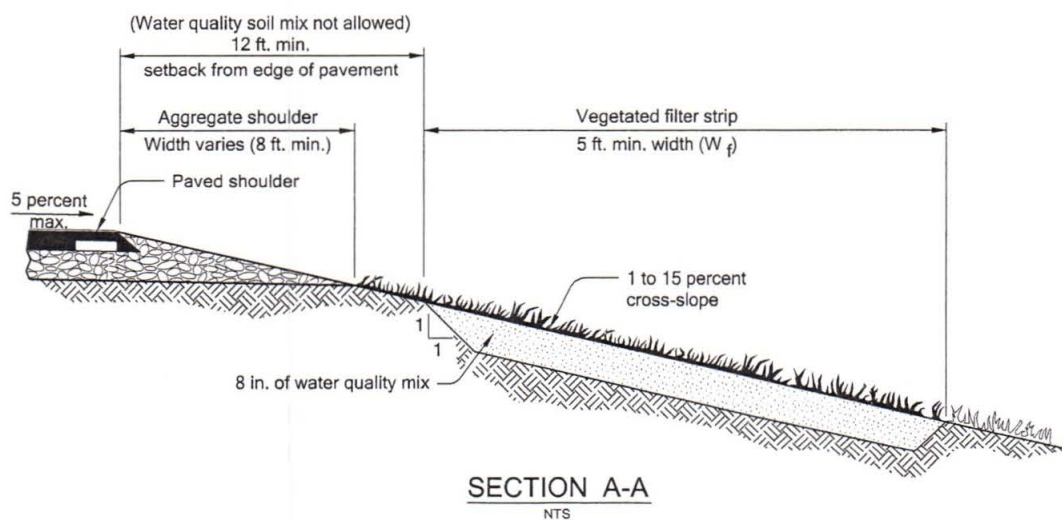
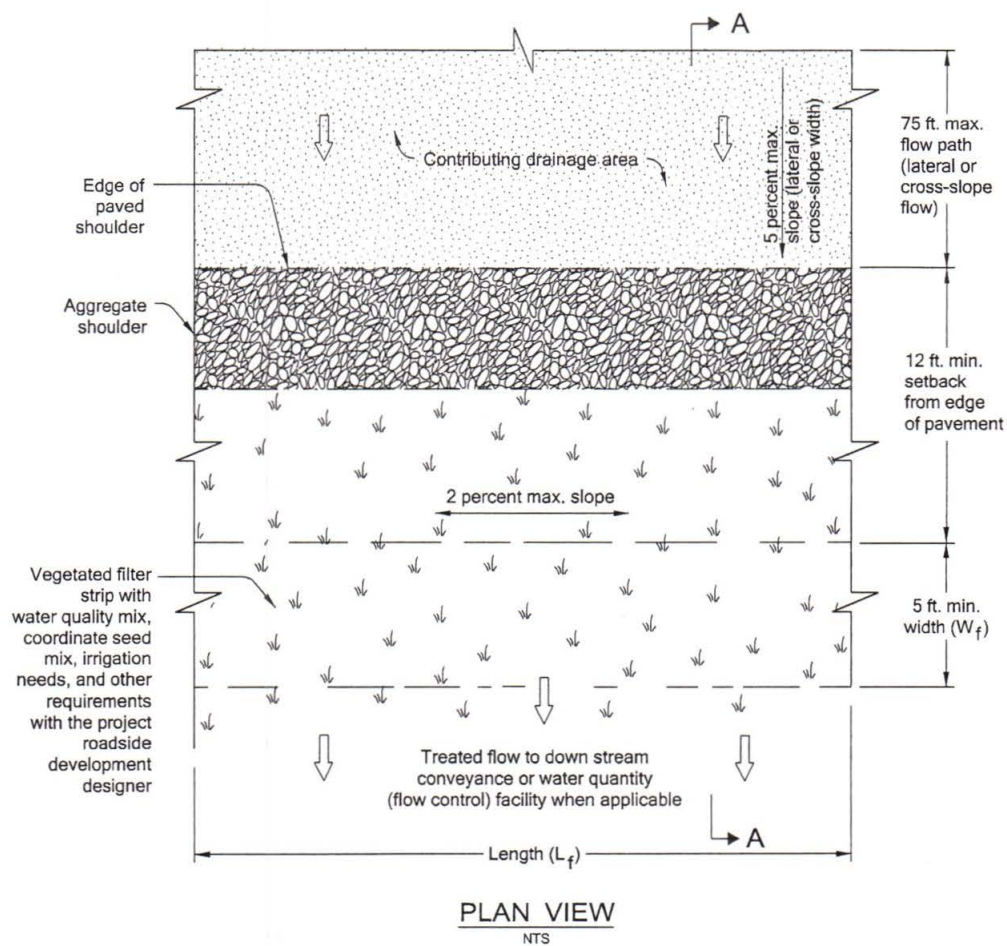


Figure 7 Grassed Filter Strip

3.1 Design Criteria

The design criteria for vegetated filter strips are presented in this section. Also apply the general requirements discussed in Section 14.10.

Site Selection

1. General siting requirements are discussed in Section 14.9. Additional siting criteria that apply specifically to filter strips include:
 - a) The site must be of sufficient size to accommodate filter strips.
 - b) Do not place a filter strip in shady areas. Daily sunlight is needed to maintain adequate vegetation cover.
 - c) Climate conditions that affect the condition of grass and plantings as discussed in Section 14.9.6.3.

Contributing Impervious Area Restrictions

1. The **maximum flow path** across the contributing impervious area to the filter strip must not exceed 75 feet.
2. The **lateral slope of the contributing impervious area** shall be 5 percent or less.
3. The **longitudinal slope of the contributing impervious area** shall be 4 percent or less.

Groundwater

1. Maintain a minimum distance of 3 feet from lowest point of the filter strip to bedrock or seasonally high water table.

Filter Strip Geometry

1. The **flow width** of the filter strip must be equal to or greater than 5 feet.
2. The **length** of filter strips placed parallel to the road must be equal to the length of the contributing impervious or pavement area. The **length** of dispersion areas away from the highway must be the length needed to create a dispersed flow condition equal to the design water depth noted below
3. The **lateral or cross-section** of the filter strip must be equal to or greater than 1 percent and to not exceed 15 percent.

4. The **maximum longitudinal slope** of the filter strip is 2 percent.
5. The flow resistance coefficient is 0.24.

Design Water Depth

1. Shallow non-concentrated flow is the goal. The maximum water depth is 1-inch.

Sizing

1. The **flow width or filter strip width** must be determined using the ratios or table provided below:
 - 2% sloped filter strip to treat 4 feet of pavement for every 1 foot of filter strip
 - 5% sloped filter strip to treat 3 feet of pavement for every 1 foot of filter strip
 - 10% sloped filter strip to treat 2 feet of pavement for every 1 foot of filter strip
 - 15% sloped filter strip to treat 1.5 feet of pavement for every 1 foot of filter strip

filter strip slope (%)	filter strip width for 20 ft pavement width	filter strip width for 30 ft pavement width	filter strip width for 40 ft pavement width	filter strip width for 50 ft pavement width	filter strip width for 60 ft pavement width
2	5	8	10	13	15
5	7	10	14	17	20
10	10	15	20	25	30
15	14	20	27	33	40

Table 1 Filter Strip Sizing

Flow Spreader

A **flow spreader** must be used between the roadway pavement and filter strip to ensure runoff is evenly distributed across the filter strip. This function is usually performed by the gravel shoulder.

A **flow spreader** must be used to create a dispersed flow condition equal to the design water depth at the inlet of dispersion areas placed away from the highway.

Water Quality Mix

There are three design options to establish a “Water Quality Mix” that meets criteria for organic content, long term hydraulic conductivity and other soil characteristics. See Appendix E.

Planting Requirements

1. Grass shall be established along the entire treatment area of the filter strip. In arid areas, aggregate may be used instead of vegetation where the soil supports infiltration.
2. Permanent seeding is best performed as follows:
 - West of the Cascades – March 1 through May 15 and September 1 through October 31 if grass areas are watered regularly during the establishment period.
 - East of the Cascades – October 1 through February 1 or March 1 through October 1 if grass areas are watered regularly during the establishment period.

Field Markers

1. Field Markers are required to be installed at the start and end of a facility's maintenance area. Marking guidance is provided in Chapter 17.

3.2 Design Procedure (low impact development approach or new installation)

The following design procedure is for new installation or for determining if an existing vegetated area meets dispersion requirements to treat stormwater runoff.

- Step 1 –** Identify areas within the project limits that will not be paved or gravelled. Areas of interest are vegetated areas or areas that can be modified with vegetation, slopes less than 15 percent, and minimum flow path widths of 5 feet (see site criteria in Section 3.1).
- Step 2 –** Determine the lateral or cross-sectional width of the impervious surface.
- Step 3 –** Determine the average lateral or cross-sectional slope. Use 2 percent for sizing treatment area if the slope is less than 2 percent.
- Step 4 –** Using the sizing table provided in Section 3.1 determine the minimum filter strip width using the information obtained in Steps 2 and 3. Coordinate with the Project Leader and Right-of-Way if additional right-of-way is necessary.
- Step 5 –** Coordinate the following field testing with the project geologist for the areas of interest identified in Step 1:
- Determine the soil type(s). Take at least three samples (one at each end and mid-point of the dispersion area(s)).
 - Determine the depth of the seasonally high water table and bedrock is at least 3 feet below existing ground for the entire limits of the dispersion area(s).

- Step 6 –** Evaluate the soils tests for gradation and organic matter content for each vegetated area identified in Step 1. Go to Appendix E, Section 2 regarding Water Quality Mix. A vegetated area(s) can be utilized as a dispersion area when the soil gradation and organic matter content is met. Alternate option for areas with soils meeting gradation requirements but not meeting the necessary percentage of organic matter is to add compost.
- Step 7 –** Coordinate seed mix, seed establishment irrigation needs, and other requirements with the project roadside development designer or landscape architect. Coordinate temporary and/or permanent erosion control measures with the project erosion control designer.
- Step 8 –** Prepare the Stormwater Design Report and Operations and Maintenance Manual as discussed in Section 14.10.15 and 14.11.
- Step 9 –** Coordinate the installation field markers at the start and end of a facility's maintenance area. Marking guidance is provided in Chapter 17.