

Proposed Retail
KINGSWOOD CENTER, WAL-MART STORE # 3850-00

*Littlerock Road
Tumwater, Washington*

*Storm Drainage and Erosion Control Plan
Report*

December 7, 2004



Prepared By:

PACLAND

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Brian Wilkinson, PE*

Owner/Proponent:

Kingswood Capitol, INC.

*701 West Georgia Street
Vancouver, BC V7Y 1A1
(604) 688-1900
Contact: Aaron Fineman*

Project Engineers Certification



William E. Dunning, P.E.

"I hereby certify that this Drainage and Erosion Control Plan for Proposed WAL-MART Store # 3850-00 has been prepared by me or under my supervision and meets minimum standards of the City of Tumwater and normal engineering practice. I understand that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me."

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SECTION A – DRAINAGE REPORT

1. Proposed Project Description

This report accompanies the Site Civil Plans for the construction of a new retail development on the east side of Littlerock Road located at Littlerock Road and Kingswood Road in Tumwater, Washington (See Vicinity Map, Appendix A, Figure 1). The property site is located in a portion of Section 3, T17N, R2W, W.M. Construction will include the installation of erosion control measures, clearing and grubbing, construction of the building pad subgrade, water and sewer utilities, permanent drainage improvements, and construction of a 207,751 SF single story retail structure.

The project site is approximately 21.6 acres. Site boundaries are an existing Costco to the north, Littlerock Road to the west, an existing Home Depot to the south, and Albany International to the east. A site plan is enclosed in Appendix A, Figure 2.

The development proposes to construct a single story 207,751 square foot retail structure. Approximately 13 acres of impervious pavement and concrete surface for sidewalks, asphalt parking, and driveways, is to be constructed. Approximately 4.8 acres of roof area is to be constructed. A separate lot will be leased to an outside party for use as a fueling station

Drainage for the post-developed site is designed to treat and infiltrate stormwater runoff across the site. Grading and storm infrastructure will result in three separate drainage systems across the site. All systems will consist of underground stormwater treatment vaults, and underground infiltration vaults.

The stormwater runoff will be collected by catch basins, and conveyed via underground pipes to stormwater treatment vaults. The stormwater treatment vaults are sized to treat runoff from the post developed 6-month storm. Flows from roof drains will be routed directly to the infiltration vaults, bypassing the stormwater treatment vaults. Flows higher than the 6-month storm event are bypassed directly to the infiltration facilities. The infiltration facilities were designed to release the 100-year 24-hour storm event into the soil stratum. The facility designs meet the requirements as stated in the City of Tumwater Development Guide.

We are including with this report an Erosion/Sediment Control Plan that meets the requirements as stated in the current City of Tumwater Development Guide.

2. Existing Conditions

Currently the project site is undeveloped and consists of medium to dense vegetation, including brush and trees. A large portion of the site is forested with second growth trees consisting of evergreens (mostly fir) and a lesser amount of

deciduous trees. The site contains some depressions in topography that do not collect surface runoff, due to infiltration of runoff into the soil stratum. There is no apparent off-site runoff that flows onto the site. No wetlands are present on-site.

3. Infiltration Rate/Soils Report

According to the Geotechnical Engineering Report, the site is covered with 3-4 feet of topsoil, and is underlain by Recessional Outwash (Soil Class A) to a depth of about 20 feet, underlain by Overconsolidated Lacustrine (very dense, silty sand) extending to the bottom of the borings (about 30 feet). Kleinfelder, Inc. performed a geotechnical exploration including eighteen (18) borings and forty six (46) test pits. A draft copy of their report, dated November 12, 2004 is enclosed in Appendix B. Generally, the soil explorations indicated varied topsoil depths down to three feet below the surface across the site, with up to 4 feet in isolated areas.

The subsoil conditions were explored by Kleinfelder, Inc. by means of test pits and borings across the site. Groundwater was encountered at depths from 16 feet to 21 feet below ground surface on site. Infiltration testing was performed at both proposed infiltration sites. Measured infiltration rates ranged from 1.0 minutes /inch to 5.7 minutes/inch. These values convert to 46 inches/hour to 10 inches/hour

For the purposes of the design, an infiltration value of 8 inches/hour for class A soils was used.

4. Wells and Septic Tanks

To our knowledge, no wells or septic tanks existing on the site or within 100 feet of any proposed stormwater retention facilities. The project site and the surrounding area received water and sewer service from the City of Tumwater. The site is not located in a well-head protection area.

5. Fuel Tanks

To our knowledge, there are no known underground fuel tanks or fuel storage facilities within the project area. However, upon the discovery of such a facility, provisions will be made by the contractor to have the facility disposed of by a Washington State licensed fuel tank removal contractor.

6. Sub-Basin Description

Sub-Basins used in our investigation of the site were delineated by the proposed grading plan. The project was divided into three sub-basins for the purpose of calculating the drainage treatment and infiltration facilities.

The South Basin consists of the area south of Kingswood Drive (4.15 Acres). The portion of the site north of Kingswood Drive is divided into 2 basins (North Basin 1

and North Basin 2). The first drainage basin (North Basin1) consists of the southern half of the building roof area and all surrounding parking lot improvements as indicated on the included Drainage Basin Exhibit. North Basin2 includes the northern half of the building area in addition to the remaining parking lot improvements as indicated on the included Drainage Basin Exhibit.

7. Analysis of the 100-Year Flood

To our knowledge, this project lies outside the designated 100-year flood plain.

8. Aesthetic Consideration For Facilities

All conveyance facilities proposed in the final stormwater design are located below grade and will not impact the aesthetics of the site. The stormwater treatment and infiltration facilities for the site consist of underground vaults. This project has a landscaping plan for this area that will provide an aesthetic design for the site.

9. Downstream Analysis and Facility Sizing

The infiltration facilities were sized using Table 4.1 of the Drainage Design and Erosion Control Manual (DDECM) for Tumwater Washington, Dated January, 1995.

South Basin

The South Basin is comprised of 4.15 acres. The site is 85% impervious, resulting in 3.53 acres of impervious area and 0.62 acres of pervious area. Runoff from the pavement and landscape area is collected through catch basins and routed to an underground vault for treatment. The water quality vault was sized per the City of Lacey design manual requirements for detention/retention. The runoff is then conveyed to the infiltration facility where it infiltrates into the ground stratum.

North Basin 1

North Basin1 contains 11.8 acres. The site is 85% impervious, resulting in 10.03 acres of impervious area and 1.77 acres of pervious area. Runoff from the pavement and landscape area is collected through catch basins and routed to an underground vault for treatment. The water quality vault was sized per the City of Lacey design manual requirements for detention/retention. The runoff is then conveyed to the infiltration facility where it infiltrates into the ground stratum.

North Basin 2

North Basin1 contains 5.7 acres. The site is 85% impervious, resulting in 4.85 acres of impervious area and 0.85 acres of pervious area. Runoff from the pavement and landscape area is collected through catch basins and routed to an underground vault for treatment. The water quality vault was sized per the City of Lacey design

manual requirements for detention/retention. The runoff is then conveyed to the infiltration facility where it infiltrates into the ground stratum.

Infiltration Facilities

The proposed infiltration facilities were sized per the (DDECM). The initial step was to determine the minimum storage volume as a function of the project infiltration rate and final pervious and impervious areas. Using Table 4.1 of the (DDECM) and a site infiltration rate of 8 inches/hour, the minimum storage volume was determined for each basin.

Table 9.A: Required Infiltration/Retention Storage Volumes

	Pervious (1,857 cf/acre)	Impervious (5,571 cf/acre)	Total (cf)
South Basin	0.62 ac x 1,857 = 1,151 cf	3.53 ac x 5,571 = 19,665 cf	20,816 cf
North Basin 1	1.77 ac x 1,857 = 3,287 cf	10.03 ac x 5,571 = 55,877 cf	59,164 cf
North Basin 2	0.85 ac x 1,857 = 1,578 cf	4.85 ac x 5,571 = 27,019 cf	28,597 cf

All infiltration facilities were sized to retain and release the 100-year, 24-hour storm event, and release at an infiltration rate of 8 inches/hour.

The required volumes were also calculated using StormShed. The calculated volumes are slightly less than those above, and are included in the appendix. The volumes above, calculated using the DDECM are used for facility design.

Compost Filter Design

The project surface water treatment for runoff is to be performed using a multi-cartridge compost filter by Stormwater Management©. The system is sized to treat a runoff flow equal to the 6-month, 24-hour pre-developed storm event runoff.

Downstream

The proposed site has been designed to retain/infiltrate the 100-year, 24-hour storm event on-site. In the event of a storm greater than the 100-year, 24-hour storm, the stormwater overflow will overflow the right-of-way of Littlerock Road. It is our understanding that there is no existing flooding or erosion problems ¼ mile downstream of the subject site. Based on a site visit, it appears that all of the stormwater runoff that falls on the site remains on-site and infiltrates into the soil stratum.

10. Covenants, Dedications, and Easements

Does not apply.

11. Homeowners-Article of Incorporation

Does not apply.

Section B - Erosion Control Report

All erosion and sediment control measures shall be governed by the requirements of The City of Tumwater Development Guide. A temporary erosion and sedimentation control plan has been prepared to assist the contractor in complying with these requirements.

1. Construction Sequence And Procedure

The proposed development includes an erosion/sedimentation control plan designed to prevent sediment-laden run-off from leaving the site during construction. The erosion potential of the site is influenced by four major factors: soil characteristics, vegetative cover, topography, and climate. Erosion/sedimentation control is achieved by a combination of structural measures, cover measures, and construction practices that are tailored to fit the specific site.

Prior to the start of any grading activity upon the site, all erosion control measures, including installation of a stabilized construction entrance, shall be installed in accordance with this plan and the construction documents.

The best construction practice will be employed to properly clear and grade the site and to schedule construction activities. The planned construction sequence for the construction of the site is as follows:

1. Flag and stake clearing limits.
2. Arrange and attend a preconstruction meeting with the City of Tumwater.
3. Clear and grub site.
4. Install erosion control features (Silt Fence, etc.)
5. Field locate all utilities.
6. Grade the site.
7. Install sanitary sewers, storm, water and other site utilities, providing CB inlet protection at the new inlet locations.
8. Install permanent infiltration system to be brought "on-line" upon completion of permanent storm system and approved by the city engineer.
9. Thoroughly clean new storm system upon completion of paving to prevent disruption to permanent infiltration facility.
10. Install sod on bottom of biofiltration swale or seed to a healthy stand of grass prior to bringing "on-line".
11. Remove temporary erosion control facility upon stabilization of entire project site, as approved by the city and project engineer.

2. Trapping Sediment

Structural control measures will be used to reduce erosion and retain sediment on the construction site. The control measures will be selected to fit specific site and seasonal conditions. The general site area is relatively flat with several depressions approximately 3-6 feet deep. In consideration of the area topography and site soils, minimal erosion control and sediment trapping measures will be needed during construction.

The following structural items will be used to control erosion and sedimentation processes:

- Stabilized construction entrance
- Filter fabric fences
- Cover measures

Vehicle tracking of mud off-site shall be avoided. Two gravel construction entrances will be installed on the site. These entrances will be located off Kingswood Drive. These entrances are minimum requirements and may be supplemented if tracking of mud onto city and county streets becomes excessive.

Stormwater shall be infiltrated on-site during construction. The contractor shall construct infiltration ditches and trenches to keep stormwater from leaving the site. If stormwater leaves the site, the contractor will be responsible to adhere to the following, as well as NPDES, requirements:

Vegetative cover is the most important form of erosion control, construction practices must adhere to stringent cover requirements. More specifically, the contractor will not be allowed to leave soils open for more than 60 days and, in some cases, immediate seeding will be required. During the period of November 1st through April 30th, all disturbed soil areas will be stabilized within seven days. Due to the nature of on-site material (refer to soils report) and low run-off potential, contractor may at his own discretion leave areas exposed provided that erosion control measures are in place and adequate to avoid run-off from directly leaving the site. Areas next to paved areas may be armored with crushed rock subbase in place of other stabilizing measures.

3. Permanent Erosion Control And Site Restoration

Grass or ground cover will be planted on all exposed areas with side slopes of 3H:1V or greater.

4. Geotechnical Analysis and Report

A Geotechnical Engineering Report has been prepared by Kleinfelder, Inc. for this project. The site has no retention/detention facilities located near regulated slopes. Infiltration testing results for the site are included in Appendix B.

5. INSPECTION SEQUENCE – weekly and after major rainfalls

	EXAMPLE	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24
Silt Fence *																									
N	Ok																								
S	Ng																								
E																									
W																									
Construction Entrance *																									
N																									
E																									
W																									
Storm Line Inlets																									

*Daily
 Ng = No good
 Ok = Okay

September 15, 1999 Planting and Site Stabilization

Hydroseed _____ Approved
 Sod _____ Approved
 Landscaping _____ Approved

The ESC Lead shall be the responsibility of the contractor. Prior to commencing work, PACLAND shall be responsible for any comments to the erosion control sequence.

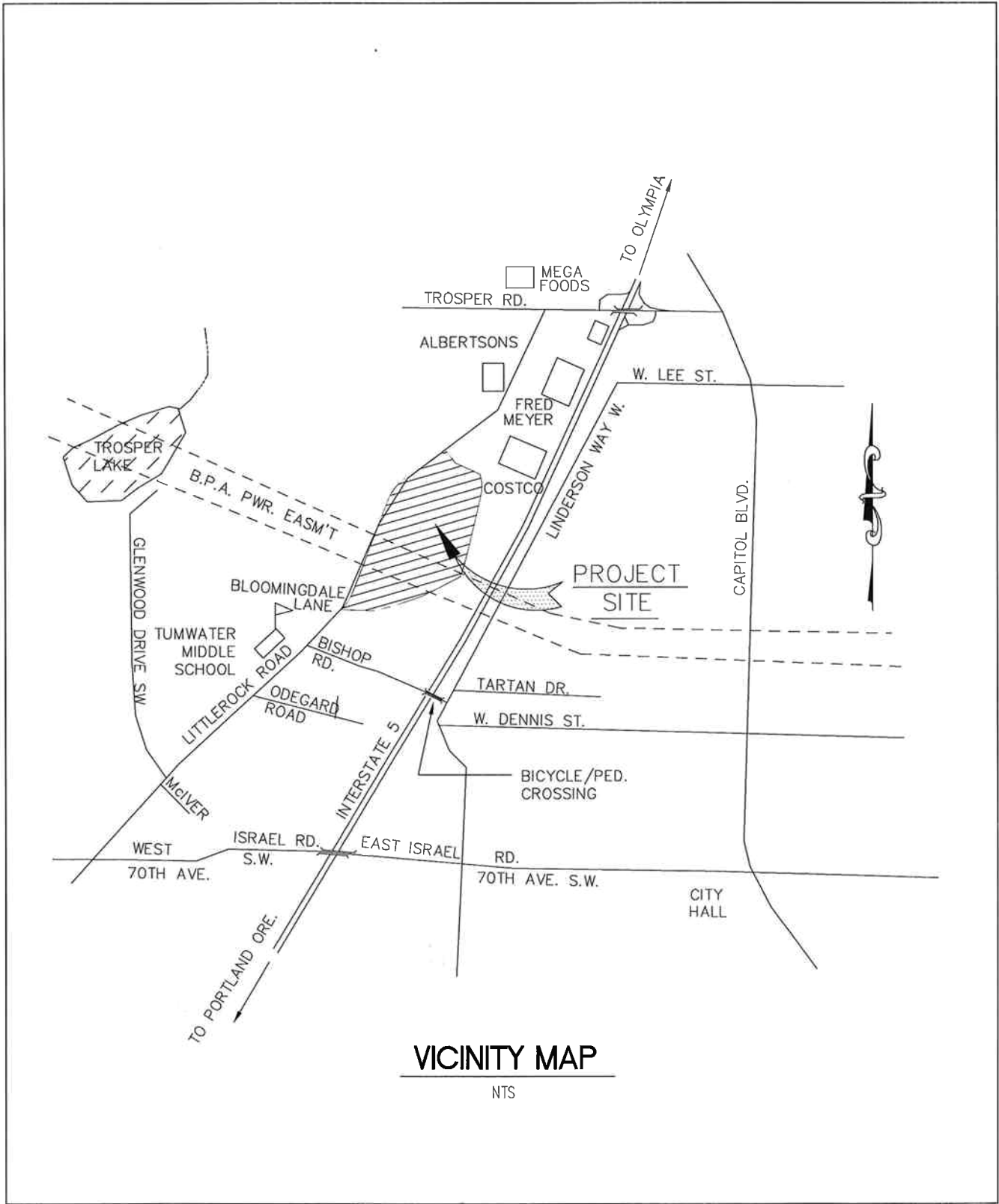
PACLAND
 606 Columbia Street N.W.
 Olympia, WA 98501
 (360) 786-9500
 FAX: (360) 786-5267
 Contact: William Dunning, PE
 Brian Wilkinson, PE

SECTION 6 – CONTROL OF POLLUTANTS OTHER THAN SEDIMENTS

Pollutants shall be controlled on the work site with a Fuel Management Area per the Department of Ecology. This shall include a centralized area for equipment, concrete truck washing and temporary storage of debris and stockpiled materials.

APPENDIX A – Figures

FIGURE 1 – VICINITY MAP



VICINITY MAP
NTS

FIGURE 2 – EXISTING CONDITIONS

SHEET INDEX

1 OF 5	DESCRIPTIONS, EASEMENTS, NOTES, ETC.
2 OF 5	BOUNDARY SURVEY, NORTH PORTION
3 OF 5	BOUNDARY SURVEY, SOUTH PORTION
4 OF 5	TOPOGRAPHIC SURVEY, NORTH PORTION
5 OF 5	TOPOGRAPHIC SURVEY, SOUTH PORTION

ALTA/ACSM LAND TITLE SURVEY
IN
SECTION 3, TOWNSHIP 17N, RANGE 2 WEST, W.M.
TUMWATER, WA
SHEET 4 OF 5

SCALE: 1"=60 FEET
0 30 60 120
MERIDIAN: BLA 03-7444TW, AF NO. 3500815

VERTICAL DATUM
DATUM: CITY OF TUMWATER NGVD '29

TUMWATER BM #0-02: FOUND RAILROAD SPIKE IN POWER POLE NORTH SIDE LITTLEROCK ROAD NEAR ENTRANCE TO OLYMPIA MEMORIAL GARDENS. NGVD '29 ELEVATION = 180.411
TUMWATER BM #0-03: FOUND RAILROAD SPIKE IN POWER POLE ON LITTLEROCK ROAD AT NORTH ENTRANCE TO TUMWATER JUNIOR HIGH SCHOOL. NGVD '29 ELEVATION = 186.121
VERTICAL DATUM VERIFIED THROUGH A GPS CONTROL SURVEY WITH MEASUREMENTS TO PRIMARY OLY-NET CONTROL POINT "TUM" AND THURSTON COUNTY HIGH PRECISION NETWORK CONTROL POINT "OLY-AR".

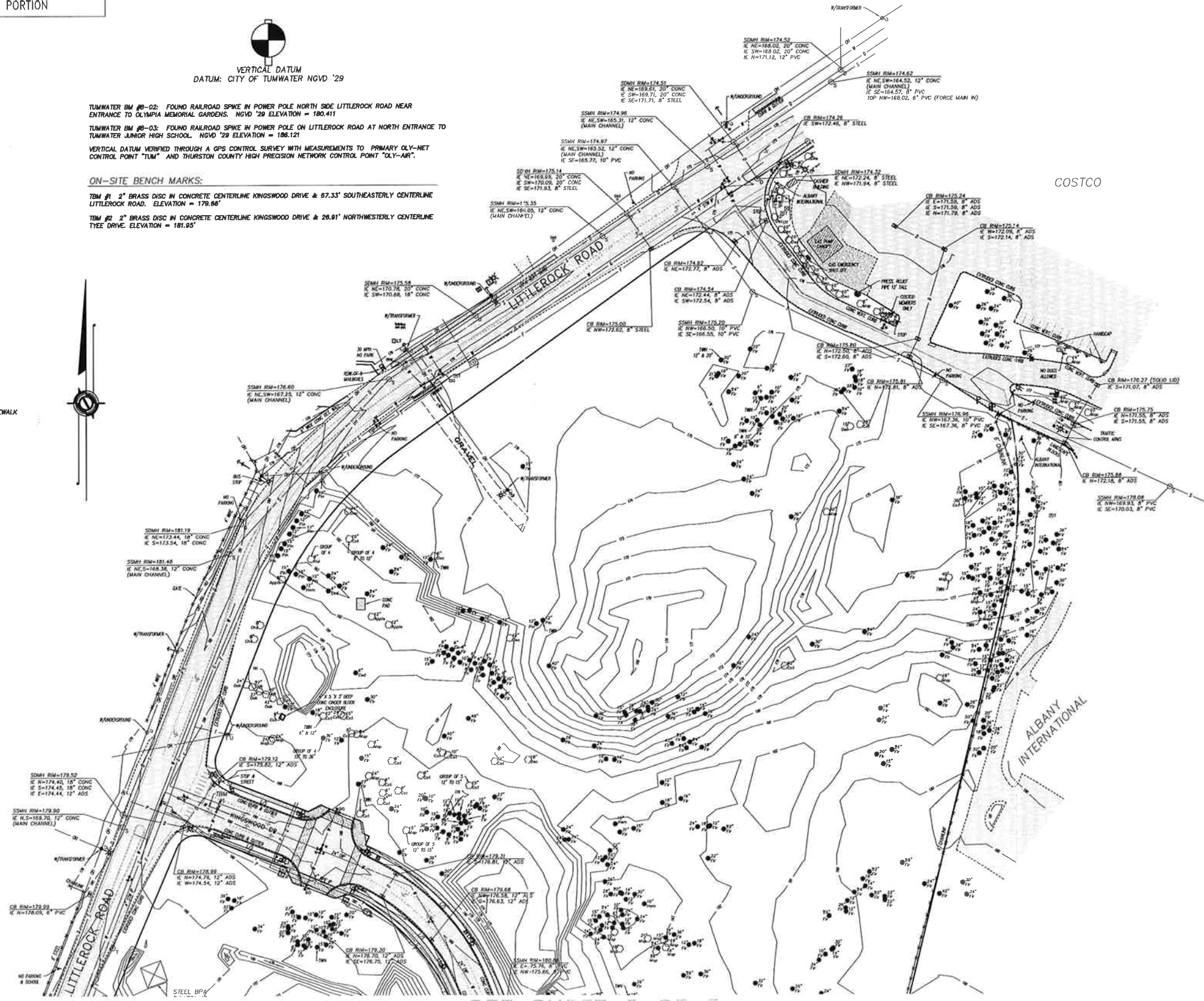
ON-SITE BENCH MARKS:
TBM #1 2" BRASS DISC IN CONCRETE CENTERLINE KINGSWOOD DRIVE & 67.33' SOUTHEASTERLY CENTERLINE LITTLEROCK ROAD. ELEVATION = 179.66'
TBM #2 2" BRASS DISC IN CONCRETE CENTERLINE KINGSWOOD DRIVE & 26.91' NORTHWESTERLY CENTERLINE TYEE DRIVE. ELEVATION = 181.95'

LEGEND

- | | | | |
|-----|------------------------------|-----|------------------------------|
| BO | BLOW OFF | TV | TELEPHONE VAULT |
| FD | FIRE HYDRANT | TM | TELEPHONE MANHOLE |
| WM | WATER METER | TP | TELEPHONE PEDESTAL |
| WMH | WATER MANHOLE | S | SIGN |
| WV | WATER VAULT | SL | STREET LIGHT |
| WV | WATER VALVE | L | LUMINARE |
| IR | IRRIGATION CONTROL BOX | LT | LIGHT JUNCTION BOX |
| SSM | SANITARY SEWER MANHOLE | M | MAILBOX |
| SSC | SANITARY SEWER CLEAN OUT | B | BOLLARD |
| SDM | STORM DRAIN MANHOLE | H | HANDICAP RAMP |
| SDC | STORM DRAIN CLEAN OUT | C | CONCRETE |
| CB | CATCH BASIN | B | BUILDING |
| PA | POLE ANCHOR | SCS | STAMPED CONCRETE SIDEWALK |
| PM | POWER METER | A | ASPHALT |
| GP | GUY POLE | F | FIR TREE |
| UT | UTILITY POLE | S | SPRUCE TREE |
| PT | POWER TRANSFORMER | H | HOLLY TREE |
| PV | POWER VAULT | Ch | CHERRY TREE |
| GM | GAS METER | C | COTTONWOOD TREE |
| GV | GAS VALVE | Ma | MAPLE TREE |
| --- | EDGE OF GRAVEL | Ap | APPLE TREE |
| --- | EDGE OF PAVEMENT | Ce | CEDAR TREE |
| --- | SANITARY SEWER LINE | Wa | WATER LINE |
| --- | STORM DRAIN LINE | OU | OVERHEAD UTILITY LINE |
| --- | WATER LINE | UGP | UNDERGROUND POWER LINE |
| --- | OVERHEAD UTILITY LINE | UTL | UNDERGROUND TELEPHONE LINE |
| --- | UNDERGROUND UTILITY LINE | UGF | UNDERGROUND FIBER OPTIC LINE |
| --- | UNDERGROUND TELEPHONE LINE | G | GAS LINE |
| --- | UNDERGROUND FIBER OPTIC LINE | --- | FENCE LINE |
| --- | GAS LINE | --- | BOUNDARY LINE |
| --- | FENCE LINE | | |
| --- | BOUNDARY LINE | | |

UTILITY NOTE:

ALL SURFACE FEATURES AND INVERT STRUCTURE ELEVATIONS SHOWN HEREON WERE FIELD LOCATED AND MEASURED BY JMH FOR THIS SURVEY. ALL UNDERGROUND UTILITY LINES ARE BASED UPON AS-BUILT PLANS OBTAINED FROM THE CITY OF TUMWATER, PUGET SOUND ENERGY, AND ON-SITE LOCATES.
KINGSWOOD DRIVE UTILITIES SHOWN HEREON ARE BASED ON FIELD LOCATED SURFACE STRUCTURES, MEASURED INVERTS, AND KINGSWOOD CENTER PHASE 1 CONSTRUCTION PLANS DATED SEPTEMBER 2002.
ALL UTILITY LINES SHOWN HEREON SHOULD BE CONSIDERED APPROXIMATE ONLY.



SEE SHEET 5 OF 5



SURVEYORS CERTIFICATE
I HEREBY CERTIFY THAT THIS MAP IS AN ACCURATE REPRESENTATION MADE BY ME OR UNDER MY DIRECTION. (SEE SHEET 1 FOR ALTA CERTIFICATE)
THOMAS J. SMITH
PROFESSIONAL LAND SURVEYOR
CERTIFICATE NO. 38489

BOUNDARY & TOPOGRAPHIC SURVEYS - CIVIL ENGINEERING - SUBDIVISIONS
ALTA/ACSM - DRIVE/RIGHT OF WAY - CONSTRUCTION SURVEYS
JMH
LAND & CONSTRUCTION SURVEYING
8120 OLD HIGHWAY 99 SE, SUITE B
OLYMPIA, WA 98501
(360) 357-9600
FAX (360) 357-9605

ALTA/ACSM LAND TITLE SURVEY
OF A PORTION OF
SEC. 3 TWP 17 N, R 2 W, W.M.,
AT THE REQUEST OF
PACLAND

SCALE: 1" = 60'
JOB: 04049
DATE: 11/30/04
SHEET 4 OF 5
04049TOPO.DWG

SHEET INDEX

1 OF 5	DESCRIPTIONS, EASEMENTS, NOTES, ETC.
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ALTA/ACSM LAND TITLE SURVEY
IN
SECTION 3, TOWNSHIP 17N, RANGE 2 WEST, W.M.
TUMWATER, WA
SHEET 5 OF 5

SEE SHEET 4 OF 5

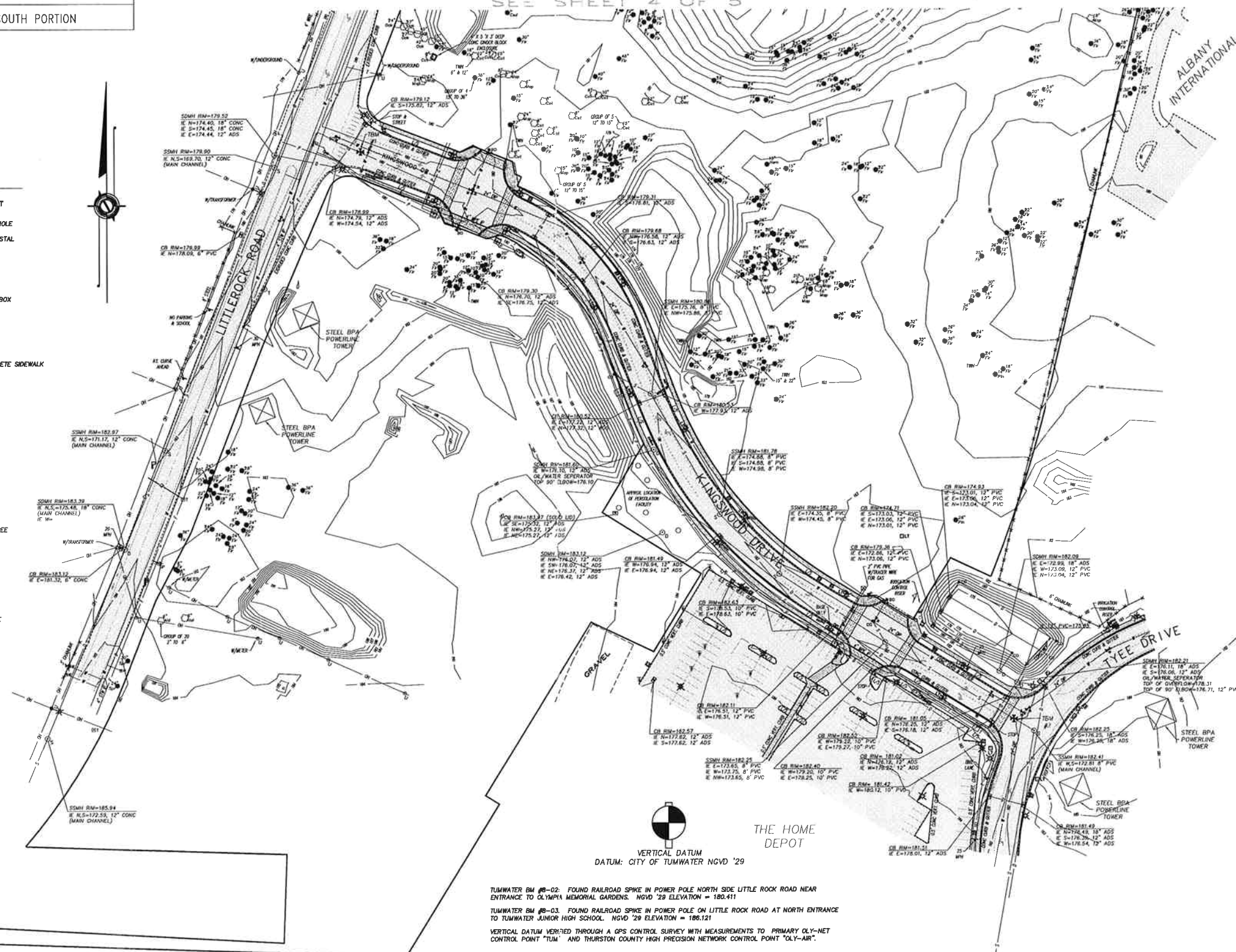
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MERIDIAN: BLA 03-7444TW, AF NO. 3500815

LEGEND

- | | | | |
|------|---|-----|---------------------------|
| BO | BLOW OFF | TV | TELEPHONE VAULT |
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| CB | CATCH BASIN | C | CONCRETE |
| VP | 12" VERT. ADS PIPES W/CAPS (FOR PERCOLATION FACILITY) | B | BUILDING |
| PA | POLE ANCHOR | A | ASPHALT |
| PM | POWER METER | F | FIR TREE |
| SCSP | STATIC COLLECTION SYSTEM POLE | S | SPRUCE TREE |
| GP | GUY POLE | H | HOLLY TREE |
| UP | UTILITY POLE | Ch | CHERRY TREE |
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| PV | POWER VAULT | M | MAPLE TREE |
| GM | GAS METER | Ap | APPLE TREE |
| GV | GAS VALVE | Ced | CEDAR TREE |
| EG | EDGE OF GRAVEL | Hem | HEMLOCK TREE |
| EP | EDGE OF PAVEMENT | St | STURGEON OAK TREE |
| SS | SANITARY SEWER LINE | Dec | DECIDUOUS TREE |
| SD | STORM DRAIN LINE | Al | ALDER TREE |
| W | WATER LINE | Oak | OAK TREE |
| OU | OVERHEAD UTILITY LINE | P | PINE TREE |
| UP | UNDERGROUND POWER LINE | | |
| UT | UNDERGROUND TELEPHONE LINE | | |
| UF | UNDERGROUND FIBER OPTIC LINE | | |
| G | GAS LINE | | |
| F | FENCE LINE | | |
| B | BOUNDARY LINE | | |

UTILITY NOTE:

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VERTICAL DATUM
DATUM: CITY OF TUMWATER NGVD '29

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VERTICAL DATUM VERIFIED THROUGH A GPS CONTROL SURVEY WITH MEASUREMENTS TO PRIMARY OLY-NET CONTROL POINT "TUM" AND THURSTON COUNTY HIGH PRECISION NETWORK CONTROL POINT "OLY-AIR".

ON-SITE BENCH MARKS:

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TBM #2 2" BRASS DISC IN CONCRETE CENTERLINE KINGSWOOD DRIVE & 28.01' NORTHWESTERLY CENTERLINE TYE DRIVE. ELEVATION = 181.95'



SURVEYORS CERTIFICATE
I HEREBY CERTIFY THAT THIS MAP IS AN ACCURATE REPRESENTATION MADE BY ME OR UNDER MY DIRECTION. (SEE SHEET 1 FOR ALTA CERTIFICATE)
DATE _____
THOMAS J. SWIFT
PROFESSIONAL LAND SURVEYOR
CERTIFICATE NO. 35848

BOUNDARY & TOPOGRAPHIC SURVEYS • CIVIL ENGINEERING • SUBSURVEYS
ALTA/ACSM • GPS/RTK • CONSTRUCTION SURVEYS
PROJECT MANAGEMENT

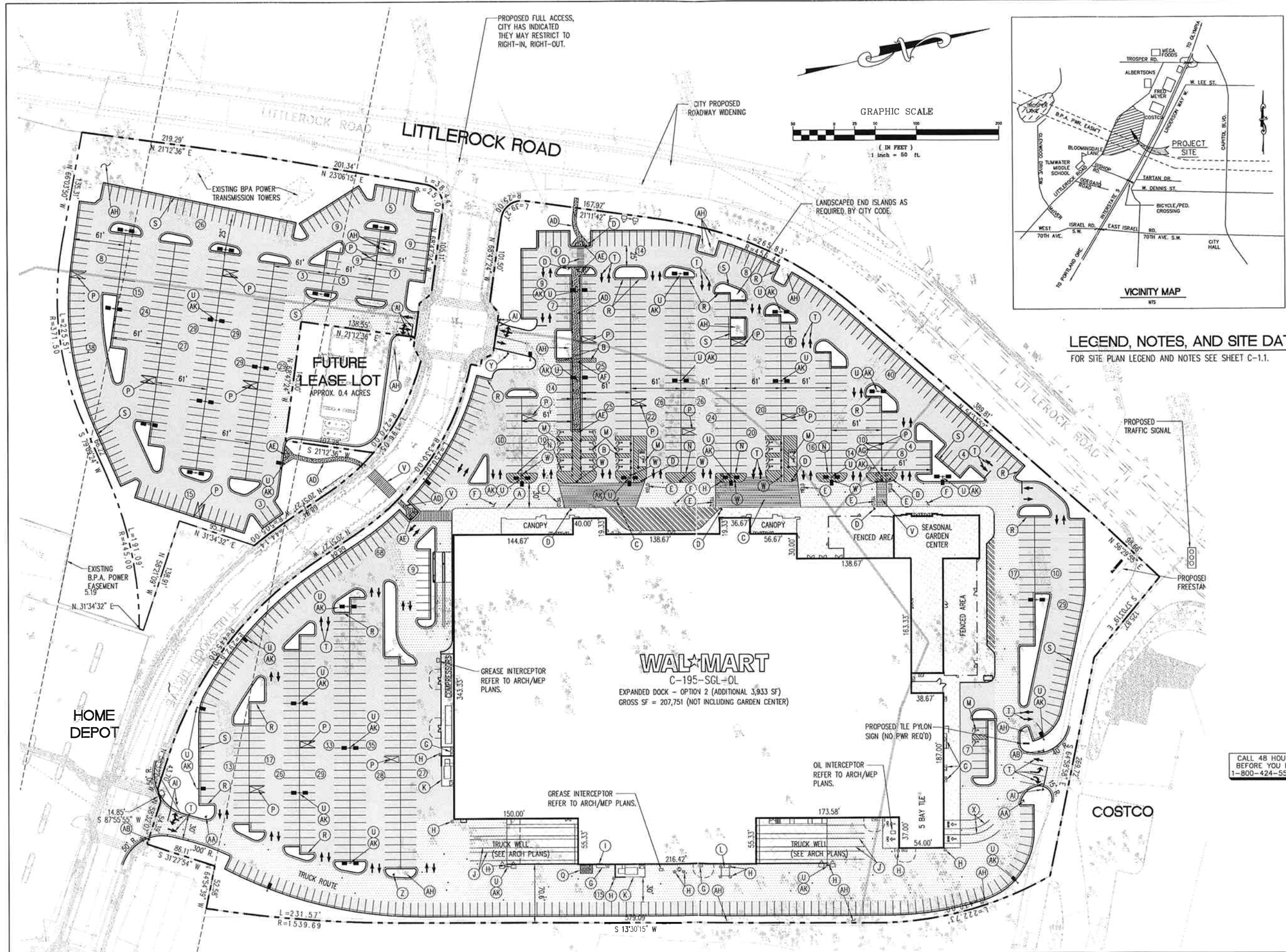
JAH CONSTRUCTION SERVICES, INC.
LAND & CONSTRUCTION SURVEYING
8120 OLD HIGHWAY 98 SE, SUITE B
OLYMPIA, WA 98501
(360) 357-8000
FAX (360) 357-8605

ALTA/ACSM LAND TITLE SURVEY
OF A PORTION OF
SEC. 3 TWP 17 N, R 2 W, W.M.,
AT THE REQUEST OF
PACLAND

SCALE: 1" = 60'
JOB: 04049
DATE: 11/30/04
SHEET 5 OF 5
04049TOPO.DWG

FIGURE 3 – PROPOSED SITE PLAN

FIGURE 4 – BASIN MAP



No.	Date	By	Revision Description

Issue Date: 12/7/04
 Drawn By: PERMIT
 Project No: 2003010113.00
 Checked By: WED

PACLAND
 600 Columbia St., N.W., Suite 106
 Olympia, WA 98501
 T (360) 796-8559
 F (360) 796-5527
 www.pacland.com

STORE # 3850-00
 LITTLEROCK ROAD
 TUMWATER, WA

WALMART

C-10

SITE PLAN

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