



# City of Tualatin

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## NOTICE OF DECISION

On March 31, 2016 the City of Tualatin approved with conditions AR 15-0029 for Lam Research Building D Expansion located at 11155-11361 SW Leveton Dr (Tax Lot: 2S123AA01000).

This staff level decision will be final after 14 calendar days from the date of this mailing unless a written request for review is received by the **Community Development Department – Planning Division at 18880 SW Martinazzi Avenue, Tualatin, OR 97062 before 5:00 p.m.** The appeal must be submitted on the City Request for Review (i.e. Appeal) form with all the information requested, as required by TDC 31.075, and signed by the appellant. Only those persons who submitted comments during the notice period may submit a request for review. The plans and appeal forms are available at the Planning Counter. The appeal forms must include reasons, the appeal fee and meet the requirements of Section 31.076 of the Tualatin Development Code.

Date notice mailed: 4/1//2016

Date a Request for Review must be filed: 4/15/2016

File: AR-15-0029



# City of Tualatin

www.tualatinoregon.gov

March 31, 2016

## ARCHITECTURAL REVIEW AND PUBLIC FACILITIES DECISION

AR-15-0029

**\*\* APPROVAL WITH CONDITIONS \*\***

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Case #:	AR-15-0029
Project:	Lam Research Building D Expansion
Location:	11155-11361 SW Leveton Drive ( <a href="#">Tax Lot 2S1 23AA 01000</a> )
Tax Map/Lots:	2S1 22AA 500, 2S1 22AB 100 & 200
Applicant/Owner:	Lam Research, Inc.
Applicant's Rep:	Lee Leighton, Mackenzie, Portland, OR (503) 224-9560

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### Contents

INTRODUCTION .....	5
REQUEST FOR ARCHITECTURAL REVIEW .....	5
ARCHITECTURAL REVIEW DECISION .....	5
ARCHITECTURAL REVIEW CONDITIONS OF APPROVAL.....	5
NOTICE OF ADDITIONAL APPLICABLE CODE PROVISIONS .....	6
Section 63.020.....	6
Section 73.100 Landscaping Installation and Maintenance. ....	6
Section 73.056 Architectural Review approvals shall expire after two years unless: .....	6
THE PROPOSAL.....	7
Project Description.....	7
Site Description .....	8
On-Site Development.....	9
Stormwater Management.....	10
Public Facilities .....	11
Stormwater System .....	11
Sanitary Sewer System.....	11
Streets.....	11
PLANNING FINDINGS .....	11
Previous Permits .....	11
Applicable Criteria.....	11
Planning District and Uses.....	12

ARRANGEMENTS CAN BE MADE TO PROVIDE THESE MATERIALS IN ALTERNATIVE FORMATS, SUCH AS LARGE TYPE OR AUDIO COMPACT DISC. PLEASE CONTACT THE PLANNING DIVISION @ 503.691.3026 TO ALLOW AS MUCH LEAD TIME AS POSSIBLE.

Chapter 62: Manufacturing Park Planning District .....	12
Section 62.020 Permitted Uses.....	12
Section 62.021 Restrictions on Permitted Uses.....	12
Section 62.023 Additional Permitted Mixed Uses in MP.....	13
Section 62.024 Restrictions on Additional Permitted Mixed Uses in MP.....	13
Section 62.030 Conditional Uses. ....	13
Section 62.031 Restrictions on Conditional Uses. ....	13
Section 62.040 Prohibited Uses.....	13
Section 62.110 Environmental Standards.....	13
Section 62.120 Community Design Standards.....	13
Section 73.050 Criteria and Standards .....	14
Section 73.055 Conditions Placed on Architectural Review Approvals.....	15
Section 73.056 Time Limit on Approval.....	15
Section 73.095 Occupancy Requirements.....	15
Section 73.100 Landscaping Installation and Maintenance.....	15
Section 73.150 Objectives.....	15
Lot Sizes.....	15
Section 62.050 Lot Size.....	15
Setback Requirements .....	16
Section 62.060 Setback Requirements .....	16
Structure Height.....	16
Section 62.080 Structure Height.....	16
Site Planning.....	17
Section 62.045 Industrial Master Plan.....	17
Section 73.160 Standards .....	17
Structure Design.....	22
Section 73.210 Objectives.....	22
Section 73.220 Standards .....	22
Section 73.226 Objectives.....	22
Waste and recyclables storage .....	23
Section 73.227 Standards .....	23
Landscaping.....	27
Section 62.130 Landscape Standards.....	27
Section 73.240 Landscaping General Provisions.....	27
Section 73.260 Tree and Plant Specifications.....	28
Section 73.280 Irrigation System Required .....	30
Section 73.290 Re-vegetation in Un-landscaped Areas.....	30
Section 73.310 Landscape Standards – Commercial, Industrial, Public and Semi-Public Uses .....	31
Tree Preservation.....	32
Section 73.250 Tree Preservation.....	32
Grading.....	33

Section 73.270 Grading.....	33
Off-Street Parking Lot Landscaping.....	34
Section 62.100 Off-Street Parking and Loading.....	34
Section 73.320 Off-Street Parking Lot Landscaping Standards .....	35
Section 73.340 Off-Street Parking Lot and Loading Area Landscaping.....	35
Section 73.360 Off-Street Parking Lot Landscape Islands - Commercial, Industrial, Public, and Semi-Public Uses .....	35
Off-Street Parking and Loading.....	35
Section 73.370 Off-Street Parking and Loading.....	35
73.380 Off-Street Parking Lots.....	37
Section 73.390 Off-Street Loading Facilities .....	37
Access.....	38
Section 62.090 Access.....	38
Section 73.400 Access.....	38
APPEAL.....	39
REQUEST FOR PUBLIC FACILITIES DECISION .....	40
PUBLIC FACILITIES DECISION.....	40
PUBLIC FACILITIES CONDITIONS OF APPROVAL.....	40
CITY ENGINEER’S FINDINGS .....	40
Standards and Applicable Criteria.....	40
TMC Title 03: Utilities and Water Quality .....	41
TMC Chapter 03-02: Sewer Regulations; Rates .....	41
TMC 3-2-020 Application, Permit and Inspection Procedure.....	41
TMC 3-2-030 Materials and Manner of Construction. ....	41
TMC Chapter 03-03: Water Service .....	41
TMC 3-3-040 Separate Services Required. ....	41
TMC 3-3-110 Construction Standards.....	42
TMC 3-3-120 Backflow Prevention Devices and Cross Connections. ....	42
TMC 3-3-130 Control Valves. ....	42
TMC 3-5 Additional Surface Water Management Standards .....	43
TMC 3-5-010 Policy. ....	43
TMC 3-5-050 Erosion Control Permits.....	43
TMC 3-5-060 Permit Process. ....	43
TMC 3-5-200 Downstream Protection Requirement.....	44
TMC 3-5-210 Review of Downstream System. ....	44
TMC 3-5-220 Criteria for Requiring On-Site Detention to be Constructed. ....	44
TMC 3-5 PERMANENT ON-SITE WATER QUALITY FACILITIES.....	45
TMC 3-5-280 Placement of Water Quality Facilities.....	45
TMC 3-5-290 Purpose of Title.....	45

TMC 3-5-300 Application of Title.....	45
TMC 3-5-310 Exceptions.....	45
TMC 3-5-320 Definitions.....	46
TMC 3-5-330 Permit Required.....	46
TMC 3-5-340 Facilities Required.....	47
TMC 3-5-345 Inspection Reports.....	47
TMC 3-5-350 Phosphorous Removal Standard.....	47
TMC 3-5-360 Design Storm.....	47
TMC 3-5-370 Design Requirements.....	47
TMC 3-5-330 Permit Required.....	47
TMC -5-340 Facilities Required.....	47
TMC 3-5-390 Facility Permit Approval.....	47
Chapter 04-02: Fire Hydrant Locations and Rates of Flow.....	48
TMC 4-2-010 Hydrants and Water Supply for Fire Protection.....	48
TDC Chapter 73: Community Design Standards.....	49
TDC Section 73.270 Grading.....	49
TDC Section 73.400 Access.....	49
TDC Chapter 74: Public Improvement Requirements.....	53
TDC Section 74.210 Minimum Street Right-of-Way Widths.....	53
TDC Section 74.420 Street Improvements.....	54
TDC Section 74.425 Street Design Standards.....	57
TDC Section 74.440 Streets, Traffic Study Required.....	58
TDC Section 74.470 Street Lights.....	59
TDC Section 74.475 Street Names.....	60
TDC Section 74.610 Water Service.....	60
TDC Section 74.620 Sanitary Sewer Service.....	60
TDC Section 74.630 Storm Drainage System.....	61
TDC Section 74.640 Grading.....	61
TDC Section 74.650 Water Quality, Storm Water Detention and Erosion Control.....	62
TDC Section 74.660 Underground.....	63
TDC Section 74.670 Existing Structures.....	63
TDC Chapter 75: Access Management.....	64
TDC Section 75.010 Purpose.....	64
TDC Section 75.030 Freeways and Arterials Defined.....	64
TDC Section 75.120 Existing Streets.....	64
APPEAL.....	65

- Attachments:** Applicant's Exhibit D - Plans  
Applicant's Exhibit E - Republic Services Approval Letter  
Applicant's Exhibit I - Trip Generation Letter 9 28 16

Applicant's Exhibit J - Stormwater Report  
Letter February 2, 2016 - TVF&R comments  
Letter February 5, 2016 - Clean Water Services comments  
Letter January 21, 2016 - City Engr. Notice of Complete Draft  
Letter March 8, 2016 - Additional Traffic Information

## **INTRODUCTION**

The subject site is the 58-acre Lam Research campus, located on the west side of SW 108th Avenue between SW Tualatin Road and SW Leveton Drive, in the Manufacturing Park (MP) Planning District. Lam Research (Applicant) proposes an 18,140 square foot addition to Building D, a manufacturing facility internal to the site. The building addition will be surrounded on three sides by existing buildings. It will support and expand manufacturing operations, with a corresponding estimated increase of 30 jobs. Previously, all of the site's street frontages have been constructed with improvements meeting the applicable standards.

## **REQUEST FOR ARCHITECTURAL REVIEW**

Architectural Review (AR) approval of an 18,140 square foot addition to Building D, Lam Research campus, 11357 SW Leveton Drive, Tualatin, Oregon.

Plan District Designation: MP (Manufacturing Park)

Site Size: 58.0 acres (3 parcels)

## **ARCHITECTURAL REVIEW DECISION**

Approved with conditions.

**Please refer to the Public Facilities Decision section of this document for additional decisions, conditions of approval, and findings.**

## **ARCHITECTURAL REVIEW CONDITIONS OF APPROVAL**

PRIOR TO ISSUANCE OF BUILDING PERMITS:

- AR 1. All further submittals shall be sent in one complete and full set. No piecemeal submittals will be accepted. Submittals prior to building permit shall contain one plan set, with one table of contents that includes all pages submitted. All plan set pages and documents shall be numbered in accordance with table of contents. All plan submittals must be on 24 x 36 inch paper. All submittals shall be stapled or bound together down the length of the bound side. Please do not use binder or paper clips. The entire set will be reviewed at one time. A narrative shall be included and will address each condition of approval. Each applicant

narrative response shall include how the condition is being addressed and on what revised plan page the condition is shown to be met in drawn form. Each resubmittal will start a new 2-week minimum review period by staff.

- AR 2. Revise plans to provide a security fence or wall at least 6' tall completing the enclosure of the generator on the northwest corner of the proposed addition. TDC Section 73.160(3)(f)
- AR 3. Revise plans to provide a sight obscuring fence, wall or landscaping screening the generator on the northwest corner of the proposed addition. TDC Section 73.160(4)(c)
- AR 4. Revise plans to provide at least 119 square feet of additional trash enclosure area or revise the applicant's narrative to support the use of an alternative method described in TDC Section 73.227. TDC Section 73.227

## **NOTICE OF ADDITIONAL APPLICABLE CODE PROVISIONS**

### **Section 63.020**

All industrial uses, regardless of the Planning District in which they are located, shall comply with the environmental standards contained in TDC 63.050.

### **Section 73.100 Landscaping Installation and Maintenance.**

- (1) All landscaping approved through the Architectural Review Process shall be continually maintained, including necessary watering, weeding, pruning and replacement, in a manner substantially similar to that originally approved through the Architectural Review Process, unless subsequently altered with Community Development Director approval.
- (2) All building exterior improvements approved through the Architectural Review Process shall be continually maintained including necessary painting and repair so as to remain substantially similar to original approval through the Architectural Review Process, unless subsequently altered with Community Development Director approval. [Ord. 862-92, § 51, 3/23/92; Ord. 904-93, § 45, 9/13/93]

### **Section 73.056 Architectural Review approvals shall expire after two years unless:**

- (1) A building, or grading permit submitted in conjunction with a building permit application, has been issued and substantial construction pursuant thereto has taken place and an inspection performed by a member of the Building Division; or
- (2) The Architectural Review (AR) applicant requests in writing an extension and the City approves it. If the Community Development Director and City Engineer or their designees approved the AR. then the Community Development Director and City Engineer shall decide upon the extension request. If the Architectural Review Board (ARB) approved the AR. then the ARB shall decide upon the extension request. The applicant shall provide notice of extension request to

past recipients of the AR notice of application and post a sign pursuant to TDC 31.064. Before approving an extension, the deciding party shall find the request meets these criteria:

- i. The applicant submitted a written extension request prior to the original expiration date.
- ii. There have been no significant changes in any conditions, ordinances, regulations or other standards of the City or applicable agencies that affect the previously approved project so as to warrant its resubmittal for AR.
- iii. If the previously approved application included a special study, the applicant provided with the extension a status report that shows no significant changes on the site or within the vicinity of the site. A letter from a recognized professional also would satisfy this criterion if it states that conditions have not changed after the original approval and that no new study is warranted.
- iv. If the AR applicant neglected site maintenance and allowed the site to become blighted, the deciding party shall factor this into its decision.
- v. The deciding party shall grant no more than a single one-year extension for an AR approval.
- vi. If the Community Development Director and City Engineer or their designees are the deciding party, then they shall decide within thirty (30) days of receipt of the request. If the ARB is the deciding party, then the ARB shall decide within sixty (60) days of receipt of the request. If the deciding party fails to decide within the applicable time period, the decision shall default to approval.

## **THE PROPOSAL**

*The following introductory materials and descriptions are based largely on the applicant's narrative. Staff has made some minor edits.*

### **Project Description**

Lam Research (Applicant) proposes an 18,140 square foot addition to Building D, a manufacturing facility internal to the 58-acre site. The building addition will be surrounded on three sides by existing buildings. It will support and expand manufacturing operations, with a corresponding estimated increase of 30 jobs for people to work at the site when the new facility is completed.

Based on the position and height of the proposed addition in relation to existing buildings, topography and landscaping, the new construction will not be visible from SW Tualatin Road or SW 108th Avenue. Visibility from SW Leveton Drive will be very limited because the addition will be set back more than 450 feet from the right-of-way, and the sloping landscaped edge along the street acts as a berm with plantings that obstructs sight lines into the central part of the property.

As viewed from points within the property, the new addition's position, scale, materials, colors, and other features have been designed for compatibility and visual integration with the existing buildings making up the Applicant's manufacturing operation. A landscape area to be reshaped by realignment of a drive aisle will be replanted to restore its appearance.

A pre-application conference for this project was held on September 2, 2015. A neighborhood/developer meeting was held on October 13, 2015. The applicant's narrative addresses the applicable development standards for the proposed addition. Excerpts were used for portions of the introductory material in this report without citation. In the Planning Findings section, the applicant's responses to criteria are credited.

Figure II.1 Aerial Map of Subject Site and Area of Work



## Site Description

The subject site is the Lam Research campus, located on the west side of SW 108th Avenue between SW Tualatin Road and SW Leveton Drive. The property consists of tax lots 100 and 200 of Washington County tax map 2S1 22AB, and tax lot 500 of tax map 2S1 22AA, containing a total of 58 acres. The subject lots and neighboring property to the west are in the City of Tualatin's Manufacturing Park (MP) Planning District. To the south, across SW Leveton Drive, the Fujimi site and adjacent property to its west are also in the MP District. Other neighboring industrial properties, to the east across SW 108th Avenue and across SW Leveton Drive east of Fujimi, are in the Light Manufacturing (ML) Planning District. North of the subject property, across SW Tualatin Road, there are single-family homes in the

Low-Density Residential (RL) Planning District and, at the west, an assisted living facility and homes in the Medium Low Residential (RML) Planning District.

All of the public improvements along the site's street frontages have previously been constructed meeting the applicable City of Tualatin Public Works standards.

## On-Site Development

The proposed addition centrally located, surrounded by the site's existing buildings where it cannot be seen from SW Tualatin Road or SW 108th Avenue. It will be only partially visible from SW Leveton Drive at a distance of more than 400 feet, obscured by landscaping. Its height, mass, materials and colors are designed to integrate with those of the existing buildings, including the glazing of an elevated pedestrian walkway between buildings.

Applicant's Table 1 Site Analysis

	Building D Addition	Existing	Site Total or Average
Lot Area (SF)	-	2,526,480	2,526,480
Building Area (SF)	18,140	535,000	553,140
Building Coverage On Lot (%)	-	21.2%	21.9%
Total Parking	-7	854	847
Accessible Parking	0	24	24
Van/Carpool Parking	0	18	18
Min. Required Parking (1.6/KSF)	29	856	885
Build-Out Parking (per Industrial Master Plan)	-	-	2,304

No additional trash and recycling areas are proposed in conjunction with this addition to Building D because the added area and staff can be served by the existing facilities on the site. This approach has been approved by Republic Services, the solid waste hauler (see Exhibit E, letter from Frank Lonergan).

Because the building addition will replace part of a paved drive aisle, the Applicant has coordinated with Tualatin Valley Fire & Rescue (TVFR) to ensure that firefighting access to all of the buildings will be satisfactory.

## Applicant's Table 2 Development Standards

	MP District/IMP MP 00-01	Proposed Building D Addition
<b>Setback Requirements</b>	-	(from property line to addition)
Front Yard	30'	326' minimum
Side Yard	0'	515' minimum
Rear Yard	0'	843' minimum
<b>Parking and Circulation</b>	10' (streets) 5' (internal)	No change
<b>Maximum Structure Height</b>	60'	35'
<b>Landscaping</b>	20% of site area (per approved IMP) (42.36% for Lot 2 only)	40.47% of Lot 2
<b>Minimum Parking (per 1,000 GSF)</b> Manufacturing (per IMP)	1.6 (885)	847
<b>Maximum Parking (per 1,000 GSF)</b> Manufacturing	<u>Zone B</u> None	
<b>Minimum Bicycle Parking</b>	Warehousing/Manufacturing: 2, or 0.1 per 1,000 GSF, whichever is greater (55)	No change
<b>Percentage of Bicycle Parking to be Covered</b>	First 5 spaces or 30% of parking spaces, whichever is greater (17)	No change

Using the minimum parking ratio for Manufacturing, 1.6 spaces per thousand square feet (KSF), the site's 847 parking spaces (existing 854 less 7 to be removed by the Building D expansion) are 38 parking spaces short of meeting the minimum requirement of 885 spaces, including the Building D addition (553,140 SF at 1.6 spaces/1,000 SF). The approved Industrial Master Plan (IMP-00-01) anticipates development in phases, with some interim parking located where future buildings are planned. At this time, according to the Applicant, operations and staffing levels at the facility do not require construction of additional parking to meet operational needs. The Applicant wishes to operate on a temporary basis with constructed parking at less than 1.6 parking spaces per thousand square feet of building area. (See response below, under Section 73.370 Off-Street Parking and Loading, for detailed findings.) The Applicant intends to submit plans for construction of additional parking area(s) in conjunction with the next Architectural Review for additional building(s) on the site, at a level sufficient to bring the site as a whole to the ratio of 1.6 spaces per thousand square feet of building floor area.

### Stormwater Management

The site's stormwater management facilities have been designed with capacity to accommodate current and future development within the entire subject property, providing substantial excess capacity to handle runoff from the existing improvements, plus the proposed addition to Building D. Runoff from roof drains and paved surfaces will be collected in new catch basins and pipes connecting to the existing on-site system (see Sheet C2.3.). These issues are addressed in the City Engineer's findings.

## **Public Facilities**

### **Stormwater System**

No new public stormwater facilities are proposed. As noted above, the site's stormwater management facilities have been designed to accommodate current and future development within the subject property.

### **Sanitary Sewer System**

A new gravity sewer link to serve the proposed addition to Building D will be extended from an existing on-site (private) line within the drive aisle north of the expansion site, as depicted on Sheet C2.3.

### **Streets**

No changes in the street configurations or improvements along the property's frontages are proposed or warranted as part of the Building D addition project. The property's street frontages have previously been improved to meet public works standards, and no changes in site access (street driveway locations) or primary on-site circulation routes are proposed.

The Applicant has provided a memo from Mackenzie traffic engineer Brent Ahrend which concludes that "With the low number of peak hour trips anticipated with the expansion of Building D, impacts on these intersections will be minimal, and not trigger any offsite mitigation. Therefore, it is not anticipated a full TIA would be needed for the expansion." (See Exhibit I of the application.)

## **PLANNING FINDINGS**

*Note: In the following sections, planning Staff comments, findings, and conditions of approval are in Italic font.*

### **Previous Permits**

The site was the subject of the following previous land use actions (excluding Minor Architectural Review):

MIP-89-03 Creation of 58-acre parcel

AR-89-24 Oki Semiconductor Architectural Review

IMP-00-01 Novellus Systems, Inc. Industrial Master Plan (2001)

PAR-00-04 Minor Land Partition dividing the property into three parcels (Partition Plat 2001-058)

AR00-30 Novellus Systems Architectural Review

### **Applicable Criteria**

#### **Tualatin Development Code (TDC)**

TDC Chapter 62: Manufacturing Park Planning District

TDC Chapter 73: Community Design Standards

TDC Chapter 74: Public Improvement Requirements

TDC Chapter 75: Access Management

**Tualatin Municipal Code (TMC)**

Title 03: Utilities and Water Quality

Title 04: Building

**IMP 00-01 Novellus Industrial Master Plan**

**Planning District and Uses**

Planning District: Manufacturing Park (MP)

Uses: Specialized manufacturing facilities and related research and development

**Chapter 62: Manufacturing Park Planning District**

**Section 62.020 Permitted Uses.**

**No building, structure or land shall be used in this district except for the following uses as restricted in TDC 62.021.** [non-applicable provisions omitted for brevity]...

**(3) Manufacture, assembling and packaging of electronic equipment, instruments and devices....**

**(5) Research offices and laboratories....**

**(15) Accessory facilities and activities customarily associated with or essential to permitted uses, and operated incidental to the principal use....**

Applicant's response: The proposed addition to Building D will support and expand the site's current specialized manufacturing facilities and related research and development. The production of equipment used to make semiconductors, along with research and engineering for continued improvement to that equipment, is consistent with listed allowed uses (3), (5), and (15) in Section 62.020. Notably, the activity on the site does not produce or emit objectionable noise other than noise related to normal manufacturing activity such as truck deliveries and operation of standard equipment.

**Section 62.021 Restrictions on Permitted Uses.**

**The following restrictions shall apply to those uses listed as permitted uses in TDC 62.020:**

**(1) The use must be conducted wholly within a completely enclosed building, except off-street parking and loading, utility facilities, wireless communication facilities, and outdoor storage occupying less than ten percent of the total site area.**

**(2) The retail sale of products manufactured, assembled, packaged or wholesaled on the site is allowed provided that the retail sale area, including the showroom area, shall be no greater than 5% of the gross floor area of the building not to exceed 1,500 square feet.**

**(3) For other retail uses, excluding retail sales of products manufactured, assembled, packaged or wholesaled on the site...**

Applicant's response: All production activity, with the exception of loading and unloading of equipment, will occur within the buildings as required by subparagraph (1). This proposal does not include a request to engage in on-site retail activities subject to subparagraphs (2) and (3). These provisions are satisfied.

**Section 62.023 Additional Permitted Mixed Uses in MP.**

Applicant's response: None of these uses are proposed. This section does not apply.

**Section 62.024 Restrictions on Additional Permitted Mixed Uses in MP.**

Applicant's response: No mixed uses are proposed. This section does not apply.

**Section 62.030 Conditional Uses.**

**The following uses are permitted in accordance with TDC Chapter 32 as restricted in TDC 62.031:**

**(1) Outdoor storage activity or mechanical equipment when proposed to occupy more than ten percent of the total lot area when part of and necessary for the operation of any permitted use.**

**(2) Residence for a caretaker when necessary for security purposes.**

**(3) Fire station.**

Applicant's response: None of these uses are proposed. This section does not apply.

**Section 62.031 Restrictions on Conditional Uses.**

Applicant's response: None of these uses are proposed. This section does not apply.

**Section 62.040 Prohibited Uses.**

Applicant's response: None of these uses are proposed. This section does not apply.

**Section 62.110 Environmental Standards.**

**Except as otherwise provided under TDC Chapter 37, refer to TDC Chapter 63.**

Applicant's response: The proposed Building D addition is located south of an existing building that fully screens it from SW Tualatin Road (where residential uses are located on the north side of the street). Activities outside the addition will be limited to access and circulation, with operations conducted within the building. This combination of screening and the conduct of activities ensures that the facility will continue to operate in compliance with Chapter 63's standards regarding noise, vibration, air quality, odor, heat and glare, stored materials, and liquid waste materials.

*Chapter 63 regulates environmental factors that are related to manufacturing operations. As such, these regulations are matters of zoning enforcement, and less matters to be reviewed as development standards. Therefore, Staff's findings regarding the proposal in review are mute as to compliance with Section 62.110.*

**Section 62.120 Community Design Standards.**

**Except as otherwise provided under TDC Chapter 37, refer to TDC Chapter 73.**

Applicant's response: Please refer to the section devoted to Chapter 73 below.

### **Section 73.050 Criteria and Standards**

**(1) In exercising or performing his or her powers, duties, or functions, the Planning Director shall determine whether there is compliance with the following:**

**(a) The proposed site development, including the site plan, architecture, landscaping, parking and graphic design, is in conformance with the standards of this and other applicable City ordinances insofar as the location, height, and appearance of the proposed development are involved;**

**(b) The proposed design of the development is compatible with the design of other developments in the general vicinity; and**

**(c) The location, design, size, color and materials of the exterior of all structures are compatible with the proposed development and appropriate to the design character of other developments in the vicinity.**

Applicant's response: The proposed addition is consistent with the existing Building D (to which it is attached) and other existing buildings on the Lam Research site. The Lam Research building complex has previously been found to comply with these requirements for compatibility with industrial development adjacent to the subject property on the west, south, and east sides, all of which are also in the MP Planning District. No changes are proposed along the north edge of the property, across SW Tualatin Road from residential development, and the proposed Building D addition will not be visible because it is behind an existing building. As explained below and based on the enclosed plans, the proposed Building D addition project meets the applicable standards of the City of Tualatin Development Code. These requirements are met.

*With regard to Section 73.050(1)(a), staff's analysis of compliance with this ordinance is found in the sections of this report addressing specific standards. With regard to Section 73.050(1)(b) and (c), staff concurs with the applicant's analysis.*

**(2) In making his or her determination of compliance with the above requirements, the Planning Director shall be guided by the objectives and standards set forth in this chapter. If the architectural review plan includes utility facilities or public utility facilities, then the City Engineer shall determine whether those aspects of the proposed plan comply with applicable standards.**

Applicant's response: This application includes site plans, elevations with notes on architectural features, site grading/erosion control and utility facilities plans, a lighting plan, and a landscape planting plan. No public improvements are proposed. The submitted documents reflect the Applicant's attention to the objectives and standards in this Chapter.

*The architectural plans submitted by the applicant include utility facilities. Utility facilities and public utility facilities are not addressed in this, the Planning Findings part of the report. The City Engineer's*

*findings are incorporated into the later part of this document. Refer to the Table of Contents for specific references.*

**(3) In determining compliance with the requirements set forth, the Planning Director shall consider the effect of his or her action on the availability and cost of needed housing...**

Applicant's response: The proposed development does not include housing, and the subject property is not zoned to allow residential development at all. This standard does not apply.

**(4) As part of Architectural Review, the property owner may apply for approval to cut trees in addition to those allowed in TDC 34.200. The granting or denial of a tree cutting permit shall be based on the criteria in TDC 34.230.**

Applicant's response: No tree removal is proposed. This standard does not apply.

**(5) Conflicting Standards. In addition to the MUCOD requirements, the requirements in TDC Chapter 73 (Community Design Standards) and other applicable Chapters apply...**

Applicant's response: The subject site is not within the MUCOD. The applicable design standards in TDC Chapter 73 are reviewed in detail below.

### **Section 73.055 Conditions Placed on Architectural Review Approvals.**

### **Section 73.056 Time Limit on Approval.**

### **Section 73.095 Occupancy Requirements.**

### **Section 73.100 Landscaping Installation and Maintenance.**

*TDC Sections 73.055, 73.056, 73.095 and 73.100 concern legal, procedural and enforcement issues applicable to all architectural reviews. This proposal invokes them, but not in any specific way. Any applicable findings are general in nature and addressed elsewhere in this document. Refer to the Table of Contents.*

### **Section 73.150 Objectives**

*The objectives of this section are aspirational and offered for consideration and guidance. They inform the writing and interpretation of the standards that follow. Therefore, Staff's findings regarding the proposal in review are mute as to compliance with Section 73.150.*

## **Lot Sizes**

### **Section 62.050 Lot Size.**

Applicant's response: The subject property consists of three parcels that are each consistent with the minimum lot area requirements of the approved IMP. No new lot or reconfiguration is proposed. This section does not apply.

## Setback Requirements

### Section 62.060 Setback Requirements.

**(1) The setbacks set forth in an Industrial Master Plan approved in accordance with TDC Chapter 37 apply. Where setbacks are not specified in an Industrial Master Plan, TDC 62.060(2) - (5) apply....** [non-applicable provisions omitted for brevity]

Applicant's response: The approved IMP allows an 80-foot minimum setback on the south side of the property (abutting SW Leveton Drive), a 35-foot parking and circulation area setback on the northern side of the property (abutting SW Tualatin Road), and a northern interior line set back 20 feet from existing manufacturing buildings. The proposed Building D expansion is centrally located within the property and is consistent with all applicable setback requirements.

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site's campus was approved with conditions on January 22, 2001. Through this master plan, some development standards of TDC Chapter 62 and TDC Chapter 73 were adjusted. Refer to applicant's Table 2 "Development Standards".*

## Structure Height

### Section 62.080 Structure Height.

**(1) Except as provided in TDC 62.080(2) or (3), no structure shall exceed a height of 70 feet, except for flagpoles displaying the flag of the United States of America either alone or with the State of Oregon flag, which shall not exceed 100 feet above grade provided that the setbacks are not less than a distance equal to the flagpole height.**

Applicant's response: The roof of the proposed Building D addition is 35 feet high, consistent with the height of the existing Building D. Mechanical screening for rooftop equipment will be at 47 feet, which is visually consistent with the height of the existing bridge between buildings. Therefore, the proposed addition meets this requirement.

**(2) Height Adjacent to a Residential District. Except as otherwise provided in TDC Chapter 37, where a property line, street or alley separates MP land from land in a residential district, a building, flagpole or wireless communication support structure shall not be greater than 28 feet in height at the required 50 foot or 100 foot setback line. No building or structure, including flagpoles, shall extend above a plane beginning at 28 feet in height at the required 50 foot or 100 foot setback line and extending away from and above the setback line at a slope of 45 degrees, subject always to the maximum height limitation in TDC 62.080(1).**

Applicant's response: The building will be located more than 900 feet from the residential district north of SW Tualatin Road. This standard is met.

**(3) Wireless Communication Support Structure. Except as otherwise provided in TDC Chapter 37, the maximum structure height for a wireless communication support structure and antennas is 100 feet.**

Applicant's response: This provision is not applicable because the proposal does not include a wireless communication support structure in excess of 100 feet.

## Site Planning

### Section 62.045 Industrial Master Plan.

**Industrial Master Plans may be approved subject to TDC Chapter 37.**

Applicant's response: No new Industrial Master Plan (IMP) or amendment of the existing IMP is proposed. This standard does not apply. Conditions of approval of the original Industrial Master Plan are addressed in Section VI of this narrative.

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site's campus was approved with conditions on January 22, 2001. Through this master plan, some development standards of TDC Chapter 62 and TDC Chapter 73 were adjusted. Following the master plan, a design for the site was approved on May 26, 2001. Specific adjustments relevant to the current proposal are noted in findings regarding their respective subsections.*

### Section 73.160 Standards

#### **(1) Pedestrian and Bicycle Circulation:**

##### **(b) For Industrial Uses:**

**(i) a walkway shall be provided from the main building entrance to sidewalks in the public right-of-way and other on-site buildings and accessways. The walkway shall be a minimum of 5 feet wide and constructed of concrete, asphalt, or a pervious surface such as pavers or grasscrete, but not gravel or woody material, and be ADA compliant, if applicable.**

Applicant's response: As shown on the attached plans (see sheet C2.2), the realigned north-south drive aisle will include minimum 5' wide concrete walkways linking primary building entries and the parking area west of the new addition with the existing on-site walkways the [sic] connect to public sidewalks along the street frontages. Walkways will be ADA compliant. This standard is met.

**(ii) Walkways through parking areas, drive aisles and loading areas shall have a different appearance than the adjacent paved vehicular areas.**

Applicant's response: The crosswalk across the north-south drive aisle west of the Building D expansion will be restriped following construction of the new alignment. No other pedestrian crossing of a vehicular drive aisle is affected by the proposed expansion. This standard is met.

**(iii) Accessways shall be provided as a connection between the development's walkway and bikeway circulation system and an adjacent bike lane;**

Applicant's response: Site access and circulation for bicycle riders are available via the existing internal circulation routes and driveways on SW Tualatin Road, SW 108th Avenue, and SW Leveton Drive, as well as on the pedestrian walkways within the site. This objective is met.

**(iv) Accessways may be gated for security purposes;**

Applicant's response: The Applicant is not proposing to gate the vehicular or pedestrian access points to the site. This standard is not applicable.

**(v) Outdoor Recreation Access Routes shall be provided between the development's walkway and bikeway circulation system and parks, bikeways and greenways where a bike or pedestrian path is designated.**

Applicant's response: There is no park, bikeway, or greenway with a designated bike or pedestrian path abutting the subject property. This standard is not applicable.

**(c) Curb ramps shall be provided wherever a walkway or accessway crosses a curb.**

Applicant's response: Curb ramps will be provided where the walkway crosses a curb or drive aisle, as shown on the attached site plan (see sheet C2.2). This standard is met.

**(d) Accessways shall be a minimum of 8 feet wide and constructed in accordance with the Public Works Construction Code if they are public accessways, and if they are private access-ways they shall be constructed of asphalt, concrete or a pervious surface such as pervious asphalt or concrete, pavers or grasscrete, but not gravel or woody material, and be ADA compliant, if applicable.**

Applicant's response: No public accessway is proposed. As shown on the attached plans (see sheet C2.2), 5' to 6.5' wide concrete and striped walkways will be provided along the realigned north-south drive aisle between the complex of buildings and the parking area to the west, connecting to existing on-site paths connecting to the public sidewalks on the property's three street frontages. This standard is met.

**(e) Accessways to undeveloped parcels or undeveloped transit facilities need not be constructed at the time the subject property is developed. In such cases the applicant for development of a parcel adjacent to an undeveloped parcel shall enter into a written agreement with the City guaranteeing future performance by the applicant and any successors in interest of the property being developed to construct an accessway when the adjacent undeveloped parcel is developed. The agreement shall be subject to the City's re-view and approval.**

Applicant's response: No accessways to undeveloped parcels or transit facilities are required or proposed. This standard does not apply.

**(f) Where a bridge or culvert would be necessary to span a designated greenway or wetland to provide a connection to a bike or pedestrian path, the City may limit the number and location of accessways to reduce the impact on the greenway or wetland.**

Applicant's response: There is no wetland or greenway in or abutting the project area. This standard does not apply.

**(g) Accessways shall be constructed, owned and maintained by the property owner.**

Applicant's response: All accessways will be constructed, owned, and maintained by the applicant. This standard is met.

## **(2) Drive-up Uses**

Applicant's response: The use proposed does not include a drive-up facility. This section does not apply.

## **(3) Safety and Security**

**(a) Locate windows and provide lighting in a manner which enables tenants, employees and police to watch over pedestrian, parking and loading areas.**

Applicant's response: Surveillance of pedestrian, parking, and loading areas is currently provided by the orientation of existing buildings and lighting. The proposed addition to Building D will not compromise visibility of those areas for safety and security. See sheets IL1.0 and IL2.0 for lighting details and illumination levels within the proposed development area. This standard is met.

**(b) In commercial, public and semi-public development and where possible in industrial development, locate windows and provide lighting in a manner which enables surveillance of interior activity from the public right-of-way.**

Applicant's response: The central location of the proposed Building D expansion obscures it from view behind existing buildings, or by virtue of distance (400 feet or more) and landscaping. This standard is not suitable for application at this specific project site.

*Staff concurs with the applicant's assessment regarding the applicability of 73.160(3)(a).*

**(c) Locate, orient and select on-site lighting to facilitate surveillance of on-site activities from the public right-of-way without shining into public rights-of-way or fish and wildlife habitat areas.**

Applicant's response: No fish or wildlife habitat areas exist on or near the project site. As shown on the lighting plan (see sheets IL1.0 and IL2.0), site lighting will illuminate the buildings, circulation areas, and parking areas generally, but topography and existing buildings limit the visibility of the development area from the public right-of-way. Lighting will be designed to avoid shining into public rights-of-way. This standard is met.

**(d) Provide an identification system which clearly locates buildings and their entries for patrons and emergency services.**

Applicant's response: The proposed Building D expansion will not affect the primary access/circulation pattern of the subject property. Emergency access to Building D will be added to the expanded portion of the building in a manner consistent with the existing on-site identification system. This standard is met.

*Staff finds that the size, location and configuration of the proposed addition will not significantly impact the ease of identification for patrons and emergency services. No plan revision is needed.*

**(e) Shrubs in parking areas must not exceed 30 inches in height. Tree canopies must not extend below 8 feet measured from grade.**

Applicant's response: The proposed landscaping in the parking and circulation areas west of the Building D expansion is designed to meet these standards. No trees will be planted in clear vision areas, and seeded lawn is specified rather than shrubs in the landscape island adjacent to the north-south drive aisle. This standard is met.

**(f) Above ground sewer or water pumping stations, pressure reading stations, water reservoirs, electrical substations, and above ground natural gas pumping stations shall provide a minimum 6' tall security fence or wall.**

Applicant's response: The proposed building expansion does not include any of these elements. This standard does not apply.

*The site plan, Sheet C2.1, shows the eastern side of the generator enclosure open. Staff finds that a generator is in a general category of equipment requiring security precautions described in Section 73.160(3)(f). A security fence or wall at least 6' tall is required.*

*Condition of Approval: Revise plans to provide a security fence or wall at least 6' tall completing the enclosure of the generator on the northwest corner of the proposed addition.*

**(4) Service, Delivery and Screening**

**(a) On and above grade electrical and mechanical equipment such as transformers, heat pumps and air conditioners shall be screened with sight obscuring fences, walls or landscaping.**

Applicant's response: As shown in the attached plans, the generator, electrical equipment, scrubber, and gas cylinder will be located within walled-in areas, screened from view. Screening will be provided for rooftop-mounted mechanical equipment. This standard is met.

**(b) Outdoor storage, excluding mixed solid waste and source separated recyclables storage areas listed under TDC 73.227, shall be screened with a sight obscuring fence, wall, berm or dense evergreen landscaping.**

Applicant's response: The proposed addition to Building D does not include any outdoor storage. This standard does not apply.

**(c) Above ground pumping stations, pressure reading stations, water reservoirs; electrical substations, and above ground natural gas pumping stations shall be screened with sight-obscuring fences or walls and landscaping.**

Applicant's response: The proposed development does not include any of these elements. This standard does not apply.

*The site plan, Sheet C2.1, shows the eastern side of the generator enclosure open. Staff finds that a generator is in a general category of equipment requiring screening described in Section 73.160(4)(a). A sight obscuring fence or wall or landscaping is required.*

*Condition of Approval: Revise plans to provide a sight obscuring fence, wall or landscaping screening the generator on the northwest corner of the proposed addition.*

**(5) The Federal Americans with Disabilities Act (ADA) applies to development in the City of Tualatin. Although TDC, Chapter 73 does not include the Oregon Structural Specialty Code's (OSSC) accessibility standards as requirements to be reviewed during the Architectural Review process, compliance with the OSSC is a requirement at the Building Permit step. It is strongly recommended all materials submitted for Architectural Review show compliance with the OSSC.**

Applicant's response: The Applicant has prepared the site and building plans with the knowledge that ADA and OSSC standards must be met during the building permit process. This standard is met.

**(6) (a) All industrial, institutional, retail and office development on a transit street designated in TDC Chapter 11 (Figure 11-5) shall provide either a transit stop pad on-site, or an on-site or public sidewalk connection to a transit stop along the subject property's frontage on the transit street.**

Applicant's response: The proposed project is not on a transit street. This standard does not apply.

*Staff notes that this portion of Leveton Drive, east of 118<sup>th</sup> Avenue, is not designated as a transit street on TDC Chapter 11, Figure 11-5: Tualatin Transit Plan.*

**(b) In addition to (a) above, new retail, office and institutional uses abutting major transit stops as designated in TDC Chapter 11 (Figure 11-5) shall...**

Applicant's response: The site is not abutting a major transit stop shown in the figure. This standard does not apply.

## Structure Design

### Section 73.210 Objectives

*The objectives of this section are aspirational and offered for consideration and guidance. They inform the writing and interpretation of the standards that follow. Therefore, Staff's findings regarding the proposal in review are mute as to compliance with Section 73.210.*

### Section 73.220 Standards

#### (1) Safety and Security

**(a) Locate, orient and select on-site lighting to facilitate surveillance of on-site activities from the public right-of-way or other public areas without shining into public rights-of-way or fish and wildlife habitat areas.**

Applicant's response: No fish or wildlife habitat areas exist on or near the project site. As shown on the lighting plan (see sheets IL1.0 and IL2.0), site lighting will illuminate the buildings, circulation areas, and parking areas generally, but topography and existing buildings limit the visibility of the development area from the public right-of-way. Lighting will be designed to avoid shining into public rights-of-way. This standard is met.

**(b) Provide an identification system which clearly identifies and locates buildings and their entries.**

Applicant's response: The proposed Building D expansion will not affect the primary access/circulation pattern of the subject property. Emergency access to Building D will be added to the expanded portion of the building in a manner consistent with the existing on-site identification system. This standard is met.

*Staff finds that the size, location and configuration of the proposed addition will not significantly impact the existing system of identification. No plan revision is needed.*

**(c) Shrubs in parking areas shall not exceed 30 inches in height, and tree canopies must not extend below 8 feet measured from grade, ...**

Applicant's response: The proposed landscaping in the parking and circulation areas west of the Building D expansion is designed to meet these standards. Plantings include tree species suitable for pruning to a canopy height of at least eight feet, and seeded lawn is specified rather than shrubs in the landscape island adjacent to the north-south drive aisle. This standard is met.

### Section 73.226 Objectives

*The objectives of this section are aspirational and offered for consideration and guidance. They inform the writing and interpretation of the standards that follow. Therefore, Staff's findings regarding the proposal in review are mute as to compliance with Section 73.226.*

## Waste and recyclables storage

### Section 73.227 Standards

**(1) The mixed solid waste and source separated recyclables storage standards shall apply to all new or expanded multi-family residential developments containing five or more units and to new or expanded commercial, industrial, public and semi-public development.**

Applicant's response: The project is an expanded industrial development. These standards apply and are addressed below.

### **(2) Minimum Standards Method.**

**(a) The size and location of the storage area(s) shall be indicated on the site plan. Compliance with the requirements set forth below are reviewed through the Architectural Review process. [detailed provisions omitted for brevity]**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers. This objective is met.

**(v) Commercial, industrial, public and semi-public developments shall provide a minimum storage area of 10 square feet plus: Office - 4 square feet/1000 square feet gross leasable area (GLA); Retail - 10 square feet/1000 square feet GLA; Wholesale/ Warehouse/ Manufacturing - 6 square feet/1000 square feet GLA; Educational and institutional - 4 square feet/1000 square feet GLA; and other - 4 square feet/1000 square feet GLA.**

Applicant's response: The 18,140 square foot building expansion requires 109 square feet of storage for the proposed R&D and Manufacturing use. This capacity is available in existing trash facilities on-site, which the staff in the expansion will use. The local garbage hauler, Republic Services, has reviewed and approved the proposed use of existing facilities (see Exhibit E, letter from Frank Lonergan). This standard is met.

*The site plan approved for the existing facility shows two trash enclosures with a total area of 1280 square feet. This is far less than current code requires:*

$$10sf + (6/1000sf \times 535,000sf) = 3220sf$$

*Based on this information, staff finds that there is no excess capacity to allocate to the proposed addition. Therefore, the Minimum Standards Method cannot be used to demonstrate compliance. The applicant must provide additional trash enclosure space:*

$$10sf + (6/1000sf \times 18,140sf) = 119sf$$

*or demonstrate compliance using one of the other three methods described in 73.227. Note that using the Franchised Hauler Review Method will require additional narrative explaining how unique conditions*

*associated with the site, use, or waste stream make using any of the three other methods of compliance impracticable.*

*Condition of Approval: Revise plans to provide at least 119 square feet of additional trash enclosure area or revise the applicant's narrative to support the use of an alternative method described in TDC Section 73.227.*

**(6) Location, Design and Access Standards for Storage Areas.**

**(a) Location Standards**

**(i) To encourage its use, the storage area for source separated recyclables may be co-located with the storage area for mixed solid waste.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(ii) Indoor and outdoor storage areas shall comply with Building and Fire Code requirements.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(iii) Storage area space requirements can be satisfied with a single location or multiple locations, and can combine both interior and exterior locations.**

Applicant's response: The proposed expansion will rely on the existing hauler facilities for Building D. This standard is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(iv) Exterior storage areas shall not be located within a required front yard setback or in a yard adjacent to a public or private street.**

Applicant's response: No exterior storage is proposed in a yard adjacent to a public or private street. This standard is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(v) Exterior storage areas shall be located in central and visible locations on the site to enhance security for users.**

Applicant's response: This proposal does not include any new exterior storage area. This standard is not applicable.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(vi) Exterior storage areas can be located in a parking area, if the proposed use provides parking spaces required through the Architectural Review process. Storage areas shall be appropriately screened according to TDC 73.227(6)(b)(iii).**

Applicant's response: This proposal does not include any new exterior storage area. This standard does not apply.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(vii) Storage areas shall be accessible for collection vehicles and located so that the storage area will not obstruct pedestrian or vehicle traffic movement on site or on public streets adjacent to the site.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

## **(b) Design Standards**

**(i) The dimensions of the storage area shall accommodate containers consistent with current methods of local collection at the time of Architectural Review approval.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities. (See Exhibit E.) No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(ii) Storage containers shall meet Fire Code standards and be made and covered with water proof materials or situated in a covered area.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(iii) Exterior storage areas shall be enclosed by a sight obscuring fence or wall at least 6 feet in height. In multi-family, commercial, public and semi-public developments evergreen plants shall be placed around the enclosure walls, excluding the gate or entrance openings. Gate openings for haulers shall be a minimum of 10 feet wide and shall be capable of being secured in a closed and open position. A separate pedestrian access shall also be provided in multi-family, commercial, public and semi-public developments.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(iv) Exterior storage areas shall have either a concrete or asphalt floor surface.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(v) Storage areas and containers shall be clearly labeled to indicate the type of material accepted.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(c) Access Standards**

**(i) Access to storage areas can be limited for security reasons. However, the storage areas shall be accessible to users at convenient times of the day, and to hauler personnel on the day and approximate time they are scheduled to provide hauler service.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(ii) Storage areas shall be designed to be easily accessible to hauler trucks and equipment, considering paving, grade, gate clearance and vehicle access. A minimum of 10 feet horizontal clearance and 8 feet vertical clearance is required if the storage area is covered.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

**(iii) Storage areas shall be accessible to collection vehicles without requiring backing out of a driveway onto a public street. If only a single access point is available to the storage area, adequate turning radius shall be provided to allow vehicles to safely exit the site in a forward motion.**

Applicant's response: The Applicant has contacted Republic Services, which has provided a letter acknowledging the sufficiency of using the existing trash hauling facilities (see Exhibit E). No change is proposed in the facilities for haulers, which have been approved in prior Architectural Review decisions. This objective is met.

*See staff's finding regarding TDC Section 73.227(2)(a)(v).*

## **Landscaping**

### **Section 62.130 Landscape Standards.**

**Except as otherwise provided under TDC Chapter 37, refer to TDC Chapter 73.**

Applicant's response: Please refer to the section devoted to Chapter 73 below.

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site's campus was approved with conditions on January 22, 2001. Through this master plan, some development standards of TDC Chapter 62 and TDC Chapter 73 were adjusted. Following the master plan, a design for the site was approved on May 26, 2001 making additional adjustments. Specific adjustments relevant to the current proposal are noted in findings regarding their respective subsections.*

### **Section 73.240 Landscaping General Provisions**

**(4) The minimum area requirement for landscaping for uses in IN, CN, CO/MR, MC and MP Planning Districts shall be twenty-five (25) percent of the total land area to be developed. When a dedication is granted in accordance with the planning district provisions on the subject property for a fish and wildlife habitat area, the minimum area requirement for landscaping may be reduced by 2.5 percent from the minimum area requirement as determined through the AR process.**

**(6) The minimum area requirement for landscaping for approved Industrial Master Plans shall be 20% of the total land area to be developed.**

Applicant's response: The subject property is in the MP Planning District, and it is the subject of an approved Industrial Master Plan (IMP-00-01) that required 20% minimum landscaping. The site far exceeds this minimum. On Lot 2, where the proposed expansion is located, the landscape percentage is currently 42.36%; this will decrease to 40.47% with the expansion. The Building D expansion and associated improvements will result in a net reduction of 1,595 square feet of landscaped area in the immediate vicinity of the building addition and drive aisle realignment to the west (16,117 square feet total), but the lot and site will remain well in conformance with the standard. This standard is met.

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site's campus was approved with conditions on January 22, 2001. Through this master plan, some development standards of TDC Chapter 62 and TDC Chapter 73 were adjusted. Refer to applicant's Table 2 "Development Standards".*

**(11) Any required landscaped area shall be designed, constructed, installed, and maintained so that within three years the ground shall be covered by living grass or other plant materials. (The foliage crown of trees shall not be used to meet this requirement.) A maximum of 10% of the landscaped area may be covered with un-vegetated areas of bark chips, rock or stone. Disturbed soils are encouraged to be amended to an original or higher level of porosity to regain infiltration and stormwater storage capacity.**

Applicant's response: The proposed Building D expansion will require a westward shift of an existing north-south drive aisle. The landscape area will be re-graded and replanted using seeded grass and ginkgo biloba trees in a cluster on both sides of the pedestrian path extending west to the parking area. Lawn seed will also be used in the area north of the Building D expansion. This standard is met.

**(13) Landscape plans for required landscaped areas that include fences should carefully integrate any fencing into the plan to guide wild animals toward animal crossings under, over, or around transportation corridors.**

Applicant's response: No new fences are proposed for the project. This standard does not apply.

### **Section 73.260 Tree and Plant Specifications**

**(1) The following specifications are minimum standards for trees and plants:**

**(a) Deciduous Trees:**

**Deciduous shade and ornamental trees shall be a minimum one and one-half inch (1 1/2") caliper measured six inches (6") above ground, balled and burlapped. Bare root trees will be acceptable to plant during their dormant season. Trees shall be characteristically shaped specimens.**

*Staff finds that the landscape plan, sheet L2.1, specifies 2" caliper trees balled and burlapped. The standard is met.*

**(b) Coniferous Trees.**

Coniferous trees shall be a minimum five feet (5') in height above ground, balled and burlapped. Bare root trees will be acceptable to plant during their dormant season. Trees shall be well branched and characteristically shaped specimens.

**(c) Evergreen and Deciduous Shrubs.**

Evergreen and deciduous shrubs shall be at least one (1) to five (5) gallon size. Shrubs shall be characteristically branched. Side of shrub with best foliage shall be oriented to public view.

**(d) Groundcovers.**

Groundcovers shall be fully rooted and shall be well branched or leafed. English ivy (*Hedera helix*) is considered a high maintenance material which is detrimental to other landscape materials and buildings and is therefore prohibited.

**(e) Lawns.**

Lawns shall consist of grasses, including sod, or seeds of acceptable mix within the local landscape industry. Lawns shall be 100 percent coverage and weed free.

Applicant's response: Replanting consists of seeded lawn in the reshaped/regarded landscape island and six ginkgo biloba trees adjacent to the pedestrian path to the parking area to the west. These standards are met.

**(2) Landscaping shall be installed in accordance with the provisions of Sunset New Western Garden Book (latest edition), Lane Publishing Company, Menlo Park, California or the American Nurserymen Association Standards (latest edition).**

Applicant's response: Landscaping will be installed in accordance with the Sunset New Western Garden Book standards and has been designed by a professional landscape architect. This standard is met.

**(3) The following guidelines are suggested to ensure the longevity and continued vigor of plant materials:**

**(a) Select and site permanent landscape materials in such a manner as to produce a hardy and drought-resistant landscaped area.**

**(b) Consider soil type and depth, spacing, exposure to sun and wind, slope and contours of the site, building walls and overhangs, and compatibility with existing native vegetation preserved on the site or in the vicinity.**

Applicant's response: Hardy, drought-resistant plants, appropriate to the proposed development and region, have been selected. The project contractor will test and amend the soil as needed. These guidelines are addressed.

**(4) All trees and plant materials shall be healthy, disease-free, damage-free, well-branched stock, characteristic of the species.**

Applicant's response: All plant materials will be new and healthy. This standard is met.

**(5) All plant growth in landscaped areas of developments shall be controlled by pruning, trimming or otherwise so that:**

**(a) It will not interfere with designated pedestrian or vehicular access; and**

**(b) It will not constitute a traffic hazard because of reduced visibility.**

Applicant's response: The selected plant materials are appropriate for the proposed development and climate and will not interfere with visibility or movement. In clear vision areas, no trees will exist within the 30" to 8' clear area. Responsibility for maintenance of landscaping is accepted by the property owner. This standard is met.

*Staff finds that these regulations are matters of zoning enforcement, and less matters to be reviewed as development standards. Therefore, Staff's findings regarding the proposal in review are mute as to compliance with Section 73.260(4).*

#### **Section 73.280 Irrigation System Required**

**Except for townhouse lots, landscaped areas shall be irrigated with an automatic underground or drip irrigation system.**

Applicant's response: The proposed landscaped areas will be irrigated. This standard is met.

#### **Section 73.290 Re-vegetation in Un-landscaped Areas**

**The purpose of this section is to ensure erosion protection, and in appropriate areas to encourage soil amendment, for those areas not included within the landscape percentage requirements so native plants will be established, and trees will not be lost.**

**(1) Where vegetation has been removed or damaged in areas not affected by the landscaping requirements and that are not to be occupied by structures or other improvements, vegetation shall be replanted.**

Applicant's response: The proposed Building D expansion will occupy the southern and western parts of a seeded lawn area set aside for future development. The remainder of the future development area will be re-seeded with lawn following the proposed construction. This standard is met.

**(2) Plant materials shall be watered at intervals sufficient to ensure survival and growth for a minimum of two growing seasons.**

Applicant's response: The Applicant will water landscape areas in conjunction with maintenance of the whole campus property, consistent with this Section.

*Staff finds that these regulations are matters of zoning enforcement, and less matters to be reviewed as development standards. Therefore, Staff's findings regarding the proposal in review are mute as to compliance with Section 73.290(2).*

**(3) The use of native plant materials is encouraged to reduce irrigation and maintenance demands.**

Applicant's response: In the limited landscape areas affected by this proposed building expansion, seeded lawn is used for consistency with other landscape areas at the subject property. This standard is not applicable.

*Staff finds that this subsection is not binding and not strictly applicable. The applicant may ignore it.*

**(4) Disturbed soils should be amended to an original or higher level of porosity to regain infiltration and stormwater storage capacity.**

Applicant's response: There are no disturbed soils on the site that need to be amended. This standard does not apply.

*Staff finds that the landscape plan, sheet L2.1, specifies that in disturbed areas 2" of compost will be tilled in prior to seeding. With regard to infiltration and stormwater storage capacity, staff defers to the analysis of the City Engineer in this report. Refer to the Table of Contents.*

**Section 73.310 Landscape Standards – Commercial, Industrial, Public and Semi-Public Uses**

**(1) A minimum 5'-wide landscaped area must be located along all building perimeters which are viewable by the general public from parking lots or the public right-of-way, excluding loading areas, bicycle parking areas and pedestrian egress/ingress locations...**

Applicant's response: The proposed Building D expansion and landscape area reconfiguration are centrally located within the property and not viewable by the general public. This standard is not applicable.

*Staff notes that this standard is applicable. The interior parking lots of this campus are accessible to the general public, and hence the building perimeters are viewable by the general public. The addition requires perimeter landscaping. However, the lawn area around the addition is a reasonable fulfillment of this requirement. Therefore, a condition of approval is not needed.*

**(2) Areas exclusively for pedestrian use that are developed with pavers, bricks, etc., and contain pedestrian amenities, such as benches, tables with umbrellas, children's play areas, shade trees, canopies, etc., may be included as part of the site landscape area requirement.**

Applicant's response: The specific location of the Building D expansion is not suitable for pedestrian amenity features. Because the Applicant has not requested credit for such amenity areas in landscape area calculations, this standard is not applicable.

**(3) All areas not occupied by buildings, parking spaces, driveways, drive aisles, pedestrian areas or undisturbed natural areas shall be landscaped.**

Applicant's response: As shown on the attached plans, all areas not occupied by the features listed in this Section are proposed to be landscaped. This standard is met.

## **Tree Preservation**

### **Section 73.250 Tree Preservation**

**(1) Trees and other plant materials to be retained shall be identified on the landscape plan and grading plan.**

Applicant's response: The proposed westward realignment of the north-south drive aisle will require the removal and replacement of some or all of the eight existing trees on both sides of the pedestrian path extending west to the parking area. The landscaping plan shows six ginkgo biloba trees as replacement plantings, reflecting the shortened length of the path. This standard is met.

**(2) During the construction process:**

**(a) The owner or the owner's agents shall provide above and below ground protection for existing trees and plant materials identified to remain.**

**(b) Trees and plant materials identified for preservation shall be protected by chain link or other sturdy fencing placed around the tree at the drip line.**

**(c) If it is necessary to fence within the drip line, such fencing shall be specified by a qualified arborist as defined in TDC 31.060.**

**(d) Neither top soil storage nor construction material storage shall be located within the drip line of trees designated to be preserved.**

**(e) Where site conditions make necessary a grading, building, paving, trenching, boring, digging, or other similar encroachment upon a preserved tree's drip-line area, such grading, paving, trenching, boring, digging, or similar encroachment shall only be permitted under the direction of a qualified arborist. Such direction must assure that the health needs of trees within the preserved area can be met.**

**(f) Tree root ends shall not remain exposed.**

Applicant's response: No existing trees or plant materials within the work area are proposed to remain. This standard does not apply.

**(3) Landscaping under preserved trees shall be compatible with the retention and health of said tree.**

Applicant's response: No existing trees or plant materials within the work area are proposed to remain. This standard does not apply.

**(4) When it is necessary for a preserved tree to be removed in accordance with TDC 34.210 the landscaped area surrounding the tree or trees shall be maintained and replanted with trees that relate to the present landscape plan, or if there is no landscape plan, then trees that are complementary with existing, nearby landscape materials. Native trees are encouraged**

Applicant's response: No existing trees or plant materials within the work area are proposed to remain. This standard does not apply.

**(5) Pruning for retained deciduous shade trees shall be in accordance with National Arborist Association "Pruning Standards For Shade Trees," revised 1979.**

Applicant's response: No existing trees within the work area are proposed to remain. This standard does not apply.

**(6) Except for impervious surface areas, one hundred percent (100%) of the area preserved under any tree or group of trees retained in the landscape plan (as approved through the Architectural Review process) shall apply directly to the percentage of landscaping required for a development.**

Applicant's response: No existing trees or plant materials within the work area are proposed to remain. This standard does not apply.

## **Grading**

### **Section 73.270 Grading**

**(1) After completion of site grading, top-soil is to be restored to exposed cut and fill areas to provide a suitable base for seeding and planting.**

Applicant's response: Topsoil will be stockpiled during excavation to be used for backfill of landscape areas. Additionally, amendments will be added to the topsoil at that time. This standard is met.

*Staff finds that the landscape plan, sheet L2.1, specifies that in disturbed areas 2" of compost will be tilled in prior to seeding. The standard is met.*

**(2) All planting areas shall be graded to provide positive drainage.**

Applicant's response: As shown on the attached grading and utility plans (see C2.2 and C2.3), catch basins and field inlets collect stormwater runoff from planting areas and convey it into the existing onsite system. This standard is met.

**(3) Neither soil, water, plant materials nor mulching materials shall be allowed to wash across roadways or walkways.**

Applicant's response: As shown on the attached grading and utility plans (see C2.2 and C2.3), landscape areas are surrounded by curbing, with catch basins and field inlets that collect stormwater runoff from planting areas and convey it into the existing on-site system, avoiding surface flows that would cross roadways or walkways. This standard is met.

**(4) Impervious surface drainage shall be directed away from pedestrian walkways, dwelling units, buildings, outdoor private and shared areas and landscape areas except where the landscape area is a water quality facility.**

Applicant's response: As shown on the attached grading plans (see C2.2 and C2.3), runoff from impervious surfaces will be directed to catch basins and conveyed to the existing on-site system. A catch basin has been placed to minimize surface flow at the designated walkway to the parking area to the west. This standard is met.

## **Off-Street Parking Lot Landscaping**

### **Section 62.100 Off-Street Parking and Loading.**

**Except as otherwise provided under TDC Chapter 37, refer to TDC Chapter 73.**

Applicant's response: For more details, please refer to the section devoted to Chapter 73 below. The proposed Building D addition will remove seven parking spaces, reducing the site total from 854 to 847 parking spaces, which is 38 spaces fewer than the calculated minimum requirement of 885 (at the manufacturing ratio of 1.6 spaces per thousand square feet, including the addition). The build-out requirement in the Industrial Master Plan (IMP) is 2,304 spaces. IMP-00-01 anticipates its ultimate development in multiple phases, with some interim parking use at locations where future buildings are planned. At this time, operations and staffing levels at this facility do not require construction of additional parking to meet operational needs, so the Applicant can operate on a temporary basis with constructed parking at less than 1.6 parking spaces per thousand square feet of building area. The Applicant will submit plans for construction of additional parking area(s) in conjunction with the next Architectural Review for additional building(s) on the site, at a level sufficient to bring the site as a whole to the ratio of 1.6 spaces per thousand square feet of building floor area.

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site's campus was approved with conditions on January 22, 2001. Through this master plan, some development standards of TDC Chapter 62 and TDC Chapter 73 were adjusted. Following the master plan, a design for the site was approved on May 26, 2001 making additional adjustments. Refer to applicant's Table 2 "Development Standards".*

### **Section 73.320 Off-Street Parking Lot Landscaping Standards**

**(2) Application. Off-street parking lot landscaping standards shall apply to any surface vehicle parking or circulation area.**

Applicant's response: As shown on the attached landscape plans, one landscape island adjacent to a vehicle parking area will need to be realigned. Its current landscaping with seeded grass and trees on both sides of a pedestrian walkway crossing it will be restored with similar features following construction. This standard is met.

### **Section 73.340 Off-Street Parking Lot and Loading Area Landscaping...**

**(1) A clear zone shall be provided for the driver at ends of on-site drive aisles and at driveway entrances, vertically between a maximum of 30 inches and a minimum of 8 feet as measured from the ground level, ....**

Applicant's response: As shown in the attached landscape plans (see L1.1 and L1.2), landscaping at the realigned drive aisle intersection northwest of the Building D expansion will meet these standards. This standard is met.

**(2) Perimeter site landscaping of at least 5 feet in width shall be provided in all off-street parking and vehicular circulation areas (including loading areas). For conditional uses in multifamily residential planning districts the landscape width shall be at least 10 feet except for uses allowed by TDC 40.030(3), 40.030(5)(j), 40.030(5)(m), 40.030(5)(n) and 41.030(2).**

Applicant's response: As shown in the attached plans (see for example sheet C2.2), the realignment of the north-south drive aisle will maintain the width of the westerly landscape island (between it and the parking area to the west) at more than 20 feet wide, exceeding this requirement. This standard is met.

*Staff interprets this standard to apply to the perimeter of the entire site. The proposal under review does not directly affect any portion of the site perimeter. The standards of 73.340(2) are not applicable.*

### **Section 73.360 Off-Street Parking Lot Landscape Islands - Commercial, Industrial, Public, and Semi-Public Uses**

Applicant's response: No changes are proposed to off-street parking lots, which will remain. As shown in the attached plans (see C1.0 and C2.1), seven parking spaces located within the footprint of the building addition will be removed, but no other parking areas will change. This section does not apply.

## **Off-Street Parking and Loading**

### **Section 73.370 Off-Street Parking and Loading**

**(1) General Provisions.**

**(a) At the time of establishment of a new structure or use, or change in use, or change in use of an existing structure, within any planning district of the City, off-street parking spaces, off-street vanpool and carpool parking spaces for commercial, institutional and industrial uses, off-street bicycle parking,**

and off-street loading berths shall be as provided in this and following sections, unless greater requirements are otherwise established by the conditional use permit or the Architectural Review process, based upon clear findings that a greater number of spaces are necessary at that location for protection of public health, safety and welfare or that a lesser number of vehicle parking spaces will be sufficient to carry out the objectives of this section.

**(2) Off-Street Parking Provisions.**

**(a) The following are the minimum and maximum requirements for off-street motor vehicle parking in the City...**

USE	MINIMUM MOTOR VEHICLE PARKING REQUIREMENT	MAXIMUM MOTOR VEHICLE PARKING REQUIREMENT	BICYCLE PARKING REQUIREMENT	PERCENTAGE OF BICYCLE PARKING TO BE COVERED
<u>Industrial</u>				
(i) Manufacturing	1.60 spaces per 1,000 sq. ft. of gross floor area	None	2, or 0.10 spaces per 1,000 gross sq. ft., whichever is greater	First 5 spaces or 30%, whichever is greater
(ii) Warehousing	0.30 spaces per 1,000 sq. ft. of gross floor area	Zone A: 0.4 spaces per 1,000 sq. ft. gross floor area Zone B: 0.5 spaces per 1,000 sq. ft. gross floor area	2, or 0.10 spaces per 1,000 gross sq. ft., whichever is greater	First 5 spaces or 30%, whichever is greater
(iii) Wholesale establishment	3.00 spaces per 1,000 sq. ft. of gross floor area	None	2, or 0.50 spaces per 1,000 gross sq. ft., whichever is greater	First 5 spaces or 30%, whichever is greater

Applicant's response: The adopted Industrial Master Plan (IMP-00-01) addresses the original intent of permanent and temporary parking areas as the campus develops over time, and outlines the minimum and maximum parking requirements: "proposed off-street parking and loading will meet the minimum requirements of TDC Chapter 73, section 73.070-73.400. No parking maximums exist for manufacturing

uses therefore the minimum 1.6/1000 parking ratio will be met along with minimum requirements for loading berths.” (IMP, 62.100)

The site’s existing parking areas have been designed and constructed according to requirements in the Development Code and the approved Industrial Master Plan (IMP). The Trip Generation Letter provided by the Applicant (see Exhibit 9) notes that staffing associated with the proposed addition to Building D consists of employees already working at the Subject Property, so no change in traffic or commuting patterns is expected to occur with construction of the new building, and the site’s parking capacity will remain sufficient to meet Lam’s parking needs at this time, including the proposed building addition. Therefore, the Applicant’s evidence demonstrates that the existing on-site parking is consistent with Section 73.370(1)(a), which allows an Applicant to demonstrate “that a lesser number of vehicle parking spaces will be sufficient to carry out the objectives of this section.”

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site’s campus was approved with conditions by the City Council on January 22, 2001. The master plan set development standards for this phased project. The physical design of the site was approved through an architectural review of Phase 1 (AR-00-30). The approved site plan permitted an interim number of parking spaces slightly less than the number required based on Phase 1 gross square footage.*

### **(3) Off-Street Vanpool and Carpool Parking Provisions.**

**The minimum number of off-street Vanpool and Carpool parking for commercial, institutional and industrial uses is as follows:**

Applicant’s response: Carpool spaces are located on the campus, primarily south of Building F (eight spaces), with four east of Building D and four east of Building A. No changes are proposed to the existing carpool spaces. This standard is met.

### **73.380 Off-Street Parking Lots**

Applicant’s response: No changes are proposed to off-street parking lots which will remain. As shown in the attached plans (see C1.0 and C2.1), seven parking spaces within the footprint of the Building D expansion will be removed. No other parking areas will change. This section does not apply.

### **Section 73.390 Off-Street Loading Facilities**

**(1) The minimum number of off-street loading berths for commercial, industrial, public and semi-public uses is as follows:**

Applicant’s response: The proposed addition to Building D will not require truck loading facilities, because Building D’s existing loading facilities will be sufficient to serve the expanded building. Because loading facilities will not be affected, no further review of loading area provisions is required.

## Access

### Section 62.090 Access.

**Except as otherwise provided in TDC Chapter 37 and as provided below, no lot shall be created without provision for access to the public right-of-way in accordance with TDC 73.400 and TDC Chapter 75. ...**

Applicant's response: The proposed addition to Building D will not involve creation of a new lot, nor will it cause any change in site access as previously approved pursuant to this Section. This Section is not applicable.

*Pursuant to TDC Chapter 37, an Industrial Master Plan (IMP 00-01) for the subject site's campus was approved with conditions on January 22, 2001. Through this master plan, shared access was approved and appropriate easements created.*

### Section 73.400 Access

#### **(12) Minimum Access Requirements for Industrial Uses.**

**Ingress and egress for industrial uses shall not be less than the following:**

Applicant's response: No changes are proposed to site accesses. Access is currently available to the site via SW Leveton Drive to the south, SW 108th Avenue to the east, and SW Tualatin Road to the north, and the primary circulation aisles within the property will not be affected by the proposed Building D expansion. The building expansion will remove 9 parking spaces. The existing access locations were approved for the existing 856 parking spaces; with 9 fewer, these accesses remain sufficient. Therefore, no further review of access provisions is required.

*Staff notes that in the plans and elsewhere in the narrative the applicant indicates 854 existing spaces and that 7 spaces will be removed. The discrepancy is not significant and does not affect the review. Please refer also to findings of the City Engineer below.*

## APPEAL

The Architectural Review portion of this decision will be final after 14 calendar days on April 14, 2016, unless a written appeal is received by the Community Development Department – Planning Division at 18880 SW Martinazzi Avenue, Tualatin, Oregon 97062 before 5:00 p.m., April 8, 2016. The appeal must be submitted on the City appeal form with all the information requested provided thereon and signed by the appellant. The plans and appeal forms are available at the Tualatin Library and at the Community Development Department – Planning Division offices. Appeals of a staff Architectural Features decision are reviewed by the Architectural Review Board (ARB).

Issued by:



Aquilla Hurd-Ravich  
Planning Manager

Submitted by:



Robin G Dehnert  
Associate Planner

## **REQUEST FOR PUBLIC FACILITIES DECISION**

Public Facilities Decision approval of an 18,140 square foot addition to Building D, Lam Research campus, 11357 SW Leveton Drive, Tualatin, Oregon.

Plan District Designation: MP (Manufacturing Park)

Site Size: 58.0 acres (3 parcels)

## **PUBLIC FACILITIES DECISION**

The City Engineer approves the preliminary plans of AR15-0029, LAM Bldg. D Addition with the following conditions:

## **PUBLIC FACILITIES CONDITIONS OF APPROVAL**

PRIOR TO ISSUANCE OF BUILDING PERMITS:

- PFR 1. Submit final sanitary sewer plans that show location of the lines, grade, materials, and other details.
- PFR 2. Submit final water system plans that show location of the water lines, grade, materials, and other details.
- PFR 3. Obtain a NPDES Erosion Control Permit in accordance with code section TMC 3-5-060.
- PFR 4. Obtain a City of Tualatin erosion control permit in accordance with code section TMC 3-5-060.
- PFR 5. Submit plans that meet the requirements of TVF&R.
- PFR 6. Submit plans that are sufficient to obtain a Stormwater Connection Permit Authorization Letter that complies with the submitted Service Provider Letter conditions and obtain an Amended Service Provider Letter as determined by Clean Water Services for any revisions to the proposed plans.

PRIOR TO ISSUANCE OF A CERTIFICATE OF OCCUPANCY:

- PFR 7. The applicant shall complete all private improvements.

## **CITY ENGINEER'S FINDINGS**

### **Standards and Applicable Criteria**

Tualatin Municipal Code (TMC)

Title 03: Utilities and Water Quality

Title 04: Building

Tualatin Development Code (TDC)

Chapter 73: Community Design Standards

Chapter 74: Public Improvement Requirements

Chapter 75: Access Management

## **TMC Title 03: Utilities and Water Quality**

### **TMC Chapter 03-02: Sewer Regulations; Rates**

#### **TMC 3-2-020 Application, Permit and Inspection Procedure.**

**(1) No person shall connect to any part of the sanitary sewer system without first making an application and securing a permit from the City for such connection, nor may any person substantially increase the flow, or alter the character of sewage, without first obtaining an additional permit and paying such charges therefore as may be fixed by the City, including such charges as inspection charges, connection charges and monthly service charges.**

#### **TMC 3-2-030 Materials and Manner of Construction.**

**(1) All building sewers, side sewers and connections to the main sewer shall be so constructed as to conform to the requirements of the Oregon State Plumbing Laws and rules and regulations and specifications for sewerage construction of the City.**

**(3) A public works permit must be secured from the City and other agency having jurisdiction by owners or contractors intending to excavate in a public street for the purpose of installing sewers or making sewer connections.**

#### **FINDING:**

An additional gravity 12" private sewer lateral to serve the proposed Building D expansion is shown on Sheet C2.3, but it connects to an existing private sewer line within the property. No change is proposed in the property's connections to the public sanitary sewer system. Compliance with applicable standards will be achieved through City permitting procedures for on-site sewer construction.

The applicant will submit sanitary sewer plans that show location of the lines, grade, materials, and other details prior to obtaining a Building Permit. This criterion is satisfied with conditions of approval PFR-1.

### **TMC Chapter 03-03: Water Service**

#### **TMC 3-3-040 Separate Services Required.**

**(1) Except as authorized by the City Engineer, a separate service and meter to supply regular water service or fire protection service shall be required for each building, residential unit or structure served. For the purposes of this section, trailer parks and multi-family residences of more than four dwelling units shall constitute a single unit unless the City Engineer determines that separate services are required.**

**TMC 3-3-110 Construction Standards.**

All water line construction and installation of services and equipment shall be in conformance with the City of Tualatin Public Works Construction Code. In addition, whenever a property owner extends a water line, which upon completion, is intended to be dedicated to the City as part of the public water system, said extension shall be carried to the opposite property line or to such other point as determined by the City Engineer. Water line size shall be determined by the City Engineer in accordance with the City's Development Code or implementing ordinances and the Public Works Construction Code.

**TMC 3-3-120 Backflow Prevention Devices and Cross Connections.**

(2) The owner of property to which City water is furnished for human consumption shall install in accordance with City standards an appropriate backflow prevention device on the premises where any of the following circumstances exist:

4) Except as otherwise provided in this subsection, all irrigation systems shall be installed with a double check valve assembly. Irrigation system backflow prevention device assemblies installed before the effective date of this ordinance, which were approved at the time they were installed but are not on the current list of approved device assemblies maintained by the Oregon State Health Division, shall be permitted to remain in service provided they are properly maintained, are commensurate with the degree of hazard, are tested at least annually, and perform satisfactorily. When devices of this type are moved, or require more than minimum maintenance, they shall be replaced by device assemblies which are on the Health Division list of approved device assemblies.

**TMC 3-3-130 Control Valves.**

The customer shall install a suitable valve, as close to the meter location as practical, the operation of which will control the entire water supply from the service. The operation by the customer of the curb stop in the meter box is prohibited.

**FINDING:**

An additional 10" private water lateral to serve the proposed Building D expansion, including installation of a new fire hydrant east of the building addition, is shown on Sheet C2.3, but it connects to an existing private water line within the property. No change is proposed in the property's connections to the public water system. Compliance with applicable standards will be achieved through City permitting procedures for on-site water line construction, including appropriate controls and other devices required by applicable codes.

The applicant will submit water system plans that show location of the water lines, grade, materials, and other details prior to obtaining a Building Permit. This criterion is satisfied with conditions of approval PFR-2.

## **TMC 3-5 Additional Surface Water Management Standards**

### **TMC 3-5-010 Policy.**

It is the policy of the City to require temporary and permanent measures for all construction projects to lessen the adverse effects of construction on the environment. The contractor shall properly install, operate and maintain both temporary and permanent works as provided in this chapter or in an approved plan, to protect the environment during the term of the project. In addition, these erosion control rules apply to all properties within the City, regardless of whether that property is involved in a construction or development activity. Nothing in this chapter shall relieve any person from the obligation to comply with the regulations or permits of any federal, state, or local authority...

### **TMC 3-5-050 Erosion Control Permits.**

(1) Except as noted in subsection (3) of this section, no person shall cause any change to improved or unimproved real property that causes, will cause, or is likely to cause a temporary or permanent increase in the rate of soil erosion from the site without first obtaining a permit from the City and paying prescribed fees...

### **TMC 3-5-060 Permit Process.**

(1) Applications for an Erosion Control Permit. Application for an Erosion Control Permit shall include an Erosion Control Plan which contains methods and interim facilities to be constructed or used concurrently and to be operated during construction to control erosion. The plan shall include either:

(a) A site specific plan outlining the protection techniques to control soil erosion and sediment transport from the site to less than one ton per acre per year as calculated using the Soil Conservation Service Universal Soil Loss Equation or other equivalent method approved by the City Engineer, or

(b) Techniques and methods contained and prescribed in the Soil Erosion Control Matrix and Methods, outlined in TMC 3-5.190 or the Erosion Control Plans - Technical Guidance Handbook, City of Portland and Unified Sewerage Agency, January, 1991.

(2) Site Plan. A site specific plan, pre-pared by an Oregon registered profession-al engineer, shall be required when the site meets any of the following criteria:

(a) greater than five acres;

(b) greater than one acre and has slopes greater than 20 percent;

(c) contains or is within 100 feet of a City-identified wetland or a waterway identified on FEMA floodplain maps; or

(d) greater than one acre and contains highly erodible soils.

**FINDING:**

The Applicant has submitted plans including erosion control on Sheet C2.4. The City of Tualatin Fact Sheet indicates the development area is 1.22 acres. The applicant will obtain a City of Tualatin Erosion Control Permit and a 1200CN NPDES Permit. This criterion is satisfied with conditions of approval PFR -3 and 4.

**TMC 3-5-200 Downstream Protection Requirement.**

Each new development is responsible for mitigating the impacts of that development upon the public storm water quantity system. The development may satisfy this requirement through the use of any of the following techniques, subject to the limitations and requirements in TMC 3-5-210: Construction of permanent on-site stormwater quantity detention facilities designed in accordance with this title;...

**TMC 3-5-210 Review of Downstream System.**

For new development other than the construction of a single family house or duplex, plans shall document review by the design engineer of the downstream capacity of any existing storm drainage facilities impacted by the proposed development. That review shall extend downstream to a point where the impacts to the water surface elevation from the development will be insignificant, or to a point where the conveyance system has adequate capacity, as determined by the City Engineer. To determine the point at which the downstream impacts are insignificant or the drainage system has adequate capacity, the design engineer shall submit an analysis using the following guidelines:

- (1) evaluate the downstream drainage system for at least  $\frac{1}{4}$  mile;
- (2) evaluate the downstream drainage system to a point at which the runoff from the development in a build out condition is less than 10 percent of the total runoff of the basin in its current development status. Developments in the basin that have been approved may be considered in place and their conditions of approval to exist if the work has started on those projects;
- (3) evaluate the downstream drainage system throughout the following range of storms: 2, 5, 10, 25 year;
- (4) The City Engineer may modify items 1, 2, 3 to require additional information to determine the impacts of the development or to delete the provision of unnecessary information.

**TMC 3-5-220 Criteria for Requiring On-Site Detention to be Constructed.**

The City shall determine whether the onsite facility shall be constructed. If the onsite facility is constructed, the development shall be eligible for a credit against Storm and Surface Water System Development Charges, as provided in City ordinance. On-site facilities shall be constructed when any of the following conditions exist:

- (1) There is an identified downstream deficiency, as defined in TMC 3-5-210, and detention rather than conveyance system enlargement is determined to be the more effective solution...

**FINDING:**

The site's stormwater management facilities have been designed with capacity to accommodate current and future development within the whole subject property, providing substantial excess capacity to handle runoff from the current set of improvements, including the proposed addition to Building D. Runoff from roof drains and paved surfaces will be collected in new catch basins and pipes connecting to the existing on-site system (see Sheet C2.3.).The Applicant has provided a storm report analyzing the capacity of the existing on- site stormwater management facilities to accommodate additional runoff from the proposed expansion project. The report concludes that on-site system capacities are sufficient.

This criterion is satisfied.

## **TMC 3-5 PERMANENT ON-SITE WATER QUALITY FACILITIES**

### **TMC 3-5-280 Placement of Water Quality Facilities.**

**Title III specifies that certain properties shall install water quality facilities for the purpose of removing phosphorous. No such water quality facilities shall be constructed within the defined area of existing or created wetlands unless a mitigation action, approved by the City, is constructed to replace the area used for the water quality facility.**

**FINDING:**

The site's existing water quality facilities are not located in wetlands or associated buffers. This criterion is satisfied.

### **TMC 3-5-290 Purpose of Title.**

**The purpose of this title is to require new development and other activities which create impervious surfaces to construct or fund on-site or off-site permanent water quality facilities to reduce the amount of phosphorous entering the storm and surface water system.**

### **TMC 3-5-300 Application of Title.**

**Title III of this Chapter shall apply to all activities which create new or additional impervious surfaces, except as provided in TMC 3-5.310.**

### **TMC 3-5-310 Exceptions.**

**(1) Those developments with application dates prior to July 1, 1990, are exempt from the requirements of Title III.**

**The application date shall be defined as the date on which a complete application for development approval is accepted by the City in accordance with City regulations.**

**(2) Construction of one and two family (duplex) dwellings are exempt from the requirements of Title III.**

**(3) Sewer lines, water lines, utilities or other land development that will not directly increase the amount of storm water run-off or pollution leaving the site once construction has been completed and the site is either restored to or not altered from its approximate original condition are exempt from the requirements of Title III.**

**TMC 3-5-320 Definitions.**

**(1) "Stormwater Quality Control Facility" refers to any structure or drainage way that is designed, constructed and maintained to collect and filter, retain, or detain surface water run-off during and after a storm event for the purpose of water quality improvement. It may also include, but is not limited to, existing features such as constructed wetlands, water quality swales, low impact development approaches ("LIDA"), and ponds which are maintained as stormwater quality control facilities.**

**(2) "Low impact development approaches" or "LIDA: means stormwater facilities constructed utilizing low impact development approaches used to temporarily store, route or filter run-off for the purpose of improving water quality. Examples include; but are not limited to, Porous Pavement, Green Roofs, Infiltration Planters/Rain Gardens, Flow-Through Planters, LIDA Swales, Vegetated Filter Strips, Vegetated Swales, Extended Dry Basins, Constructed Water Quality Wetland, Conveyance and Stormwater Art, and Planting Design and Habitats.**

**(3) "Water Quality Swale" means a vegetated natural depression, wide shallow ditch, or constructed facility used to temporarily store, route or filter run-off for the purpose of improving water quality.**

**(4) "Existing Wetlands" means those areas identified and delineated as set forth in the Federal Manual for Identifying the Delineating Jurisdictional Wetlands, January, 1989, or as amended, by a qualified wetlands specialist.**

**(5) "Created Wetlands" means those wetlands developed in an area previously identified as a non-wetland to replace, or mitigate wetland destruction or displacement.**

**(6) "Constructed Wetlands" means those wetlands developed as a water quality or quantity facility, subject to change and maintenance as such. These areas must be clearly defined and/or separated from existing or created wetlands. This separation shall preclude a free and open connection to such other wetlands.**

**TMC 3-5-330 Permit Required.**

**Except as provided in TMC 3-5-310, no person shall cause any change to improved or unimproved real property that will, or is likely to, increase the rate or quantity of run-off or pollution from the site without first obtaining a permit from the City and following the conditions of the permit.**

**TMC 3-5-340 Facilities Required.**

For new development, subject to the exemptions of TMC 3-5-310, no permit for construction, or land development, or plat or site plan shall be approved unless the conditions of the plat, plan or permit approval require permanent stormwater quality control facilities in accordance with this Title III.

**TMC 3-5-345 Inspection Reports.**

The property owner or person in control of the property shall submit inspection reports annually to the City for the purpose of ensuring maintenance activities occur according to the operation and maintenance plan submitted for an approved permit or architectural review.

**TMC 3-5-350 Phosphorous Removal Standard.**

The stormwater quality control facilities shall be designed to remove 65 percent of the phosphorous from the runoff from 100 percent of the newly constructed impervious surfaces. Impervious surfaces shall include pavement, buildings, public and private roadways, and all other surfaces with similar runoff characteristics.

**TMC 3-5-360 Design Storm.**

The stormwater quality control facilities shall be designed to meet the removal efficiency of TMC 3-5-350 for a mean summertime storm event totaling 0.36 inches of precipitation falling in four hours with an average return period of 96 hours.

**TMC 3-5-370 Design Requirements.**

The removal efficiency in TDC Chapter 35 specifies only the design requirements and are not intended as a basis for performance evaluation or compliance determination of the stormwater quality control facility installed or constructed pursuant to this Title III.

**TMC 3-5-330 Permit Required.**

Except as provided in TMC 3-5-310, no person shall cause any change to improved or unimproved real property that will, or is likely to, increase the rate or quantity of run-off or pollution from the site without first obtaining a permit from the City and following the conditions of the permit.

**TMC -5-340 Facilities Required.**

For new development, subject to the exemptions of TMC 3-5-310, no permit for construction, or land development, or plat or site plan shall be approved unless the conditions of the plat, plan or permit approval require permanent stormwater quality control facilities in accordance with this Title III.

**TMC 3-5-390 Facility Permit Approval.**

A stormwater quality control facility permit shall be approved only if the following are met:

(1) The plat, site plan, or permit application includes plans and a certification prepared by an Oregon registered, professional engineer that the proposed stormwater quality control facilities have been designed in accordance with criteria expected to achieve removal efficiencies for total phosphorous required by this Title III. Clean Water Services Design and Construction Standards shall be used in preparing the plan for the water quality facility; and

**(2) The plat, site plan, or permit application shall be consistent with the areas used to determine the removal required in TMC 3-5-350; and**

**(3) A financial assurance, or equivalent security acceptable to the City, is provided by the applicant which assures that the stormwater quality control facilities are constructed according to the plans established in the plat, site plan, or permit approval. The financial assurance may be combined with our financial assurance requirements imposed by the City; and**

**(4) A stormwater facility agreement identifies who will be responsible for assuring the long term compliance with the operation and maintenance plan.**

**FINDING:**

The site's stormwater management facilities have been designed with capacity to accommodate current and future development within the whole subject property, providing substantial excess capacity to handle runoff from the current set of improvements, including the proposed addition to Building D. Runoff from roof drains and paved surfaces will be collected in new catch basins and pipes connecting to the existing on-site system (see Sheet C2.3.). The Applicant has provided a storm report analyzing the capacity of the existing on-site stormwater management facilities to accommodate additional runoff from the proposed expansion project. The report concludes that on-site system capacities are sufficient. This criterion is satisfied.

## **Chapter 04-02: Fire Hydrant Locations and Rates of Flow**

### **TMC 4-2-010 Hydrants and Water Supply for Fire Protection.**

**(1) Every application for a building permit and accompanying plans shall be submitted to the Building Division for review of water used for fire protection, the approximate location and size of hydrants to be connected, and the provisions for access and egress for firefighting equipment. If upon such review it is determined that the fire protection facilities are not required or that they are adequately provided for in the plans, the Fire and Life Safety Reviewer shall recommend approval to the City Building Official.**

**(2) If adequate provisions for such facilities are not made, the Fire and Life Safety Reviewer shall either recommend against approval of the plans or indicate to the applicant in writing where the plans are deficient or recommend approval of plans subject to conditions.**

**FINDING:**

The Applicant has submitted plans including a private water line extension within the site to serve the proposed building addition as well as a new fire hydrant east of it. No new public fire hydrant is required. Because the building addition will replace part of a paved drive aisle, the Applicant has coordinated with Tualatin Valley Fire & Rescue (TVFR) to ensure that firefighting access to all of the buildings will be satisfactory. TVF&R has submitted a letter February 2, 2016 regarding their requirements. The applicant will need to address these requirements in the final plans.

This criterion is satisfied with conditions of approval PFR -5.

## **TDC Chapter 73: Community Design Standards**

### **TDC Section 73.270 Grading.**

**(1) After completion of site grading, top-soil is to be restored to exposed cut and fill areas to provide a suitable base for seeding and planting.**

**(2) All planting areas shall be graded to provide positive drainage.**

**(3) Neither soil, water, plant materials nor mulching materials shall be allowed to wash across roadways or walkways.**

**(4) Impervious surface drainage shall be directed away from pedestrian walkways, dwelling units, buildings, outdoor private and shared areas and landscape areas except where the landscape area is a water quality facility.**

#### **FINDING:**

Topsoil will be stockpiled during excavation to be used for backfill of landscape areas. Additionally, amendments will be added to the topsoil at that time. As shown on the attached grading and utility plans (see C2.2 and C2.3), catch basins and field inlets collect stormwater runoff from planting areas and convey it into the existing onsite system. As shown on the attached grading and utility plans (see C2.2 and C2.3), landscape areas are surrounded by curbing, with catch basins and field inlets that collect stormwater runoff from planting areas and convey it into the existing on-site system, avoiding surface flows that would cross roadways or walkways. As shown on the attached grading plans (see C2.2 and C2.3), runoff from impervious surfaces will be directed to catch basins and conveyed to the existing on-site system. A catch basin has been placed to minimize surface flow at the designated walkway to the parking area to the west.

This criterion is satisfied with conditions of approval PFR -3 and 4.

### **TDC Section 73.400 Access.**

**(2) Owners of two or more uses, structures, or parcels of land may agree to utilize jointly the same ingress and egress when the combined ingress and egress of both uses, structures, or parcels of land satisfies their combined requirements as designated in this code; provided that satisfactory legal evidence is presented to the City Attorney in the form of deeds, easements, leases or contracts to establish joint use. Copies of said deeds, easements, leases or contracts shall be placed on permanent file with the City Recorder.**

**(3) Joint and Cross Access.**

**(b) A system of joint use driveways and cross access easements may be required and may incorporate the following:**

(i) a continuous service drive or cross access corridor extending the entire length of each block served to provide for driveway separation consistent with the access management classification system and standards.

(ii) a design speed of 10 mph and a maximum width of 24 feet to accommodate two-way travel aisles designated to accommodate automobiles, service vehicles, and loading vehicles;

(iii) stub-outs and other design features to make it visually obvious that the abutting properties may be tied in to provide cross access via a service drive;

(iv) a unified access and circulation system plan for coordinated or shared parking areas.

(c) Pursuant to this section, property owners may be required to:

(i) Record an easement with the deed allowing cross access to and from other properties served by the joint use driveways and cross access or service drive;

(ii) Record an agreement with the deed that remaining access rights along the roadway will be dedicated to the city and pre-existing driveways will be closed and eliminated after construction of the joint-use driveway;

(iii) Record a joint maintenance agreement with the deed defining maintenance responsibilities of property owners;

(5) Lots that front on more than one street may be required to locate motor vehicle accesses on the street with the lower functional classification as determined by the City Engineer.

(6) Except as provided in TDC 53.100, all ingress and egress shall connect directly with public streets.

(8) To afford safe pedestrian access and egress for properties within the City, a sidewalk shall be constructed along all street frontage, prior to use or occupancy of the building or structure proposed for said property. The sidewalks required by this section shall be constructed to City standards, except in the case of streets with inadequate right-of-way width or where the final street design and grade have not been established, in which case the sidewalks shall be constructed to a design and in a manner approved by the City Engineer. Sidewalks approved by the City Engineer may include temporary sidewalks and sidewalks constructed on private property; provided, however, that such sidewalks shall provide continuity with sidewalks of adjoining commercial developments existing or proposed. When a sidewalk is to adjoin a future street improvement, the sidewalk construction shall include construction of the curb and gutter section to grades and alignment established by the City Engineer.

(9) The standards set forth in this Code are minimum standards for access and egress, and may be increased through the Architectural Review process in any particular instance where the standards provided herein are deemed insufficient to protect the public health, safety, and general welfare.

**(10) Minimum access requirements for residential uses:**

(a) Ingress and egress for single-family residential uses, including townhouses, shall be paved to a minimum width of 10 feet. Maximum driveway widths shall not exceed 26 feet for one and two car garages, and 37 feet for three or more car garages. For the purposes of this section, driveway widths shall be measured at the property line....

**(11) Minimum Access Requirements for Commercial, Public and Semi-Public Uses.**

...In all other cases, ingress and egress for commercial uses shall not be less than the following:

<b>Required Parking Spaces</b>	<b>Minimum Number Required</b>	<b>Minimum Pavement Width</b>	<b>Minimum Pavement Walkways, Etc.</b>
1-99	1	32 feet for first 50 feet from ROW, 24' thereafter	Curbs required; walkway 1 side only
100-249	2	32 feet for first 50 feet from ROW, 24' thereafter	Curbs required; walkway 1 side only
Over 250	As required by City Engineer	As required by City Engineer	As required by City Engineer

...(12) **Minimum Access Requirements for Industrial Uses.** Ingress and egress for industrial uses shall not be less than the following:

<b>Required Parking Spaces</b>	<b>Minimum Number Required</b>	<b>Minimum Pavement Width</b>	<b>Minimum Pavement Walkways, Etc.</b>
1-250	1	36 feet for first 50' from ROW, 24' thereafter	No curbs or walkway required
Over 250	As required by City Engineer	As required by City Engineer	As required by City Engineer

**(13) One-way Ingress or Egress.**

When approved through the Architectural Review process, one-way ingress or egress may be used to satisfy the requirements of Subsections (7), (8), and (9). However, the hard surfaced pavement of one-way drives shall not be less than 16 feet for multi-family residential, commercial, or industrial uses.

**(14) Maximum Driveway Widths and Other Requirements.**

(a) Unless otherwise provided in this chapter, maximum driveway widths shall not exceed 40 feet.

(b) Except for townhouse lots, no driveways shall be constructed within 5 feet of an adjacent property line, except when two adjacent property owners elect to provide joint access to their respective properties, as provided by Subsection (2).

(c) There shall be a minimum distance of 40 feet between any two adjacent driveways on a single property unless a lesser distance is approved by the City Engineer.

**(15) Distance between Driveways and Intersections.**

Except for single-family dwellings, the minimum distance between driveways and intersections shall be as provided below. Distances listed shall be measured from the stop bar at the intersection.

(a) At the intersection of collector or arterial streets, driveways shall be located a minimum of 150 feet from the intersection.

(b) At the intersection of two local streets, driveways shall be located a minimum of 30 feet from the intersection.

(c) If the subject property is not of sufficient width to allow for the separation between driveway and intersection as provided, the driveway shall be constructed as far from the intersection as possible, while still maintaining the 5-foot setback between the driveway and property line as required by TDC 73.400(14)(b).

(d) When considering a public facilities plan that has been submitted as part of an Architectural Review plan in accordance with TDC 31.071(6), the City Engineer may approve the location of a driveway closer than 150 feet from the intersection of collector or arterial streets, based on written findings of fact in support of the decision. The written approval shall be incorporated into the decision of the City Engineer for the utility facilities portion of the Architectural Review plan under the process set forth in TDC 31.071 through 31.077.

**FINDINGS:**

No changes are proposed to site accesses. Access is currently available to the site via SW Leveton Drive to the south, SW 108th Avenue to the east, and SW Tualatin Road to the north, and the primary

circulation aisles within the property will not be affected by the proposed Building D expansion. Therefore, no further review of access provisions is required.

This criterion is satisfied.

## **TDC Chapter 74: Public Improvement Requirements**

### **TDC Section 74.210 Minimum Street Right-of-Way Widths.**

The width of streets in feet shall not be less than the width required to accommodate a street improvement needed to mitigate the impact of a proposed development. In cases where a street is required to be improved according to the standards of the TDC, the width of the right-of-way shall not be less than the minimums indicated in TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G.

**(2) For development applications other than subdivisions and partitions, wherever existing or future streets adjacent to property proposed for development are of inadequate right-of-way width, the additional right-of-way necessary to comply with TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G of the Tualatin Community Plan shall be dedicated to the City for use by the public prior to issuance of any building permit for the proposed development. This right-of-way dedication shall be for the full width of the property abutting the roadway and, if required by the City Engineer, additional dedications shall be provided for slope and utility easements if deemed necessary.**

**(3) For development applications that will impact existing streets not adjacent to the applicant's property, and to construct necessary street improvements to mitigate those impacts would require additional right-of-way, the applicant shall be responsible for obtaining the necessary right-of-way from the property owner. A right-of-way dedication deed form shall be obtained from the City Engineer and upon completion returned to the City Engineer for acceptance by the City. On subdivision and partition plats the right-of-way dedication shall be accepted by the City prior to acceptance of the final plat by the City. On other development applications the right-of-way dedication shall be accepted by the City prior to issuance of building permits. The City may elect to exercise eminent domain and condemn necessary off-site right-of-way at the applicant's request and expense. The City Council shall determine when condemnation proceedings are to be used.**

**(4) If the City Engineer deems that it is impractical to acquire the additional right-of-way as required in subsections (1)-(3) of this section from both sides of the center-line in equal amounts, the City Engineer may require that the right-of-way be dedicated in a manner that would result in unequal dedication from each side of the road. This requirement will also apply to slope and utility easements as discussed in TDC 74.320 and 74.330. The City Engineer's recommendation shall be presented to the City Council in the preliminary plat approval for subdivisions and partitions, and in the recommended decision on all other development applications, prior to finalization of the right-of-way dedication requirements.**

**(6) When a proposed development is adjacent to or bisected by a street proposed in TDC Chapter 11, Transportation Plan (Figure 11-3) and no street right-of-way exists at the time the development is proposed, the entire right-of-way as shown in TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G shall be dedicated by the applicant. The dedication of right-of-way required in this subsection shall be along the route of the road as determined by the City.**

**FINDINGS:**

The submittal included a Trip Generation Letter dated September 28, 2015 from Mackenzie indicating that the proposed project would not trigger any offsite mitigation. No changes in the street configurations or improvements along the property's frontages are proposed or warranted as part of the Building D addition project. The property's street frontages have previously been improved to meet public works standards, and no changes in site access (street driveway locations) or primary on-site circulation routes are proposed.

The applicant submitted additional information on trip generation in a letter dated March 8, 2016 as follows: "Mackenzie has prepared this letter to provide additional traffic impact information related to the proposed expansion of Building D on the Lam Research campus, located at 11357 SW Leveton Drive in Tualatin, Oregon. As noted in our letter dated January 21, 2016, the 26,000-square-foot addition will house production equipment whose support involves 30 employees, and the staffing need will be met with existing employees who already work at the site. Therefore, no net increase in employment over present staffing is associated with the expansion."

This criterion is satisfied.

**TDC Section 74.420 Street Improvements.**

**When an applicant proposes to develop land adjacent to an existing or proposed street, including land which has been excluded under TDC 74.220, the applicant should be responsible for the improvements to the adjacent existing or proposed street that will bring the improvement of the street into conformance with the Transportation Plan (TDC Chapter 11), TDC 74.425 (Street Design Standards), and the City's Public Works Construction Code, subject to the following provisions:**

**(1) For any development proposed within the City, roadway facilities within the right-of-way described in TDC 74.210 shall be improved to standards as set out in the Public Works Construction Code.**

**(2) The required improvements may include the rebuilding or the reconstruction of any existing facilities located within the right-of-way adjacent to the proposed development to bring the facilities into compliance with the Public Works Construction Code.**

**(3) The required improvements may include the construction or rebuilding of off-site improvements which are identified to mitigate the impact of the development.**

**(4) Where development abuts an existing street, the improvement required shall apply only to that portion of the street right-of-way located between the property line of the parcel proposed for development and the centerline of the right-of-way, plus any additional pavement beyond the centerline deemed necessary by the City Engineer to ensure a smooth transition between a new improvement and the existing roadway (half-street improvement). Additional right-of-way and street improvements and off-site right-of-way and street improvements may be required by the City to mitigate the impact of the development. The new pavement shall connect to the existing pavement at the ends of the section being improved by tapering in accordance with the Public Works Construction Code.**

**(5) If additional improvements are required as part of the Access Management Plan of the City, TDC Chapter 75, the improvements shall be required in the same manner as the half-street improvement requirements.**

**(6) All required street improvements shall include curbs, sidewalks with appropriate buffering, storm drainage, street lights, street signs, street trees, and, where designated, bikeways and transit facilities.**

**(7) For subdivision and partition applications, the street improvements required by TDC Chapter 74 shall be completed and accepted by the City prior to signing the final subdivision or partition plat, or prior to releasing the security provided by the applicant to assure completion of such improvements or as otherwise specified in the development application approval.**

**(10) Streets within, or partially within, a proposed development site shall be graded for the entire right-of-way width and constructed and surfaced in accordance with the Public Works Construction Code.**

**(11) Existing streets which abut the proposed development site shall be graded, constructed, reconstructed, surfaced or repaired as necessary in accordance with the Public Works Construction Code and TDC Chapter 11, Transportation Plan, and TDC 74.425 (Street Design Standards).**

**(12) Sidewalks with appropriate buffering shall be constructed along both sides of each internal street and at a minimum along the development side of each external street in accordance with the Public Works Construction Code.**

**(13) The applicant shall comply with the requirements of the Oregon Department of Transportation (ODOT), Tri-Met, Washington County and Clackamas County when a proposed development site is adjacent to a roadway under any of their jurisdictions, in addition to the requirements of this chapter.**

**(14) The applicant shall construct any required street improvements adjacent to parcels excluded from development, as set forth in TDC 74.220 of this chapter.**

**(15) Except as provided in TDC 74.430, whenever an applicant proposes to develop land with frontage on certain arterial streets and, due to the access management provisions of TDC Chapter 75, is not**

**allowed direct access onto the arterial, but instead must take access from another existing or future public street thereby providing an alternate to direct arterial access, the applicant shall be required to construct and place at a minimum street signage, a sidewalk, street trees and street lights along that portion of the arterial street adjacent to the applicant's property. The three certain arterial streets are S.W. Tualatin-Sherwood Road, S.W. Pacific Highway (99W) and S.W. 124th Avenue. In addition, the applicant may be required to construct and place on the arterial at the intersection of the arterial and an existing or future public non-arterial street warranted traffic control devices (in accordance with the Manual on Uniform Traffic Control Devices, latest edition), pavement markings, street tapers and turning lanes, in accordance with the Public Works Construction Code.**

**(16) The City Engineer may determine that, although concurrent construction and placement of the improvements in (14) and (15) of this section, either individually or collectively, are impractical at the time of development, the improvements will be necessary at some future date. In such a case, the applicant shall sign a written agreement guaranteeing future performance by the applicant and any successors in interest of the property being developed. The agreement shall be subject to the City's approval.**

**(17) Intersections should be improved to operate at a level of service of at least D and E for signalized and unsignalized intersections, respectively.**

**(18) Pursuant to requirements for off-site improvements as conditions of development approval in TDC 73.055(2)(e) and TDC 36.160(8), proposed multi-family residential, commercial, or institutional uses that are adjacent to a major transit stop will be required to comply with the City's Mid-Block Crossing Policy.**

#### **FINDINGS:**

The submittal included a Trip Generation Letter dated September 28, 2015 from Mackenzie indicating that the proposed project would not trigger any offsite mitigation. No changes in the street configurations or improvements along the property's frontages are proposed or warranted as part of the Building D addition project. The property's street frontages have previously been improved to meet public works standards, and no changes in site access (street driveway locations) or primary on-site circulation routes are proposed.

The applicant submitted additional information on trip generation in a letter dated March 8, 2016 as follows: "Mackenzie has prepared this letter to provide additional traffic impact information related to the proposed expansion of Building D on the Lam Research campus, located at 11357 SW Leveton Drive in Tualatin, Oregon. As noted in our letter dated January 21, 2016, the 26,000-square-foot addition will house production equipment whose support involves 30 employees, and the staffing need will be met with existing employees who already work at the site. Therefore, no net increase in employment over present staffing is associated with the expansion."

This criterion is satisfied.

**TDC Section 74.425 Street Design Standards.**

**(1) Street design standards are based on the functional and operational characteristics of streets such as travel volume, capacity, operating speed, and safety. They are necessary to ensure that the system of streets, as it develops, will be capable of safely and efficiently serving the traveling public while also accommodating the orderly development of adjacent lands.**

**(2) The proposed street design standards are shown in Figures 72A through 72G. The typical roadway cross sections comprise the following elements: right-of-way, number of travel lanes, bicycle and pedestrian facilities, and other amenities such as landscape strips. These figures are intended for planning purposes for new road construction, as well as for those locations where it is physically and economically feasible to improve existing streets**

**(3) In accordance with the Tualatin Basin Program for fish and wildlife habitat it is the intent of Figures 74-2A through 74-2G to allow for modifications to the standards when deemed appropriate by the City Engineer to address fish and wildlife habitat.**

**(4) All streets shall be designed and constructed according to the preferred standard. The City Engineer may reduce the requirements of the preferred standard based on specific site conditions, but in no event will the requirement be less than the minimum standard. The City Engineer shall take into consideration the following factors when deciding whether the site conditions warrant a reduction of the preferred standard:**

**(a) Arterials:**

- (i) Whether adequate right-of-way exists**
- (ii) Impacts to properties adjacent to right-of-way**
- (iii) Current and future vehicle traffic at the location**
- (iv) Amount of heavy vehicles (buses and trucks).**

**(b) Collectors:**

- (i) Whether adequate right-of-way exists**
- (ii) Impacts to properties adjacent to right-of-way**
- (iii) Amount of heavy vehicles (buses and trucks)**
- (iv) Proximity to property zoned manufacturing or industrial.**

**(c) Local Streets:**

**(i) Local streets proposed within areas which have environmental constraints and/or sensitive areas and will not have direct residential access may utilize the minimum design standard.**

**When the minimum design standard is allowed, the City Engineer may determine that no parking signs are required on one or both sides of the street.**

**FINDINGS:**

The submittal included a Trip Generation Letter dated September 28, 2015 from Mackenzie indicating that the proposed project would not trigger any offsite mitigation. No changes in the street configurations or improvements along the property's frontages are proposed or warranted as part of the Building D addition project. The property's street frontages have previously been improved to meet public works standards, and no changes in site access (street driveway locations) or primary on-site circulation routes are proposed.

The applicant submitted additional information on trip generation in a letter dated March 8, 2016 as follows: "Mackenzie has prepared this letter to provide additional traffic impact information related to the proposed expansion of Building D on the Lam Research campus, located at 11357 SW Leveton Drive in Tualatin, Oregon. As noted in our letter dated January 21, 2016, the 26,000-square-foot addition will house production equipment whose support involves 30 employees, and the staffing need will be met with existing employees who already work at the site. Therefore, no net increase in employment over present staffing is associated with the expansion."

This criterion is satisfied.

**TDC Section 74.440 Streets, Traffic Study Required.**

**(1) The City Engineer may require a traffic study to be provided by the applicant and furnished to the City as part of the development approval process as provided by this Code, when the City Engineer determines that such a study is necessary in connection with a proposed development project in order to:**

**(a) Assure that the existing or proposed transportation facilities in the vicinity of the proposed development are capable of accommodating the amount of traffic that is expected to be generated by the proposed development, and/or**

**(b) Assure that the internal traffic circulation of the proposed development will not result in conflicts between on-site parking movements and/or on-site loading movements and/or on-site traffic movements, or impact traffic on the adjacent streets.**

**(2) The required traffic study shall be completed prior to the approval of the development application.**

**(3) The traffic study shall include, at a minimum:**

**(a) an analysis of the existing situation, including the level of service on adjacent and impacted facilities.**

**(b) an analysis of any existing safety deficiencies.**

**(c) proposed trip generation and distribution for the proposed development.**

**(d) projected levels of service on adjacent and impacted facilities.**

**(e) recommendation of necessary improvements to ensure an acceptable level of service for roadways and a level of service of at least D and E for signalized and unsignalized intersections respectively, after the future traffic impacts are considered.**

**(f) The City Engineer will determine which facilities are impacted and need to be included in the study.**

**(g) The study shall be conducted by a registered engineer.**

**(4) The applicant shall implement all or a portion of the improvements called for in the traffic study as determined by the City Engineer.**

**FINDINGS:**

The submittal included a Trip Generation Letter dated September 28, 2015 from Mackenzie indicating that the proposed project would not trigger any offsite mitigation. No changes in the street configurations or improvements along the property's frontages are proposed or warranted as part of the Building D addition project. The property's street frontages have previously been improved to meet public works standards, and no changes in site access (street driveway locations) or primary on-site circulation routes are proposed.

The applicant submitted additional information on trip generation in a letter dated March 8, 2016 as follows: "Mackenzie has prepared this letter to provide additional traffic impact information related to the proposed expansion of Building D on the Lam Research campus, located at 11357 SW Leveton Drive in Tualatin, Oregon. As noted in our letter dated January 21, 2016, the 26,000-square-foot addition will house production equipment whose support involves 30 employees, and the staffing need will be met with existing employees who already work at the site. Therefore, no net increase in employment over present staffing is associated with the expansion."

This criterion is satisfied.

**TDC Section 74.470 Street Lights.**

**(1) Street light poles and luminaries shall be installed in accordance with the Public Works Construction Code.**

**(2) The applicant shall submit a street lighting plan for all interior and exterior streets on the proposed development**

**FINDINGS:**

Street lights exist on SW Leveton Drive adjacent to this development. This criterion is satisfied.

**TDC Section 74.475 Street Names.**

**(1) No street name shall be used which will duplicate or be confused with the names of existing streets in the Counties of Washington or Clackamas, except for extensions of existing streets. Street names and numbers shall conform to the established pattern in the surrounding area.**

**(2) The City Engineer shall maintain the approved list of street names from which the applicant may choose. Prior to the creation of any street, the street name shall be approved by the City Engineer.**

**FINDINGS:**

No new public streets are proposed. This criterion is satisfied.

**TDC Section 74.610 Water Service.**

**(1) Water lines shall be installed to serve each property in accordance with the Public Works Construction Code. Water line construction plans shall be submitted to the City Engineer for review and approval prior to construction.**

**(2) If there are undeveloped properties adjacent to the subject site, public water lines shall be extended by the applicant to the common boundary line of these properties. The lines shall be sized to provide service to future development, in accordance with the City's Water System Master Plan, TDC Chapter 12.**

**(3) As set forth is TDC Chapter 12, Water Service, the City has three water service levels. All development applicants shall be required to connect the proposed development site to the service level in which the development site is located. If the development site is located on a boundary line between two service levels the applicant shall be required to connect to the service level with the higher reservoir elevation. The applicant may also be required to install or provide pressure reducing valves to supply appropriate water pressure to the properties in the proposed development site.**

**FINDINGS:**

An additional 10" private water lateral to serve the proposed Building D expansion, including installation of a new fire hydrant east of the building addition, is shown on Sheet C2.3, but it connects to an existing private water line within the property. No change is proposed in the property's connections to the public water system. Compliance with applicable standards will be achieved through City permitting procedures for on-site water line construction, including appropriate controls and other devices required by applicable codes.

This criterion is satisfied.

**TDC Section 74.620 Sanitary Sewer Service.**

**(1) Sanitary sewer lines shall be installed to serve each property in accordance with the Public Works Construction Code. Sanitary sewer construction plans and calculations shall be submitted to the City Engineer for review and approval prior to construction.**

**(2) If there are undeveloped properties adjacent to the proposed development site which can be served by the gravity sewer system on the proposed development site, the applicant shall extend public sanitary sewer lines to the common boundary line with these properties. The lines shall be sized to convey flows to include all future development from all up stream areas that can be expected to drain through the lines on the site, in accordance with the City's Sanitary Sewer System Master Plan, TDC Chapter 13.**

**FINDINGS:**

An additional 12" private gravity sewer lateral to serve the proposed Building D expansion is shown on Sheet C2.3, but it connects to an existing private sewer line within the property. No change is proposed in the property's connections to the public sanitary sewer system. Compliance with applicable standards will be achieved through City permitting procedures for on-site sewer construction.

This criterion is satisfied.

**TDC Section 74.630 Storm Drainage System.**

**(1) Storm drainage lines shall be installed to serve each property in accordance with City standards. Storm drainage construction plans and calculations shall be submitted to the City Engineer for review and approval prior to construction.**

**(2) The storm drainage calculations shall confirm that adequate capacity exists to serve the site. The discharge from the development shall be analyzed in accordance with the City's Storm and Surface Water Regulations.**

**(3) If there are undeveloped properties adjacent to the proposed development site which can be served by the storm drainage system on the proposed development site, the applicant shall extend storm drainage lines to the common boundary line with these properties. The lines shall be sized to convey expected flows to include all future development from all up stream areas that will drain through the lines on the site, in accordance with the Tualatin Drainage Plan in TDC Chapter 14.**

**FINDINGS:**

No new public stormwater facilities are proposed. The site's stormwater management facilities have been designed with capacity to accommodate current and future development within the whole subject property, providing substantial excess capacity to handle runoff from the current set of improvements, including the proposed addition to Building D. Runoff from roof drains and paved surfaces will be collected in new catch basins and pipes connecting to the existing on-site system (see Sheet C2.3.).

This criterion is satisfied.

**TDC Section 74.640 Grading.**

**(1) Development sites shall be graded to minimize the impact of storm water runoff onto adjacent properties and to allow adjacent properties to drain as they did before the new development.**

**(2) A development applicant shall submit a grading plan showing that all lots in all portions of the development will be served by gravity drainage from the building crawl spaces; and that this development will not affect the drainage on adjacent properties. The City Engineer may require the applicant to remove all excess material from the development site.**

**FINDINGS:**

Topsoil will be stockpiled during excavation to be used for backfill of landscape areas. Additionally, amendments will be added to the topsoil at that time. As shown on the attached grading and utility plans (see C2.2 and C2.3), catch basins and field inlets collect stormwater runoff from planting areas and convey it into the existing onsite system. As shown on the attached grading and utility plans (see C2.2 and C2.3), landscape areas are surrounded by curbing, with catch basins and field inlets that collect stormwater runoff from planting areas and convey it into the existing on-site system, avoiding surface flows that would cross roadways or walkways. As shown on the attached grading plans (see C2.2 and C2.3), runoff from impervious surfaces will be directed to catch basins and conveyed to the existing on-site system. A catch basin has been placed to minimize surface flow at the designated walkway to the parking area to the west.

This criterion is satisfied with conditions of approval PFR -3 and 4.

**TDC Section 74.650 Water Quality, Storm Water Detention and Erosion Control.**

**The applicant shall comply with the water quality, storm water detention and erosion control requirements in the Surface Water Management Ordinance. If required:**

**(1) On subdivision and partition development applications, prior to approval of the final plat, the applicant shall arrange to construct a permanent on-site water quality facility and storm water detention facility and submit a design and calculations indicating that the requirements of the Surface Water Management Ordinance will be satisfied and obtain a Stormwater Connection Permit from Clean Water Services; or**

**(3) For on-site private and regional non-residential public facilities, the applicant shall submit a stormwater facility agreement, which will include an operation and maintenance plan provided by the City, for the water quality facility for the City's review and approval. The applicant shall submit an erosion control plan prior to issuance of a Public Works Permit. No construction or disturbing of the site shall occur until the erosion control plan is approved by the City and the required measures are in place and approved by the City.**

**FINDINGS:**

No new public stormwater facilities are proposed. The site's stormwater management facilities have been designed with capacity to accommodate current and future development within the whole subject property, providing substantial excess capacity to handle runoff from the current set of improvements,

including the proposed addition to Building D. Runoff from roof drains and paved surfaces will be collected in new catch basins and pipes connecting to the existing on-site system (see Sheet C2.3.).

The applicant has submitted a Service Provider Letter from Clean Water Services indicating that Sensitive Areas do not exist on-site. A CWS Memorandum was received dated February 5, 2016 for development on this site. The applicant will need to submit plans that are sufficient to obtain a Stormwater Connection Permit Authorization Letter that complies with the submitted Service Provider Letter conditions, for review and approval. This criterion is satisfied with conditions of approval PFR -6.

**TDC Section 74.660 Underground.**

**(1) All utility lines including, but not limited to, those required for gas, electric, communication, lighting and cable television services and related facilities shall be placed underground. Surface-mounted transformers, surface-mounted connection boxes and meter cabinets may be placed above ground. Temporary utility service facilities, high capacity electric and communication feeder lines, and utility transmission lines operating at 50,000 volts or above may be placed above ground. The applicant shall make all necessary arrangements with all utility companies to provide the underground services. The City reserves the right to approve the location of all surface-mounted transformers.**

**(2) Any existing overhead utilities may not be upgraded to serve any proposed development. If existing overhead utilities are not adequate to serve the proposed development, the applicant shall, at their own expense, provide an underground system. The applicant shall be responsible for obtaining any off-site deeds and/or easements necessary to provide utility service to this site; the deeds and/or easements shall be submitted to the City Engineer for acceptance by the City prior to issuance of the Public Works Permit.**

**FINDINGS:**

SW Leveton Drive was constructed with all utilities belowground.

This criterion is satisfied.

**TDC Section 74.670 Existing Structures.**

**(1) Any existing structures requested to be retained by the applicant on a proposed development site shall be connected to all available City utilities at the expense of the applicant.**

**(2) The applicant shall convert any existing overhead utilities serving existing structures to underground utilities, at the expense of the applicant.**

**(3) The applicant shall be responsible for continuing all required street improvements adjacent to the existing structure, within the boundaries of the proposed development site.**

**FINDINGS:**

All proposed site development is shown connecting to existing private utilities served by public facilities.

This criterion is satisfied.

## **TDC Chapter 75: Access Management**

### **TDC Section 75.010 Purpose.**

The purpose of this chapter is to promote the development of safe, convenient and economic transportation systems and to preserve the safety and capacity of the street system by limiting conflicts resulting from uncontrolled driveway access, street intersections, and turning movements while providing for appropriate access for all properties.

### **TDC Section 75.030 Freeways and Arterials Defined.**

This section shall apply to all City, County and State public streets, roads and highways within the City and to all properties that abut these streets, roads and highways.

(1) Access shall be in conformance with TDC Chapter 73 unless otherwise noted below.

(2) Freeways and Arterials Designated. For the purposes of this chapter the following are freeways and arterials: ...

(i) 65th Avenue from its intersection with Nyberg Street south to City limits;

(j) Borland Road from 65th Avenue east to Saum Creek;...

(3) Applicability

(a) This chapter applies to all developments, permit approvals, land use approvals, partitions, subdivisions, or any other actions taken by the City Council or any administrative officer of the City pertaining to property abutting any road or street listed in TDC 75.030. In addition, any parcel not abutted by a road or street listed in TDC 75.030, but having access to an arterial by any easement or prescriptive right, shall be treated as if it did abut the arterial and this chapter applies. This chapter shall take precedence over any other TDC chapter and over any other ordinance of the City when considering any development, land use approval or other proposal for property abutting an arterial or any property having an access right to an arterial.

### **TDC Section 75.120 Existing Streets.**

The following list describes in detail the freeways and arterials as defined in TDC 75.030 with respect to access. Recommendations are made for future changes in accesses and location of future accesses. These recommendations are examples of possible solutions and shall not be construed as limiting the City's authority to change or impose different conditions if additional studies result in different recommendations from those listed below....

**(15) LEVETON DRIVE**

**(a) 108th Avenue to 118th Avenue:**

**On the north side of Leveton Drive...Novellus (2S122AA 500 and 2S122AB 100) shall be permitted three driveways located approximately 25 feet and 950 feet from the west property line for Tax Lot 100 and 600 feet west of 108th Avenue for Tax Lot 500.**

**FINDINGS:**

Three driveways exist 530, 960, and 1,865 feet west of the intersection of SW 108<sup>th</sup> Avenue and SW Leveton Drive. These driveways are not proposed to be altered with this development.

This criterion is satisfied.

**APPEAL**

Requests for review of this decision must be received by the Engineering Division within the 14-day appeal period ending on April 14, 2016 at 5 PM. Issues must have been described with adequate clarity and detail with identification of the associated Tualatin Municipal or Development Code section to afford a decision maker an opportunity to respond to the issue. A request for review must be submitted on the form provided by the City, as detailed in TDC 31.076, and signed by the appellant.

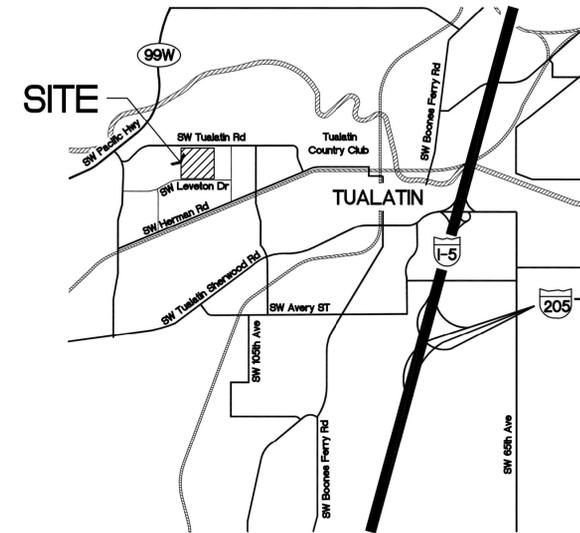
Sincerely,

A handwritten signature in blue ink, appearing to read "Tony Doran".

Tony Doran, EIT  
Engineering Associate

# LAM RESEARCH CORP.

## BUILDING D EXPANSION DESIGN REVIEW - 12/18/15



Architecture - Interiors  
Planning - Engineering

Portland, OR  
503.224.9560  
Vancouver, WA  
360.695.7879  
Seattle, WA  
206.749.9993

www.mcknze.com

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Client



### ABBREVIATIONS

A	ACCENT PAINT	ELEV	ELEVATION	INSUL	INSULATION	R	RADIUS
AB	ANCHOR BOLT	ELECT	ELECTRICAL	JNT	INTERIOR	RAD	RADIAL
AC	ASPHALTIC CONCRETE	EN	EDGE NAIL	JST	JOINT	RBE	ROOF BASE ELEVATION
ACT	ACOUSTICAL CEILING TILE	ENGR	ENGINEER	JST	JOIST	RCP	REFLECTED CEILING PLAN
ADJ	ADJACENT / ADJUSTABLE	EOP	EDGE OF PANEL	L	ANGLE	RD	ROOF DRAIN
ADA	AMERICANS WITH DISABILITIES ACT	EPDM	ETHYLENE PROPYLENE DIENE MONOMER	LAM	LAMINATE	REF	REFERENCE / REFRIGERATOR
ADD'L	ADDITIONAL	EQ	EQUAL	LAV	LAVATORY	REIN	REINFORCING
AEG	ALUMINUM ENTRANCE GRILLE	ETC	EPOXY TRAFFIC COATING / ETCETERA	LB	LAC BOLT	REQ'D	REQUIRED
AFF	ABOVE FINISH FLOOR	EW	EACH WAY	LL	LIVE LOAD	REV	REVISION
ALT	ALTERNATE	EX/EXIST	EXISTING	LLV	LONG LEG VERTICAL	RF	RESILIENT FLOORING
APPROX	APPROXIMATE	EXP JT	EXPANSION JOINT	LONGIT	LONGITUDINAL	RM	ROOM
ARCH	ARCHITECT(URAL)	EXT	EXTERIOR	LP	LOW POINT	RO	ROUGH OPENING
B/	BOTTOM OF	LWC	LIGHTWEIGHT CONCRETE	ROW	RIGHT OF WAY	SCHED	SCHEDULE
BATT	BATTEN INSULATION	F/	FACE OF	SC	SEALED CONCRETE	SCM	STRUCTURAL CLAY MASONRY
BD	BOARD	FB	FLAT BAR	M	MIRROR	SF	SQUARE FEET
BTWN	BETWEEN	FC	FACE OF CURB	M/E/P	MECHANICAL/ELECTRICAL/PLUMBING OR PROCESS	SHTG	SHEATHING
BLDG	BUILDING	FD	FLOOR DRAIN	MAS	MASONRY	SIM	SIMILAR
BLK	BLOCK	FDC	FIRE DEPARTMENT CONNECTION	MATL	MATERIAL	SLEC	SELF LEVELING EPOXY COATING
BLKG	BLOCKING	FE	FIRE EXTINGUISHER	MAX	MAXIMUM	SLV	SHORT LEG VERTICAL
BM	BENCH MARK / BEAM	FFE	FINISH FLOOR ELEVATION	MB	MACHINE BOLT	SMS	SHEET METAL SCREW
BN	BOUNDARY NAIL	FIN	FINISH(ED)	MDF	MEDIUM DENSITY FIBERBOARD	SP	SQUARE
BOTT	BOTTOM	FL	FLUSH	MDO	MEDIUM DENSITY OVERLAY	SPEC(S)	SPECIFICATION(S)
BRG P	BEARING PLATE	FLR	FLOOR	MECH	MECHANICAL	SQ	SQUARE
BSMT	BASEMENT	FOC	FACE OF CONCRETE	MFR	MANUFACTURED	SS	STAINLESS STEEL
BTWN	BETWEEN	FM	FACTORY MUTUAL	MFG	MANUFACTURING	ST	STONE
CAB	CABINET	FND	FOUNDATION	MFR	MANUFACTURER	STA PT	STATION POINT
CB	CATCH BASIN	FOC	FACE OF CONCRETE	MGR	MANAGER	STAGG	STAGGERED
CJ	CAST IRON	FOF	FACE OF FINISH	MH	MAN HOLE	STD	STANDARD
CI	CONTROL JOINT	FOIC	FURNISH BY OWNER	MH	MINIMUM	STIFF	STIFFENER
CL	CENTER LINE	FTG	FOOTING	MISC	MISCELLANEOUS	STL	STEEL
CLNG	CEILING	FWC	FABRIC WALL COVERING	MISC	MISCELLANEOUS	STRUC	STRUCTURAL
CLR	CLEAR	GA	GAUGE	NIC	NOT IN CONTRACT	SUSP	SUSPENDED
CMP	CORRUGATED METAL PIPE	GB	GRAB BAR	NO./#	NUMBER	SVC	SHEET VINYL COVED
CMU	CONCRETE MASONRY UNIT	OB	OPENING	NT	NOT TO SCALE	T&B	TOP AND BOTTOM
CTR	CENTER	OC	ON CENTER	NT	NOT TO SCALE	T/	TEMP
CO	CLEAN OUT	OD	OUTSIDE DIAMETER	NT	NOT TO SCALE	THK	THICK(NESS)
COL	COLUMN	OH	OPPOSITE HAND	NT	NOT TO SCALE	TL	TOTAL LOAD
CONC	CONCRETE	OH	OVERHEAD DOOR	NT	NOT TO SCALE	TN	TOE NAIL
CONF	CONFERENCE	OH	OVERHEAD DOOR	NT	NOT TO SCALE	TO	TOP OF
CONN	CONNECTION	OPNG	OPENING	NT	NOT TO SCALE	TOF	TOP OF FOOTING
CONST	CONSTRUCTION	OPR	OPPOSITE	NT	NOT TO SCALE	TOS	TOP OF STEEL
CONT	CONTINUOUS	OS	OUTSIDE	NT	NOT TO SCALE	TOW	TOP OF WALL
CONTR	CONTRACTOR	OSF/O/FACE	OUTSIDE FACE	NT	NOT TO SCALE	TRANSV	TRANSVERSE
CORR	CORRUGATED(ION)	OSSC	OREGON STRUCTURAL SPECIALTY CODE	NT	NOT TO SCALE	TS	TUBE STEEL
COORD	COORDINATE	OTS	OPEN TO STRUCTURE	NT	NOT TO SCALE	TU	TILT-UP
CSP	CONCRETE SEWER PIPE	PB	PARTICLE BOARD	NT	NOT TO SCALE	TYP	TYPICAL
CNTR	CENTER	PDA	POWDER DRIVEN ANCHORS	NT	NOT TO SCALE	U/S	UNDERSIDE
CR	CHEMICAL RESISTANT COATING	PJ	PANEL JOINT	NT	NOT TO SCALE	UC	UNDER COUNTER
CRK	CHEMICAL RESISTANT COATING	PL	PLATE	NT	NOT TO SCALE	UL	UNDERWRITERS LABORATORIES
CSK	COUNTERSINK	PLB	PARALLAM BEAM	NT	NOT TO SCALE	UNO	UNLESS NOTED OTHERWISE
CSP	CONCRETE SEWER PIPE	PLMB	PLUMBING	NT	NOT TO SCALE	USG	UNITED STATES GYPSUM
CTOP	COUNTERTOP	PLYWD	PLYWOOD	NT	NOT TO SCALE	U/S	UNDERSIDE
CW	CONCRETE WALL	PNL	PANEL	NT	NOT TO SCALE	VERT	VERTICAL
d	PENNY (NAILS)	PR	PAIR	NT	NOT TO SCALE	VEST	VESTIBULE
DBA	DEFORMED BAR ANCHOR	PS	POUR STRIP	NT	NOT TO SCALE	VET	VINYL ENHANCED TILE
DBL	DOUBLE	PSF	POUNDS PER SQUARE FEET	NT	NOT TO SCALE	W/	WITH
DET/DTL	DETAIL	PSF	POUNDS PER SQUARE FEET	NT	NOT TO SCALE	W/CRC	COATING W/CHEMICAL RESISTANCE
DF	DRINKING FOUNTAIN / DOUGLAS FIR	PT	PRESSURE TREATED / PORCELAIN TILE	NT	NOT TO SCALE	W/O	WITHOUT
DIA	DIAMETER	PVC	POLYVINYL CHLORIDE	NT	NOT TO SCALE	WB	WOOD BASE
DIAPH	DIAPHRAGM	PVMT	PAVEMENT	NT	NOT TO SCALE	WC	WATER CLOSET / WALL COVERING
DIA	DIAMETER			NT	NOT TO SCALE	WD	WOOD
DIM	DIMENSION			NT	NOT TO SCALE	WF	WIDE FLANGE BEAM
DL	DEAD LOAD			NT	NOT TO SCALE	WH	WATER HEATER
DN	DOWN			NT	NOT TO SCALE	WP	WATER PROOF / WOOD PANELING
DP	DEEP			NT	NOT TO SCALE	WR	WATER RESISTANT
DR	DOOR			NT	NOT TO SCALE	WS	WATER STOP / WELDED STUD
DS	DOWNSPOUT			NT	NOT TO SCALE	WWF	WELDED WIRE FABRIC
DWG	DRAWING			NT	NOT TO SCALE	WWR	WELDED WIRE MESH
DWLS	DOWELS			NT	NOT TO SCALE		
EA/	EACH			NT	NOT TO SCALE		
EF	EACH FACE			NT	NOT TO SCALE		
EIFS	EXTERIOR INSULATION FINISH SYSTEM			NT	NOT TO SCALE		

### PROJECT TEAM

#### OWNER

**LAM RESEARCH CORP.**  
11155 SW LEVENTON DRIVE, BUILDING A  
TUALATIN, OREGON 97062  
CONTACT: MIKE HALVORSON  
  
PHONE: (503) 685-8345  
FAX: (503) 685-8399  
EMAIL: Michael.Halvorson@lamresearch.com

#### ARCHITECT/STRUCT ENGINEER

**MACKENZIE**  
1515 SE WATER AVENUE, SUITE 100  
PORTLAND, OREGON 97214  
CONTACT: PETER ALTO  
  
PHONE: (503) 224-9560  
FAX: (503) 228-1285  
palto@grpmack.com

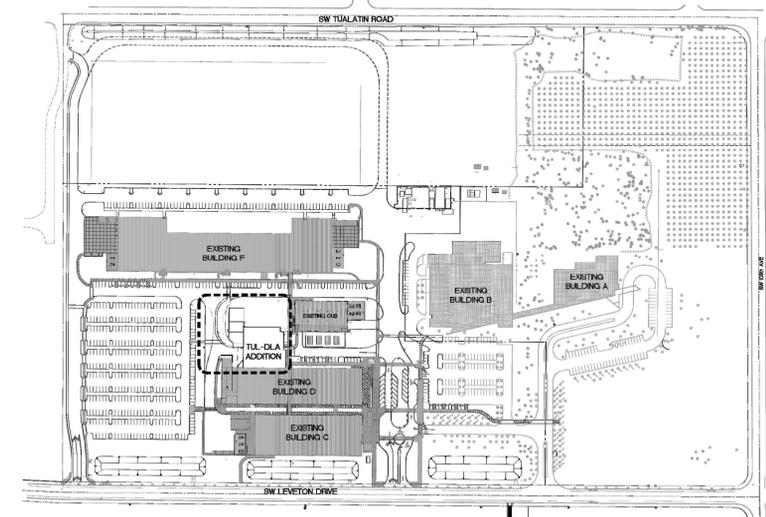
#### CIVIL

**MACKENZIE**  
1515 SE WATER AVENUE, SUITE 100  
PORTLAND, OREGON 97214  
CONTACT: MATT BUTTS

PHONE: (503) 224-9560  
FAX: (503) 228-1285  
EMAIL: mbutts@mcknze.com

#### LANDSCAPE

**MACKENZIE**  
1515 SE WATER AVENUE, SUITE 100  
PORTLAND, OREGON 97214  
CONTACT: RON HEIDEN  
  
PHONE: (503) 224-9560  
FAX: (503) 228-1285  
EMAIL: rheid@mcknze.com



### OVERALL SITE PLAN



### SHEET LIST

T1.0	TITLE SHEET AND CODE ANALYSIS
<b>CIVIL</b>	
C1.0	EXISTING CONDITIONS PLAN
C2.0	DEMO PLAN
C2.1	SITE PLAN
C2.2	GRADING PLAN
C2.3	UTILITY PLAN
C2.4	EROSION CONTROL PLAN
IL1.0	PHOTOMETRIC ANALYSIS
IL2.0	PHOTOMETRIC CUT-SHEETS

**LANDSCAPE**  
L2.1 LANDSCAPE PLAN

**ARCHITECTURAL**  
A3.1 ELEVATIONS

Project  
**DLA TUALATIN  
BUILDING D  
ADDITION**

**11357 SW LEVETON DR  
TUALATIN, OR 97062**

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#### REVISIONS:

NO.	REVISIONS	REVISION DELTA	CLOSING DATE
1	THIS SHEET		

SHEET TITLE:

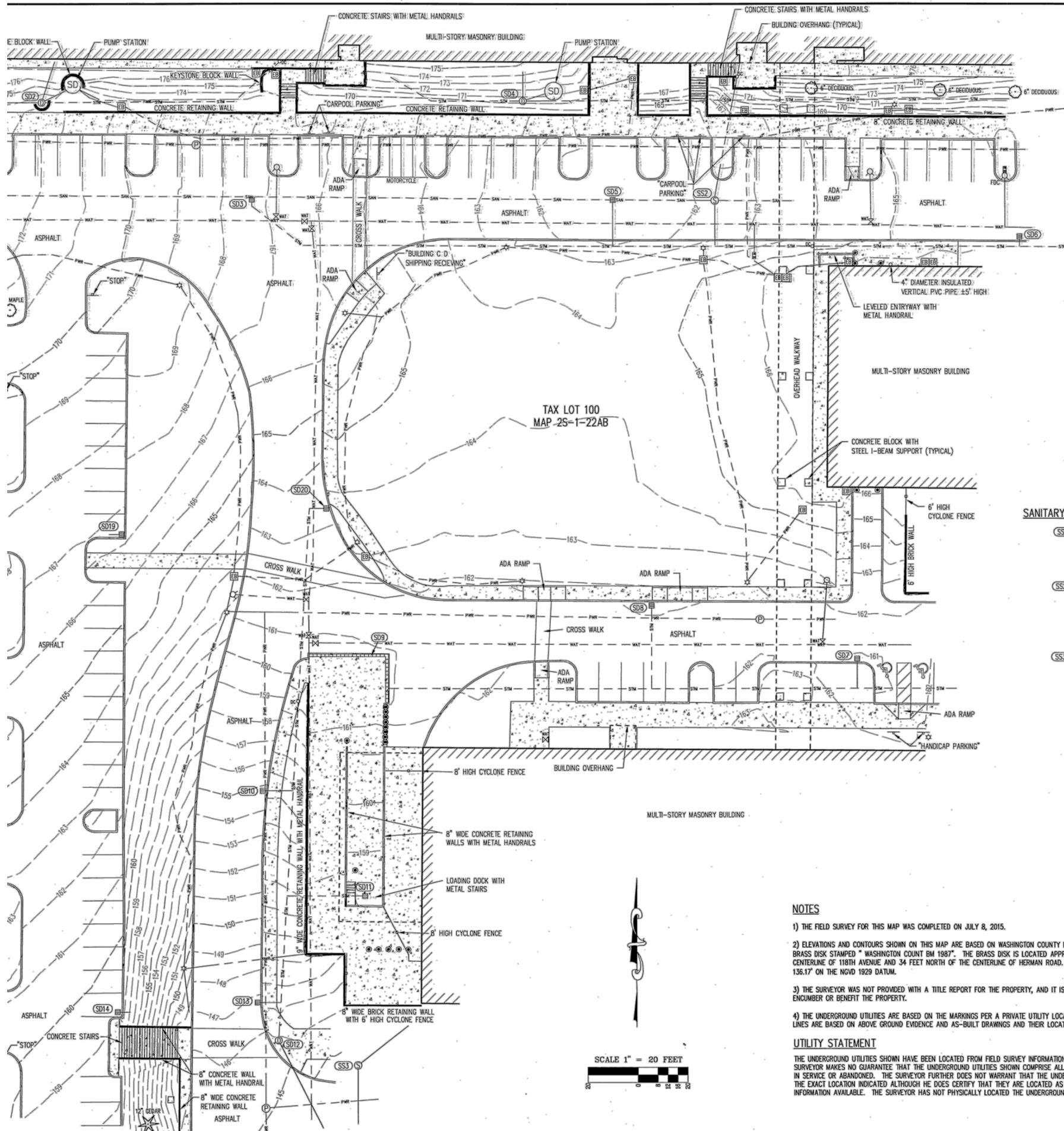
**TITLE SHEET/  
PROJECT  
INFORMATION**

DRAWN BY: ELJ

CHECKED BY: PPA

SHEET:

**T1.0**



**LEGEND:**

CONIFEROUS TREE		DECIDUOUS TREE	
FIRE HYDRANT		SANITARY SEWER CLEAN OUT	
FIRE DEPARTMENT CONNECTION		POWER VAULT	
WATER METER		POWER MANHOLE	
WATER VALVE		POWER JUNCTION BOX	
SANITARY SEWER MANHOLE		STREET LIGHT	
STORM SEWER CLEAN OUT		SIGN	
STORM SEWER CATCH BASIN		BOLLARD	
STORM SEWER MANHOLE		FOUND SURVEY MONUMENT	

RIGHT-OF-WAY LINE	
BOUNDARY LINE	
PROPERTY LINE	
CENTERLINE	
CURB	
FENCE LINE	
GRAVEL EDGE	
POWER LINE	
STORM SEWER LINE	
SANITARY SEWER LINE	
WATER LINE	

**SANITARY SEWER INFORMATION**

- SS1 MANHOLE  
RIM = 172.75'  
8" IN (W)  
8" OUT (E)  
FLOWLINE I.E. = 157.1'
- SS2 MANHOLE  
RIM = 162.38'  
4" IN (NE)  
8" IN (W)  
12" IN (S)  
15" OUT (E)  
FLOWLINE I.E. = 153.9'
- SS3 MANHOLE  
RIM = 145.14'  
8" IN (NE)  
8" OUT (S)  
FLOWLINE I.E. = 140.6'

**STORM SEWER INFORMATION**

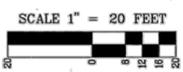
- SD1 LYNCH STYLE CATCH BASIN  
RIM = 172.91'  
OUT (N)
- SD2 LYNCH STYLE CATCH BASIN  
RIM = 174.09'  
6" I.E. IN (NE) = 170.5'  
6" I.E. IN (NE) = 170.4'  
8" I.E. IN (E) = 163.3'  
12" I.E. OUT (W) = 163.3'
- SD3 LYNCH STYLE CATCH BASIN  
RIM = 167.19'  
OUT (S)
- SD4 MANHOLE  
RIM = 170.43'  
6" I.E. IN (N) = 159.2'  
6" I.E. IN (W) = 159.2'  
8" I.E. IN (NE) = 162.2'  
8" I.E. IN (NE) = 162.2'  
12" I.E. OUT (E) = 159.0'
- SD5 LYNCH STYLE CATCH BASIN  
RIM = 160.88'  
OUT (S)
- SD6 LYNCH STYLE CATCH BASIN  
RIM = 164.82'  
OUT (S)
- SD7 LYNCH STYLE CATCH BASIN  
RIM = 160.66'  
OUT (S)
- SD8 LYNCH STYLE CATCH BASIN  
RIM = 160.76'  
OUT (S)
- SD9 SLOT DRAIN  
RIM (NW) = 160.56'  
RIM (SE) = 160.80'  
6" I.E. OUT (E) = 159.6'
- SD10 LYNCH STYLE CATCH BASIN  
RIM = 154.57'  
OUT (E)
- SD11 CATCH BASIN  
RIM = 158.09'  
WATER LEVEL = 156.4'  
NO PIPES VISIBLE
- SD12 MANHOLE  
RIM = 145.94'  
8" I.E. IN (N) = 139.3'  
12" I.E. OUT (SE) = 139.3'
- SD13 LYNCH STYLE CATCH BASIN  
RIM = 146.72'  
OUT (E)
- SD14 LYNCH STYLE CATCH BASIN  
RIM = 159.00'  
OUT (E)
- SD15 LYNCH STYLE CATCH BASIN  
RIM = 159.71'  
OUT (W)
- SD16 LYNCH STYLE CATCH BASIN  
RIM = 162.21'  
OUT (W)
- SD17 LYNCH STYLE CATCH BASIN  
RIM = 165.29'  
OUT (W)
- SD18 LYNCH STYLE CATCH BASIN  
RIM = 167.21'  
OUT (W)
- SD19 LYNCH STYLE CATCH BASIN  
RIM = 166.70'  
OUT (W)
- SD20 LYNCH STYLE CATCH BASIN  
RIM = 163.18'  
OUT (W)
- SD21 LYNCH STYLE CATCH BASIN  
RIM = 169.09'  
OUT (S)

**NOTES**

- 1) THE FIELD SURVEY FOR THIS MAP WAS COMPLETED ON JULY 8, 2015.
- 2) ELEVATIONS AND CONTOURS SHOWN ON THIS MAP ARE BASED ON WASHINGTON COUNTY BENCH MARK NUMBER 905. BEING A BRASS DISK STAMPED "WASHINGTON COUNT BM 1987". THE BRASS DISK IS LOCATED APPROXIMATELY 270 FEET WEST OF THE CENTERLINE OF 118TH AVENUE AND 34 FEET NORTH OF THE CENTERLINE OF HERMAN ROAD. THE DISK HAS AN ELEVATION OF 136.17' ON THE NGVD 1929 DATUM.
- 3) THE SURVEYOR WAS NOT PROVIDED WITH A TITLE REPORT FOR THE PROPERTY, AND IT IS UNKNOWN IF ANY EASEMENTS ENCUMBER OR BENEFIT THE PROPERTY.
- 4) THE UNDERGROUND UTILITIES ARE BASED ON THE MARKINGS PER A PRIVATE UTILITY LOCATING COMPANY. THE STORM SEWER LINES ARE BASED ON ABOVE GROUND EVIDENCE AND AS-BUILT DRAWINGS AND THEIR LOCATIONS DEPICTED ARE APPROXIMATE.

**UTILITY STATEMENT**

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.



**TOPOGRAPHIC SURVEY**

**TUALATIN, OREGON**

TAX MAP 2S-1-22AB

**ORTHWEST SURVEYING, INC.**

1815 NW 168th PLACE, SUITE 2090  
BEAVERTON, OR 97006  
PH: (503) 848-2127 FAX: (503) 848-2179  
EMAIL: nwsurveying@northwestsurveying.com

**MACKENZIE**

DESIGN DRIVEN | CLIENT FOCUSED

Project  
**DLA TUALATIN BUILDING D ADDITION**

11357 SW LEVETON DR  
TUALATIN, OR 97062

REVISIONS:

NO.	DATE	REVISIONS	REVISION DELTA
1	7/21/2015	INITIAL RELEASE	

REGISTERED PROFESSIONAL LAND SURVEYOR

*Scott F. Field*

OREGON  
JUNE 30, 1997  
SCOTT F. FIELD  
2844

12-31-2015  
RENEWAL DATE

JOB NUMBER  
**1344**

SHEET  
**1 OF 1**

DRAWN BY: NKL  
CHECKED BY: BDN  
SHEET:

**C1.0**





NO.	DATE	REVISIONS	REVISION DELTA	CLOSING DATE
1	07/25/15	ISSUED FOR PERMIT		
2	08/25/15	REVISED PER COMMENTS		
3	09/25/15	REVISED PER COMMENTS		
4	10/25/15	REVISED PER COMMENTS		
5	11/25/15	REVISED PER COMMENTS		
6	12/25/15	REVISED PER COMMENTS		
7	01/25/16	REVISED PER COMMENTS		
8	02/25/16	REVISED PER COMMENTS		
9	03/25/16	REVISED PER COMMENTS		
10	04/25/16	REVISED PER COMMENTS		
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**LEGEND**

AC PAVING	
CONCRETE SIDEWALK	
VERTICAL CURB	
SAWCUT	
PROPOSED LIGHTPOLE	
EXISTING LIGHTPOLE	
RETAINING WALL	

**GENERAL NOTES**

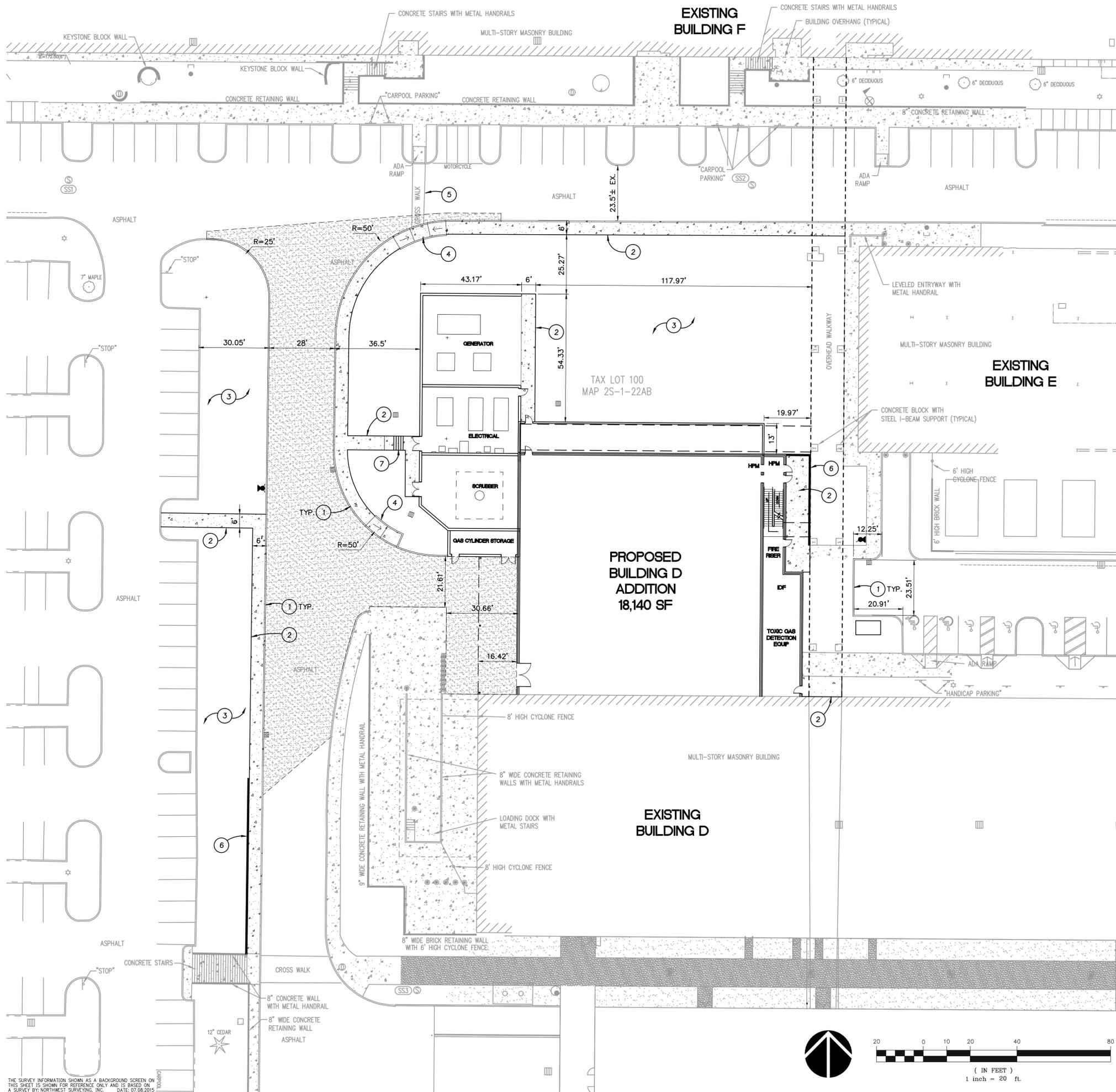
- ALL WORK SHALL CONFORM TO THE STANDARD SPECIFICATIONS AND THE REQUIREMENTS OF THE CITY OF TUALATIN, CLEAN WATER SERVICES (CWS), AND THE CURRENT AMERICAN PUBLIC WORKS ASSOCIATION STANDARDS FOR PUBLIC WORKS CONSTRUCTION.
- THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THEY DO NOT SHOW EVERY DIMENSION, COMPONENT PIECE, SECTION, JOINT OR FITTING REQUIRED TO COMPLETE THE PROJECT. ALL LOCATIONS FOR WORK SHALL BE CHECKED AND COORDINATED WITH EXISTING CONDITIONS IN THE FIELD BEFORE BEGINNING CONSTRUCTION. EXISTING UNDERGROUND UTILITIES LAYING WITHIN THE LIMITS OF EXCAVATION SHALL BE VERIFIED AS TO CONDITION, SIZE AND LOCATION BY UNCOVERING, PROVIDING SUCH IS PERMITTED BY LOCAL PUBLIC AUTHORITIES WITH JURISDICTION, BEFORE BEGINNING CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IF THERE ARE ANY DISCREPANCIES.
- EFFECTIVE EROSION PREVENTION AND SEDIMENT CONTROL IS REQUIRED. EROSION CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED TO MEET CWS REQUIREMENTS. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE EROSION CONTROL.
- EFFECTIVE DRAINAGE CONTROL IS REQUIRED. DRAINAGE SHALL BE CONTROLLED WITHIN THE WORK SITE AND SHALL BE ROUTED SO THAT ADJACENT PRIVATE PROPERTY, PUBLIC PROPERTY, AND THE RECEIVING SYSTEM ARE NOT ADVERSELY IMPACTED. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE DRAINAGE CONTROL.
- CONTRACTOR SHALL ADJUST ALL STRUCTURES IMPACTED BY CONSTRUCTION IMPROVEMENTS TO NEW FINISH GRADES.
- EXCAVATION: EXCAVATE FOR SLABS, PAVING, AND OTHER IMPROVEMENTS TO SIZES AND LEVELS SHOWN OR REQUIRED. ALLOW FOR FORM CLEARANCE AND FOR PROPER COMPACTION OF REQUIRED BACKFILLING MATERIAL. EXCAVATOR(S) MUST COMPLY WITH O.R.S. 757.541 THROUGH 757.571; EXCAVATOR(S) SHALL NOTIFY ALL UTILITY COMPANIES FOR LINE LOCATIONS SEVENTY-TWO (72) HOURS (MINIMUM) PRIOR TO START OF WORK. DAMAGE TO UTILITIES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. (ONE CALL LOCATE UTILITY NOTIFICATION CENTER - PORTLAND METRO AREA 246-6699, OREGON 696-4848, ALL OTHER AREAS 1-800-332-2344).
- WHERE CONNECTING TO AN EXISTING PIPE, AND PRIOR TO ORDERING MATERIALS, THE CONTRACTOR SHALL EXPOSE THE END OF THE EXISTING PIPE VERIFY THE LOCATION, SIZE, AND ELEVATION. NOTIFY ENGINEER OF ANY DISCREPANCIES.
- REQUEST BY THE CONTRACTOR FOR CHANGES TO THE PLANS MUST BE APPROVED BY THE ENGINEER.
- PROTECT OVERHEAD WALKWAY DURING ALL CONSTRUCTION ACTIVITIES

**KEYNOTES:**

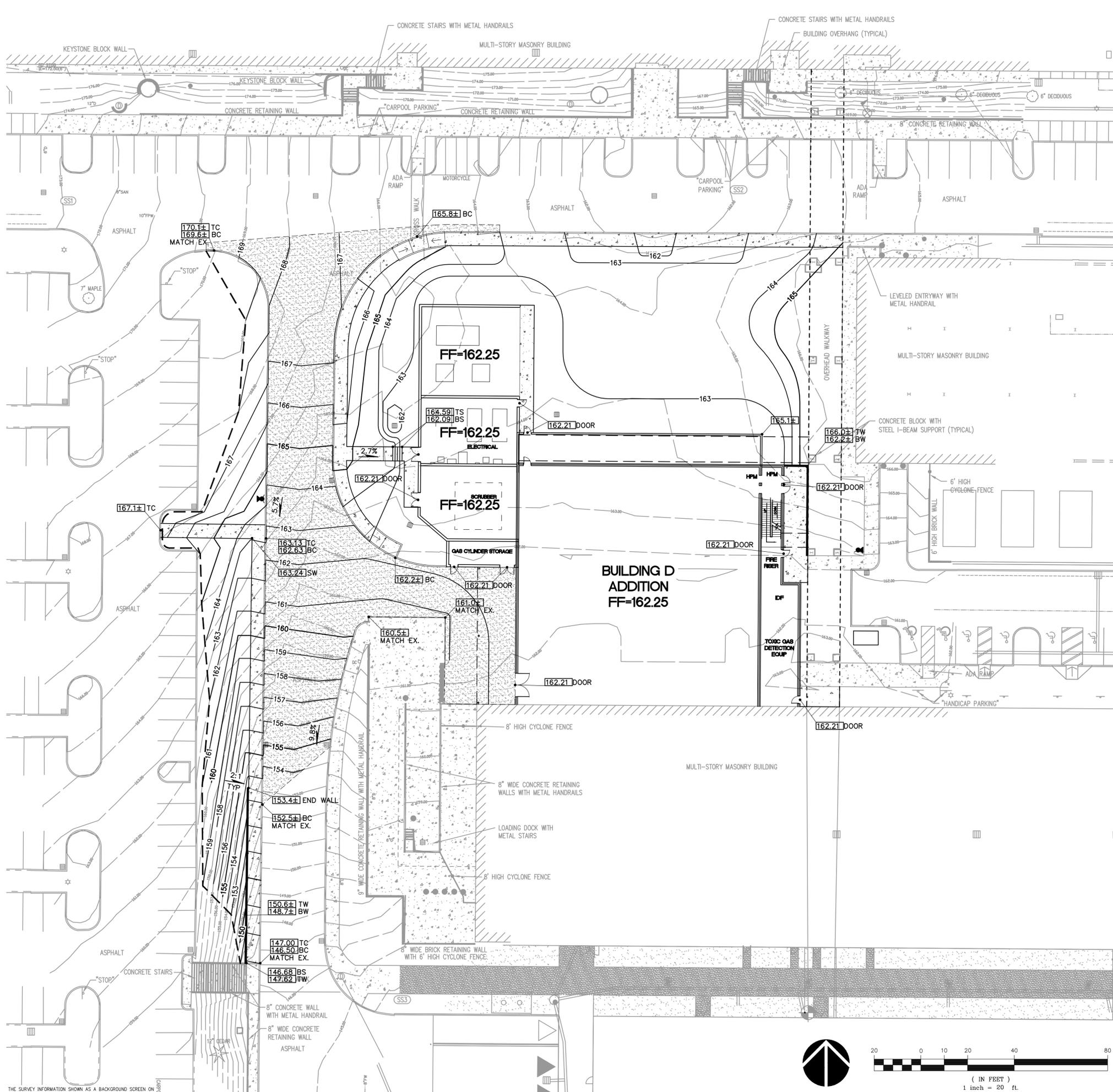
- CONCRETE VERTICAL CURB
- CONCRETE SIDEWALK
- LANDSCAPE AREA, SEE LANDSCAPE PLANS
- CURB RAMP
- REPAIR EXISTING ACCESSIBLE CROSS WALK STRIPING
- C.I.P. CONCRETE RETAINING WALL, MAX HEIGHT 2'
- CONCRETE STAIRS WITH HANDRAIL

**SITE COVERAGE SUMMARY:**

PAVING AND SIDEWALK	17,245 SF
BUILDING	18,140 SF
LANDSCAPE	17,600 SF
TOTAL AFFECTED AREA	52,985 SF



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY: NORTHWEST SURVEYING, INC. DATE: 07.08.2015



**LEGEND**

- 31.0 SURFACE ELEVATION SPOT GRADE
- 105 SURFACE ELEVATION CONTOUR
- SWALE
- SAWCUT
- SLOPE ARROW

**GRADING NOTES**

1. **ROUGH GRADING:** BRING ALL FINISH GRADES TO APPROXIMATE LEVELS INDICATED. WHERE GRADES ARE NOT OTHERWISE INDICATED, FINISH GRADES ARE TO BE THE SAME AS ADJACENT SIDEWALKS, CURBS, OR THE OBVIOUS GRADE OF ADJACENT STRUCTURE. GRADE TO UNIFORM LEVELS OR SLOPES BETWEEN POINTS WHERE GRADES ARE GIVEN. ROUND OFF SURFACES, AVOID ABRUPT CHANGES IN LEVELS. ROUGH GRADE TO ALLOW FOR DEPTH OF CONCRETE SLABS, WALKS, AND THEIR BASE COURSES. GRADE FOR PAVED DRIVES AND PAVED PARKING AREAS AS INDICATED AND SPECIFIED HEREIN, AND PROVIDE FOR SURFACE DRAINAGE AS SHOWN, ALLOWING FOR THICKNESS OF SURFACING MATERIAL.
2. **FINISH GRADING:** AT COMPLETION OF JOB AND AFTER BACKFILLING BY OTHER CRAFTS HAS BEEN COMPLETED, RE-FILL AND COMPACT AREAS WHICH HAVE SETTLED OR ERODED TO BRING TO FINAL GRADES.
3. **GRADING TOLERANCES:**  
ROUGH GRADE AT PAVED OR LANDSCAPED AREAS: ±0.1 FT.  
FINISH GRADE PRIOR TO PLACING FINAL SURFACING: ±0.03 FT.
4. **EXCAVATION:** EXCAVATE FOR SLABS, PAVING, AND OTHER IMPROVEMENTS TO SIZES AND LEVELS SHOWN OR REQUIRED. ALLOW FOR FORM CLEARANCE AND FOR PROPER COMPACTION OF REQUIRED BACKFILLING MATERIAL. EXCAVATOR(S) MUST COMPLY WITH O.R.S. 757.541 THROUGH 757.571; EXCAVATOR(S) SHALL NOTIFY ALL UTILITY COMPANIES FOR LINE LOCATIONS 72 HOURS (MINIMUM) PRIOR TO START OF WORK. DAMAGE TO UTILITIES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
5. **EFFECTIVE EROSION PREVENTION AND SEDIMENT CONTROL IS REQUIRED.** EROSION CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED MEETING CWS REQUIREMENTS. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE EROSION CONTROL.
6. **EFFECTIVE DRAINAGE CONTROL IS REQUIRED.** DRAINAGE SHALL BE CONTROLLED WITHIN THE WORK SITE AND SHALL BE SO ROUTED THAT ADJACENT PRIVATE PROPERTY, PUBLIC PROPERTY, AND THE RECEIVING SYSTEM ARE NOT ADVERSELY IMPACTED. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE DRAINAGE CONTROL.
7. **SITE TOPSOIL SHALL BE STOCKPILED DURING CONSTRUCTION AND USED FOR LANDSCAPING.**
8. **THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS BASED ON A SURVEY BY NORTHWEST SURVEYING, AND IS SHOWN FOR REFERENCE ONLY. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS WITH HIS OWN RESOURCES PRIOR TO START OF ANY CONSTRUCTION.**
9. **CONTRACTOR TO COORDINATE GRADES AT ENTRANCE WITH ARCHITECTURAL PLANS PRIOR TO CONSTRUCTION.**
10. **5% MAX SLOPE (EXCLUDING RAMPS) AT PEDESTRIAN SIDEWALK CONNECTIONS BETWEEN PUBLIC R.O.W. AND BUILDING ENTRANCES.**
11. **WHERE SLOPES ARE STEEPER THAN 3:1, CONTRACTOR SHALL INSTALL JUTE MATTING. SLOPE SHALL BE PREPARED TO ENSURE COMPLETE AND DIRECT CONTACT OF MATTING WITH SOIL. FOLLOW MANUFACTURER'S RECOMMENDATIONS.**
12. **ALL SPOT ELEVATIONS SHOWN ARE PAVEMENT GRADE UNLESS NOTED OTHERWISE ON PLANS.**
13. **GRADE ALL AREAS TO ENSURE POSITIVE DRAINAGE. NOTIFY ENGINEER IF ANY CONFLICTS.**
14. **PROTECT OVERHEAD WALKWAY DURING ALL CONSTRUCTION ACTIVITIES.**

REVISIONS:

NO.	DATE	REVISIONS	REVISION DELTA	CLOSING DATE

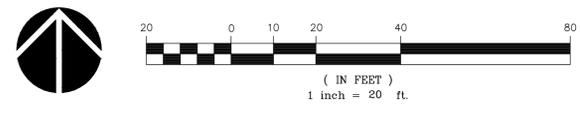
SHEET TITLE:  
**GRADING PLAN**

DRAWN BY: NKL  
CHECKED BY: BDN  
SHEET:

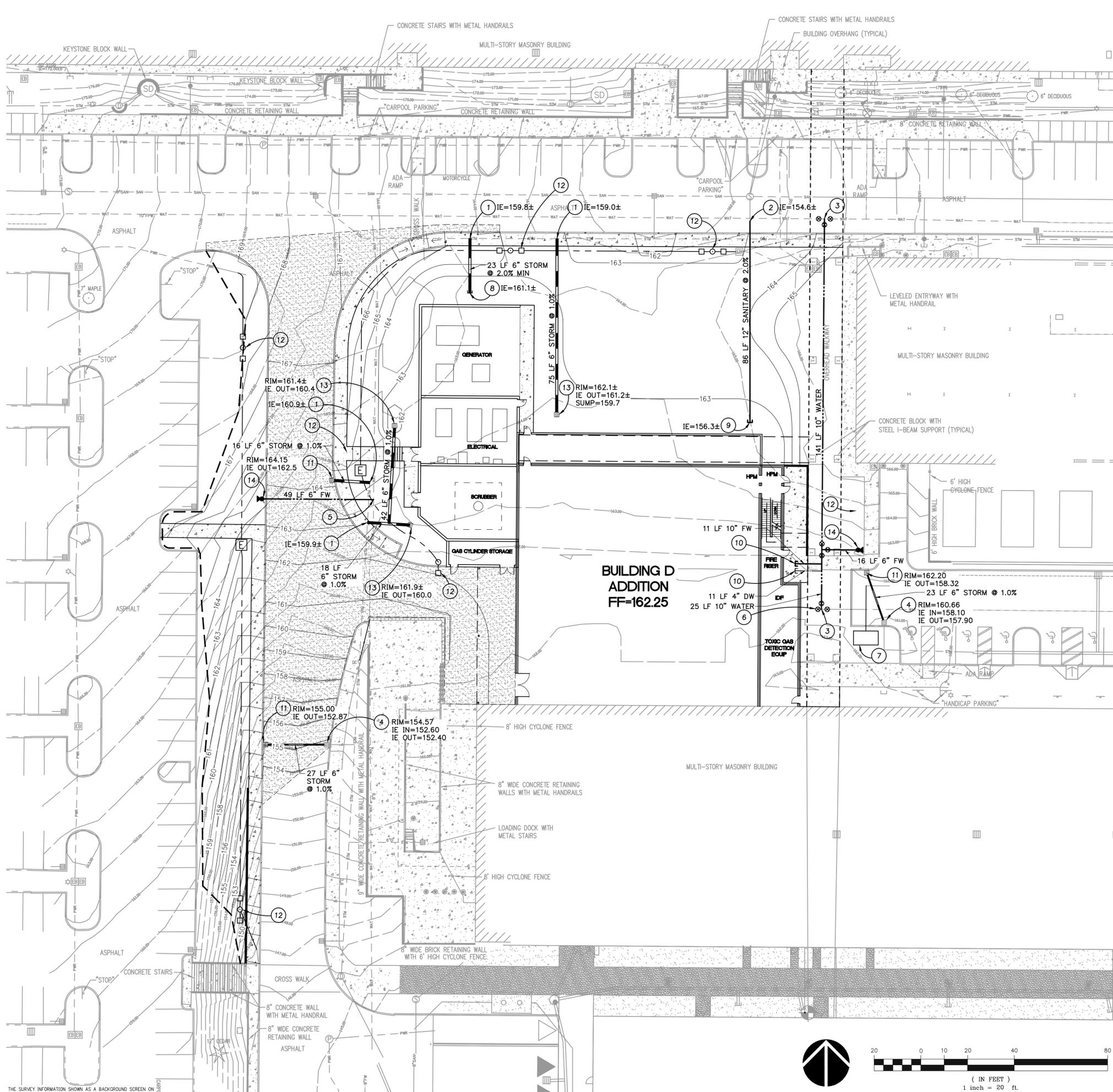
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JOB NO. **2150163.00**

**DESIGN REVIEW - 12/18/15**



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY NORTHWEST SURVEYING, INC. DATE: 07.08.2015



**LEGEND**

- STORM LINE
- FIRE WATER LINE
- SWALE
- CATCH BASIN
- THRUST BLOCK
- FIRE HYDRANT ASSEMBLY
- WATER VALVE
- LIGHT POLE

**UTILITY NOTES**

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF CITY OF TUALATIN, CLEAN WATER SERVICES, AND THE CURRENT EDITION OF THE UNIFORM PLUMBING CODE AND THE INTERNATIONAL BUILDING CODE. ALL WORK WITHIN THE PUBLIC R.O.W. REQUIRES A PUBLIC WORKS PERMIT.
2. THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THEY DO NOT SHOW EVERY DIMENSION, COMPONENT PIECE, SECTION, JOINT OR FITTING REQUIRED TO COMPLETE THE PROJECT. ALL LOCATIONS FOR WORK SHALL BE CHECKED AND COORDINATED WITH EXISTING CONDITIONS IN THE FIELD BEFORE BEGINNING CONSTRUCTION. EXISTING UNDERGROUND UTILITIES LAYING WITHIN THE LIMITS OF EXCAVATION SHALL BE VERIFIED AS TO CONDITION, SIZE AND LOCATION BY UNCOVERING, PROVIDING SUCH IS PERMITTED BY LOCAL PUBLIC AUTHORITIES WITH JURISDICTION, BEFORE BEGINNING CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IF THERE ARE ANY DISCREPANCIES.
3. PROVIDE CLEANOUTS AS REQUIRED IN THE CURRENT UNIFORM PLUMBING CODE CHAPTER 7 SECTIONS 707 AND 719, AND CHAPTER 11, SECTION 1101.12. NOTE: NOT ALL REQUIRED CLEANOUTS ARE SHOWN ON THE PLANS.
4. ALL STORM PIPING IS SIZED FOR A MANNING'S "N" VALUE = 0.013. ALL STORM PIPING IS DESIGNED USING CONCENTRIC PIPE TO PIPE AND WYE FITTINGS, UNLESS OTHERWISE NOTED.
5. SEE MECHANICAL DRAWINGS FOR UTILITIES LOCATED WITHIN THE BUILDING AND TO 5' OUTSIDE THE BUILDING.
6. ALL DOWNSPOUT LEADERS TO BE 6" AT 2.0% MIN. UNLESS NOTED OTHERWISE.
7. VERIFY LOCATION, SIZE AND DEPTH OF EXISTING UTILITIES BY POT-HOLING PRIOR TO CONSTRUCTION. NOTIFY ENGINEER OF DISCREPANCIES.
8. THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS BASED ON A SURVEY PREPARED BY NORTHWEST SURVEYING, DATED JULY 21, 2015.
9. CONTRACTOR TO PROVIDE POWER TO IRRIGATION CONTROLLER. SEE SPECIFICATIONS AND LANDSCAPE PLANS.
10. SEE BUILDING PLUMBING DRAWINGS FOR PIPING WITHIN THE BUILDING AND UP TO 5' OUTSIDE THE BUILDING, INCLUDING ANY FOUNDATION DRAINAGE PIPING.
11. CONTRACTOR TO MAINTAIN MINIMUM 3 FT OF COVER OVER ALL WATER LINE.
12. PROTECT OVERHEAD WALKWAY DURING ALL CONSTRUCTION ACTIVITIES.

**KEYNOTES:**

1. CONNECT PROPOSED STORM LATERAL TO EXISTING STORM LINE. CONTRACTOR TO VERIFY LOCATION AND DEPTH PRIOR TO CONSTRUCTION.
2. CONNECT PROPOSED SANITARY SEWER SERVICE TO EXISTING 12" SANITARY SEWER STUB. CONTRACTOR TO VERIFY INVERTS PRIOR TO CONSTRUCTION.
3. CONNECT PROPOSED FIRE WATER TO EXISTING WATER LINE
4. CONNECT PROPOSED STORM WATER LATERAL TO EXISTING STORM WATER CATCH BASIN. CONTRACTOR TO VERIFY EXISTING INVERTS.
5. CONNECT PROPOSED FIRE HYDRANT TO EXISTING WATER LINE
6. CAP EXISTING WATER LINE AT VALVE
7. RELOCATE POWER VAULT, COORDINATE WITH MEP
8. CONNECT BUILDING DOWNSPOUT SYSTEM TO SITE STORM DRAIN SYSTEM.
9. CONNECT SEWER LATERAL TO BUILDING, SEE PLUMBING PLANS.
10. CONNECT FIRELINE & WATER SERVICE TO BUILDING COORDINATE SIZE & LOCATION WITH PLUMBING PLANS.
11. CONSTRUCT CATCH BASIN. CONTRACTOR TO VERIFY INVERTS PRIOR TO CONSTRUCTION.
12. INSTALL SALVAGED LIGHT POLE AND LUMINARIE, SEE IL1.0
13. CONSTRUCT AREA DRAIN
14. INSTALL FIRE HYDRANT

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 360.695.7879  
 Seattle, WA  
 206.749.9993  
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NO.	DATE	REVISIONS	REVISIONS	REVISION DELTA

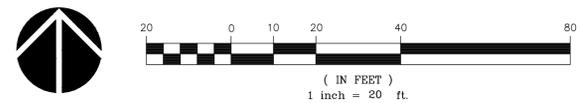
SHEET TITLE:  
**UTILITY PLAN**

DRAWN BY: NKL  
 CHECKED BY: BDN  
 SHEET:

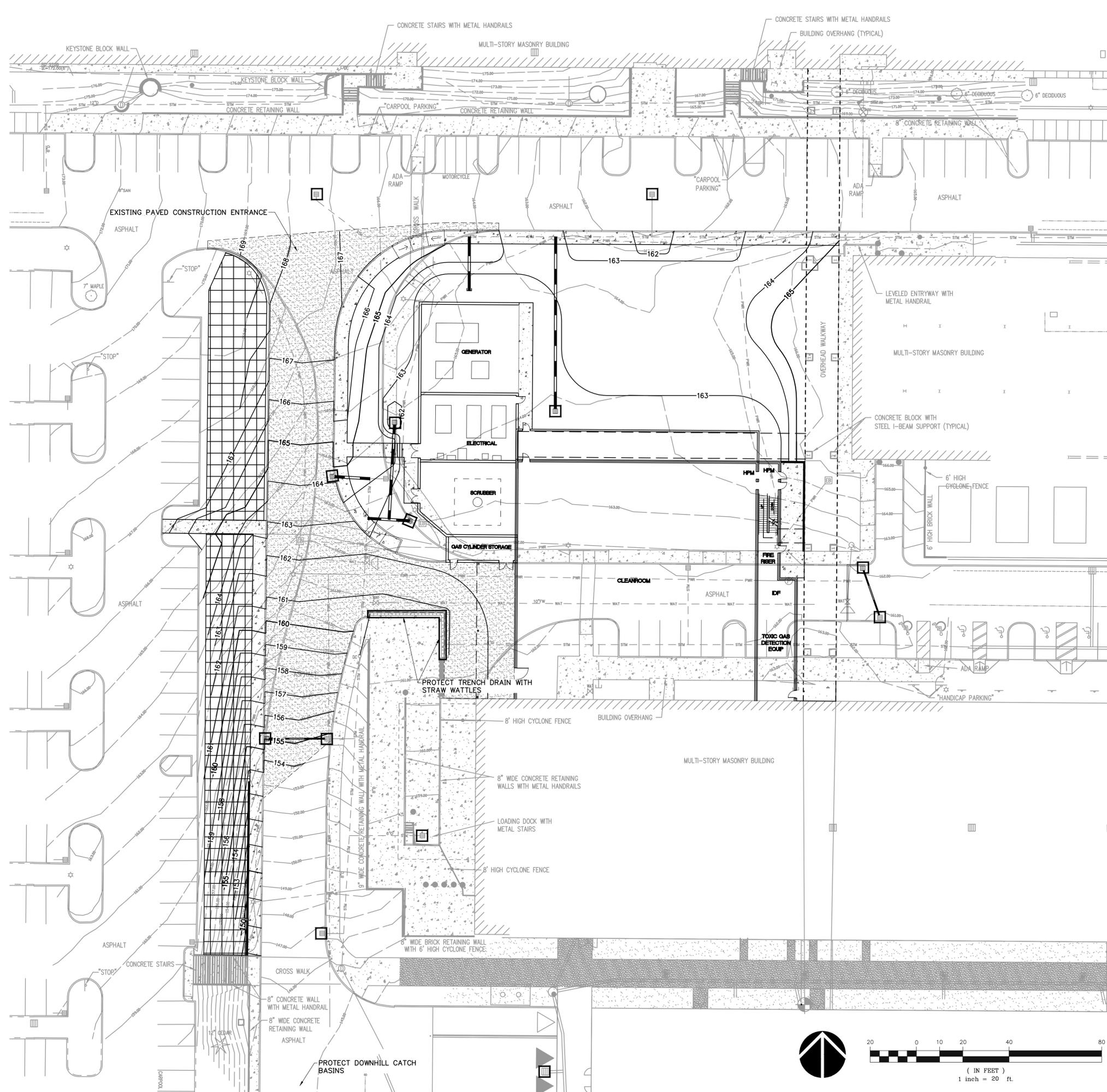
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JOB NO. **2150163.00**

DESIGN REVIEW - 12/18/15



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY: NORTHWEST SURVEYING, INC. DATE: 07.08.2015



**LEGEND**

-  -105- SURFACE ELEVATION CONTOUR
-  INLET PROTECTION
-  TEMPORARY SLOPE STABILIZATION UNTIL PERMANENT VEGETATION IS ESTABLISHED

**EROSION CONTROL GENERAL NOTES**

- TOTAL DISTURBANCE AREA: 52,985 SF (1.22 AC)
1. HOLD A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS.
  2. EROSION AND SEDIMENT CONTROL MEASURES INCLUDING PERIMETER SEDIMENT CONTROL MUST BE IN PLACE BEFORE VEGETATION IS DISTURBED AND MUST REMAIN IN PLACE AND BE MAINTAINED, REPAIRED, AND PROMPTLY IMPLEMENTED FOLLOWING PROCEDURES ESTABLISHED FOR THE DURATION OF CONSTRUCTION, INCLUDING PROTECTION FOR ACTIVE STORM DRAIN INLETS AND CATCH BASINS AND APPROPRIATE NON-STORMWATER POLLUTION CONTROLS.
  3. THIS DRAWING IS FOR GENERAL GUIDANCE ONLY. THE CONTRACTOR SHALL MEET ALL CITY OF TUALATIN AND CWS EROSION/SEDIMENT CONTROL REQUIREMENTS. ALL EROSION CONTROL MEASURES SHALL CONFORM TO THE CITY OF TUALATIN AND CWS REQUIREMENTS AND THE PLANS AND SPECIFICATIONS SPECIFIC TO THIS PROJECT.
  4. CONSTRUCT EROSION CONTROL IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS. STAGE CONSTRUCTION TO INCLUDE INSTALLATION OF PERIMETER SEDIMENT FENCING AS REQUIRED.
  5. METHOD OF INSTALLATION FOR SEDIMENT FENCE SHALL NOT CAUSE DAMAGE TO VEGETATED SLOPE EXCEPT AT POINT OF INSTALLATION. SIDECAST MATERIAL SHALL BE KEPT TO A MINIMUM AND SHALL BE TO THE UPHILL SIDE OF THE SEDIMENT FENCE. THE FENCE SHALL BE INSTALLED AT LEAST 4 FEET FROM ADJACENT TREES. ANY EXPOSED GROUND SHALL BE SEEDED AND COVERED WITH STRAW MULCH TO PREVENT EROSION. TEMPORARY GROUND COVER SHALL BE MAINTAINED UNTIL A HEALTHY STAND OF GRASS HAS BEEN ESTABLISHED. SEEDING SHALL BE WITH NATURAL SPECIES FOR THE AREA. SEE THE SPECIAL SPECIFICATIONS FOR PROPER SEED MIX.
  6. ALL EROSION CONTROL DEVICES SHALL BE EXAMINED AND REPAIRED AFTER EACH STORM OCCURRENCE, AND INLETS SHALL BE CLEANED OF SEDIMENT WHENEVER NECESSARY.
  7. HYDROSEED AND MULCH ALL DISTURBED AREAS UPON COMPLETION OF CONSTRUCTION OR AS DIRECTED BY THE INSPECTOR.
  8. THE CONTRACTOR SHALL LIMIT CONSTRUCTION TRAFFIC TO PAVED AREAS TO PREVENT AND MINIMIZE SEDIMENT TRACKING OFF-SITE. CONTRACTOR SHALL SWEEP OR VACUUM PAVED AREAS IF SEDIMENT ACCUMULATION OCCURS. DO NOT TRACK SEDIMENT TO THE PUBLIC STREET.
  9. INSTALL TEMPORARY EROSION PREVENTION SUCH AS JUTE NETTING OR GEOTEXTILE ON DISTURBED AREAS STEEPER THAN 4H:1V.

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NO.	REVISIONS	REVISION DATE	DELTA	CLOSING DATE

SHEET TITLE:  
**EROSION CONTROL  
PLAN**

DRAWN BY: NKL  
CHECKED BY: BDN  
SHEET:

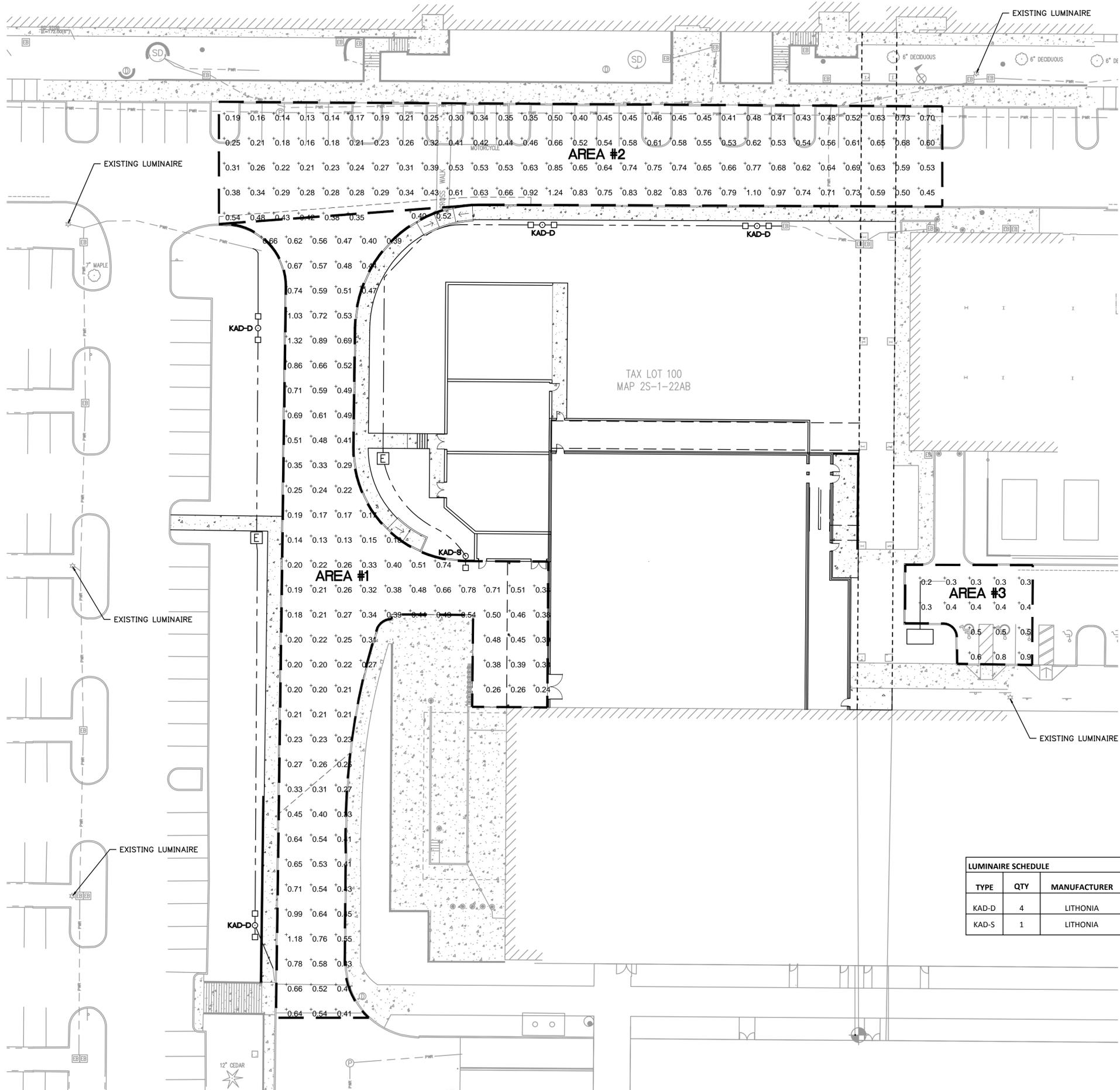
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JOB NO. **2150163.00**

DESIGN REVIEW - 12/18/15

### LIGHTING NOTES:

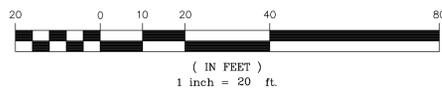
1. THIS SHEET IS PROVIDED AS A GENERAL GUIDELINE FOR FINAL DESIGN OF THE LIGHTING SYSTEM. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE A FINAL LIGHTING DESIGN AND PLAN CONFORMING TO THE PHOTOMETRICS AND SPECIFICATIONS, INCLUDED ON THIS SHEET, FOR THE ENGINEER'S APPROVAL PRIOR TO CONSTRUCTION.
2. THE FINAL DESIGN PLAN SHALL INCLUDE ALL LIGHTING DETAILS INCLUDING LUMINAIRES, POLES, BASES, CONDUIT AND WIRING, AND POWER SOURCE.
3. PHOTOMETRICS IN FOOT-CANDLES
4. TO CONVERT FROM FOOT-CANDLES TO LUMENS PER SQUARE METER:  
1 FOOT-CANDLE (FC) = 10.76 LUMEN/SQUARE METER (LM/M<sup>2</sup>)
5. LUMINAIRES ARE POLES MUST HAVE DECORATIVE FINISH (NO UNPAINTED METAL). MATCH EXISTING CAMPUS STANDARD LIGHTS.
6. FIXTURES MUST BE SHIELDED TO PREVENT LIGHT TRESPASS
7. LIGHTING CONDUIT, CONDUCTOR, AND VAULTS SHOWN FOR REFERENCE ONLY. ELECTRICAL DESIGN TO BE COMPLETED BY MEP.
8. ALL PROPOSED LUMINAIRES ARE A MINIMUM OF 200' FROM PROPERTY LINES.



DESCRIPTION	AVG.	MAX.	MIN.	MAX./MIN.	AVG./MIN.
City of Tualatin Standard (not to exceed)	0.5	-	0.13	20.0:1	4.0:1
Area #1	0.4 fc	1.3 fc	0.13 fc	10.2:1	3.4:1
Area #2	0.5 fc	1.2 fc	0.13 fc	9.5:1	3.8:1
Area #3*	0.4 fc	0.9 fc	0.20 fc	4.5:1	2.0:1

\*PHOTOMETRICS BASED ON EXISTING LUMINAIRE ONLY. EXISTING LUMINAIRE TYPE UNKNOWN, ACTUAL LIGHTING LEVELS MAY VARY

TYPE	QTY	MANUFACTURER	CATALOG#	CONFIGURATION	DISTRIBUTION	WATTS	LUMENS	HEIGHT
KAD-D	4	LITHONIA	KAD_LED_20C_530_30K_R4_MVOLT	DOUBLE	R4 (Type IV)	76	3,605	25'-0" AFG
KAD-S	1	LITHONIA	KAD_LED_20C_530_30K_R4_MVOLT	SINGLE	R4 (Type IV)	76	3,605	25'-0" AFG



## KAD LED LED Area Luminaire

**Specifications**

EPA: 1.2 ft<sup>2</sup> (0.11 m<sup>2</sup>)

Length: 17-1/2" (44.5 cm)

Width: 17-1/2" (44.5 cm)

Height: 7-1/8" (18.1 cm)

Weight (max): 36 lbs. (16.4 kg)

Catalog Number: \_\_\_\_\_

Notes: \_\_\_\_\_

Use the TAB key or mouse over the page to see all interactive elements.

**Introduction**

The Contour® Series luminaires offer traditional square dayforms with softened edges for a versatile look that complements many applications. The KAD LED combines the latest in LED technology with the familiar aesthetic of the Contour® Series for stylish, high-performance illumination that lasts. It is ideal for replacing 100-400W metal halide in area lighting applications with typical energy savings of 70% and expected service life of over 100,000 hours.

Ordering Information

**EXAMPLE: KAD LED 40C 1000 40K R5 MVOLT PUMBAK04 DDBXD**

Series	LEDs	Drive current	CCT	Distribution	Voltage	Mounting	Shipped separately
KAD LED	30C 30 LEDs	700 700mA	40K 4000K	R2 type I	MVOLT 277 <sup>1</sup>	SPUMBAK	04 4" arm DAD12P Degree arm (gold)
	40C 40 LEDs	1000 1000mA	50K 5000K	R4 type II	208 <sup>1</sup>	RPUMBAK	06 6" arm DAD12WB Degree arm (wall)
	60C 60 LEDs			R5 type V	240 <sup>1</sup>		

**Options**

**Shipped installed**

PER5 NEMA twist-lock five-wire receptacle only (no combos)<sup>1</sup> PRTVFCV Motion/ambient sensor, 0-15' mounting height, ambient sensor enabled at 16"<sup>1</sup>

PER7 Seven-wire receptacle only (no combos)<sup>1</sup> PRTVFCV Motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 16"<sup>1</sup>

SF Single face (120, 277, 347V)<sup>1</sup> PRTVFCV Motion/ambient sensor, 0-15' mounting height, ambient sensor enabled at 16"<sup>1</sup>

DF Double face (208, 240, 480V)<sup>1</sup> HS Housecode shield<sup>10</sup>

PBR Motion/ambient sensor, 0-15' mounting height, ambient sensor enabled at 16"<sup>1</sup> BL30 Bi-level switched dimming, 30%<sup>11</sup>

PBRH Motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 16"<sup>1</sup> BL50 Bi-level switched dimming, 50%<sup>11</sup>

**Stock configurations are offered for shorter lead times:**

Standard Part Number	Stock Part Number	Accessories
KAD LED 30C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 30C 40K R5	DL1127 1.5 ft <sup>2</sup> Retrofit - SL twist-lock (120-277V) <sup>11</sup>
KAD LED 30C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 30C 40K R5	DL1247 1.5 ft <sup>2</sup> Retrofit - SL twist-lock (147V) <sup>11</sup>
KAD LED 30C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 30C 40K R5	DL180F 1.5 ft <sup>2</sup> Retrofit - SL twist-lock (180V) <sup>11</sup>
KAD LED 40C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 40C 40K R5	DL180F 1.5 ft <sup>2</sup> Retrofit - SL twist-lock (180V) <sup>11</sup>
KAD LED 40C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 40C 40K R5	DL180F 1.5 ft <sup>2</sup> Retrofit - SL twist-lock (180V) <sup>11</sup>
KAD LED 40C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 40C 40K R5	DL180F 1.5 ft <sup>2</sup> Retrofit - SL twist-lock (180V) <sup>11</sup>
KAD LED 30C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 30C 40K R5 PBRH	KADLDRS 30C U Housecode shield for 30 LED unit
KAD LED 40C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 40C 40K R5 PBRH	KADLDRS 40C U Housecode shield for 40 LED unit
KAD LED 30C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 30C 40K R5 PBRH	KADLDRS 30C U Housecode shield for 30 LED unit
KAD LED 40C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 40C 40K R5 PBRH	KADLDRS 40C U Housecode shield for 40 LED unit
KAD LED 30C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 30C 40K R5 PBRH	KADLDRS 30C U Housecode shield for 30 LED unit
KAD LED 40C 1000 40K R5 MVOLT PUMBAK09 DDBXD	KADL 40C 40K R5 PBRH	KADLDRS 40C U Housecode shield for 40 LED unit

**NOTES**

- MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Single face (SF) requires 120, 277 or 347 voltage option. Double face (DF) requires 208, 240 or 480 voltage option.
- Maximum ambient temperature with 347V or 480V is 30°C.
- 9" or 12" arm is required when two or more luminaires are oriented on a 90° drilling pattern.
- Available as a separate combination accessory: PUMBAK (Finish U).
- Mounting must be reworked to 3/4" from horizontal arm per ANSI C136.10-2010.
- PBR and PBRH require the SensorSwitch (SS) or COPI control. PBRH and PBRH require the SensorSwitch (SS) or COPI control; see Motion Sensor Guide for details. Dimming driver standard.
- Requires an additional switched circuit with sense phase in main luminaire power. Supply circuit and control circuit are required to be in the same phase.
- Dimming driver standard. MVOLT only. Not available with 347V, 480V, PBR, PBRH or BL50.
- Also available as a separate accessory; see Accessories information.
- Requires luminaire to be specified with PBR option. Ordered and shipped as a separate line item from Acuity Brands Controls.

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**Drilling** Template #5

**Tenon Mounting Slipfitter\*\***

Series	Single Unit	2 at 90°	3 at 120°	4 at 90°
2-38"	T20-190	T20-280	T20-320	T20-390
2-78"	T25-190	T25-280	T25-320	T25-390
4"	T35-190	T35-280	T35-320	T35-390

\*\* For round pole mounting (R500) only. † Requires 9" or 12" arm.

**Performance Data**

**Lumen Output**

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

LED	PWA Config (PWA)	System Type	EHL Type	100' (30.5m) (100')				150' (45.7m) (150')				200' (61.0m) (200')			
				100'	150'	200'	250'	100'	150'	200'	250'	100'	150'	200'	250'
20C (10 LEDs)	150 mA	35W	R2	3415	1 0 1 1	95	1496	1 0 1 1	101	1460	1 0 1 1	101	1460	1 0 1 1	101
			R3	3400	1 0 1 1	95	1480	1 0 1 1	101	1444	1 0 1 1	101	1444	1 0 1 1	101
			R4	3405	1 0 1 1	95	1485	1 0 1 1	101	1449	1 0 1 1	101	1449	1 0 1 1	101
			R5	3426	2 0 1 1	101	1470	3 0 1 1	107	1464	3 0 1 1	107	1464	3 0 1 1	107
			R2	4317	1 0 1 1	95	1407	1 0 1 1	101	1404	1 0 1 1	101	1404	1 0 1 1	101
			R3	4319	1 0 1 1	95	1407	1 0 1 1	101	1404	1 0 1 1	101	1404	1 0 1 1	101
	700 mA	46W	R4	4324	1 0 1 1	94	1403	1 0 1 1	100	1400	1 0 1 1	100	1400	1 0 1 1	100
			R5	4402	3 0 1 1	100	1398	3 0 1 1	106	1376	3 0 1 1	106	1376	3 0 1 1	106
			R2	4393	1 0 1 1	96	1408	2 0 1 1	97	1402	2 0 1 1	97	1402	2 0 1 1	97
			R3	4377	1 0 1 1	96	1401	1 0 1 1	91	1395	1 0 1 1	91	1395	1 0 1 1	91
			R4	4385	1 0 1 1	96	1401	1 0 1 1	91	1400	1 0 1 1	91	1400	1 0 1 1	91
			R5	4394	3 0 1 1	91	1400	3 0 1 1	97	1398	3 0 1 1	97	1398	3 0 1 1	97
1000 mA	73W	R2	5328	1 0 1 1	99	1569	1 0 1 1	105	1569	1 0 1 1	105	1569	1 0 1 1	105	
		R3	5307	1 0 1 1	96	1545	1 0 1 1	102	1566	1 0 1 1	102	1566	1 0 1 1	102	
		R4	5313	1 0 1 1	98	1562	1 0 1 1	105	1572	1 0 1 1	105	1572	1 0 1 1	105	
		R5	5429	3 0 1 1	104	1599	3 0 1 1	111	1600	3 0 1 1	111	1600	3 0 1 1	111	
		R2	6454	2 0 1 1	95	1300	2 0 1 1	101	1336	2 0 1 1	101	1336	2 0 1 1	101	
		R3	6447	1 0 1 1	95	1271	1 0 1 1	101	1287	1 0 1 1	101	1287	1 0 1 1	101	
30C (30 LEDs)	103W	R4	6455	1 0 1 1	95	1280	1 0 1 1	101	1305	1 0 1 1	101	1305	1 0 1 1	101	
		R5	7460	3 0 1 1	101	1244	3 0 1 1	107	1241	3 0 1 1	107	1241	3 0 1 1	107	
		R2	8481	2 0 1 1	84	948	2 0 1 1	89	942	2 0 1 1	89	942	2 0 1 1	89	
		R3	8444	2 0 1 1	83	940	2 0 1 1	89	943	2 0 1 1	89	943	2 0 1 1	89	
		R4	8455	2 0 1 1	84	940	2 0 1 1	89	943	2 0 1 1	89	943	2 0 1 1	89	
		R5	8398	3 0 1 1	81	938	4 0 1 1	84	1004	4 0 1 1	87	957	4 0 1 1	87	
40C (40 LEDs)	141W	R2	7484	2 0 1 1	102	1463	2 0 1 1	108	1510	2 0 1 1	108	1510	2 0 1 1	108	
		R3	7485	2 0 1 1	102	1463	2 0 1 1	108	1479	2 0 1 1	108	1479	2 0 1 1	108	
		R4	7494	1 0 1 1	102	1462	1 0 1 1	108	1468	1 0 1 1	108	1468	1 0 1 1	108	
		R5	7444	3 0 1 1	108	1479	3 0 1 1	115	1467	3 0 1 1	115	1467	3 0 1 1	115	
		R2	8217	2 0 1 1	96	1295	2 0 1 1	102	1329	2 0 1 1	102	1329	2 0 1 1	102	
		R3	8201	2 0 1 1	96	1257	2 0 1 1	102	1290	2 0 1 1	102	1290	2 0 1 1	102	
60C (60 LEDs)	189W	R2	9246	3 0 1 1	102	1626	4 0 1 1	108	1671	4 0 1 1	108	1671	4 0 1 1	108	
		R3	11489	2 0 1 1	82	1223	2 0 1 1	87	1222	2 0 1 1	87	1222	2 0 1 1	87	
		R4	11500	2 0 1 1	82	1237	2 0 1 1	87	1226	2 0 1 1	87	1226	2 0 1 1	87	
		R5	12208	4 0 1 1	87	1248	4 0 1 1	91	1309	4 0 1 1	91	1309	4 0 1 1	91	
		R2	13334	2 0 1 1	102	1699	2 0 1 1	109	1703	2 0 1 1	109	1703	2 0 1 1	109	
		R3	13291	2 0 1 1	102	1648	2 0 1 1	108	1698	2 0 1 1	108	1698	2 0 1 1	108	
80C (80 LEDs)	216W	R4	13304	2 0 1 1	102	1691	2 0 1 1	109	1701	2 0 1 1	109	1701	2 0 1 1	109	
		R5	13195	4 0 1 1	108	1743	4 0 1 1	115	1745	4 0 1 1	115	1745	4 0 1 1	115	
		R2	12471	2 0 1 1	96	13492	3 0 1 1	102	13742	3 0 1 1	102	13742	3 0 1 1	102	
		R3	12418	2 0 1 1	96	13436	2 0 1 1	102	13436	2 0 1 1	102	13436	2 0 1 1	102	
		R4	12453	2 0 1 1	96	13453	2 0 1 1	102	13452	2 0 1 1	102	13452	2 0 1 1	102	
		R5	12420	4 0 1 1	102	14248	4 0 1 1	108	14241	4 0 1 1	108	14241	4 0 1 1	108	
1000 mA	216W	R2	16336	3 0 1 1	76	17279	3 0 1 1	80	17440	3 0 1 1	80	17440	3 0 1 1	80	
		R3	16208	3 0 1 1	75	17207	3 0 1 1	80	17368	3 0 1 1	80	17368	3 0 1 1	80	
		R4	16208	3 0 1 1	75	17207	3 0 1 1	80	17368	3 0 1 1	80	17368	3 0 1 1	80	
		R5	17286	4 0 1 1	80	18390	4 0 1 1	85	18455	4 0 1 1	85	18455	4 0 1 1	85	

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**Performance Data**

**Lumen Ambient Temperature (LAT) Multipliers**

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Temperature	Multiplier
0°C	1.00
10°C	1.01
20°C	1.00
25°C	0.99
30°C	1.00
40°C	0.99

**Projected LED Lumen Maintenance**

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Operating Hours	8000 LUMENS (1000)	10000 LUMENS (1000)	15000 LUMENS (1000)

REVISIONS:

NO.	REVISIONS	REVISION DATE
1	ISSUE FOR PERMITS	
2	ISSUE FOR PERMITS	
3	ISSUE FOR PERMITS	
4	ISSUE FOR PERMITS	
5	ISSUE FOR PERMITS	

SHEET TITLE:  
**SITE PLAN**

**L2.1**

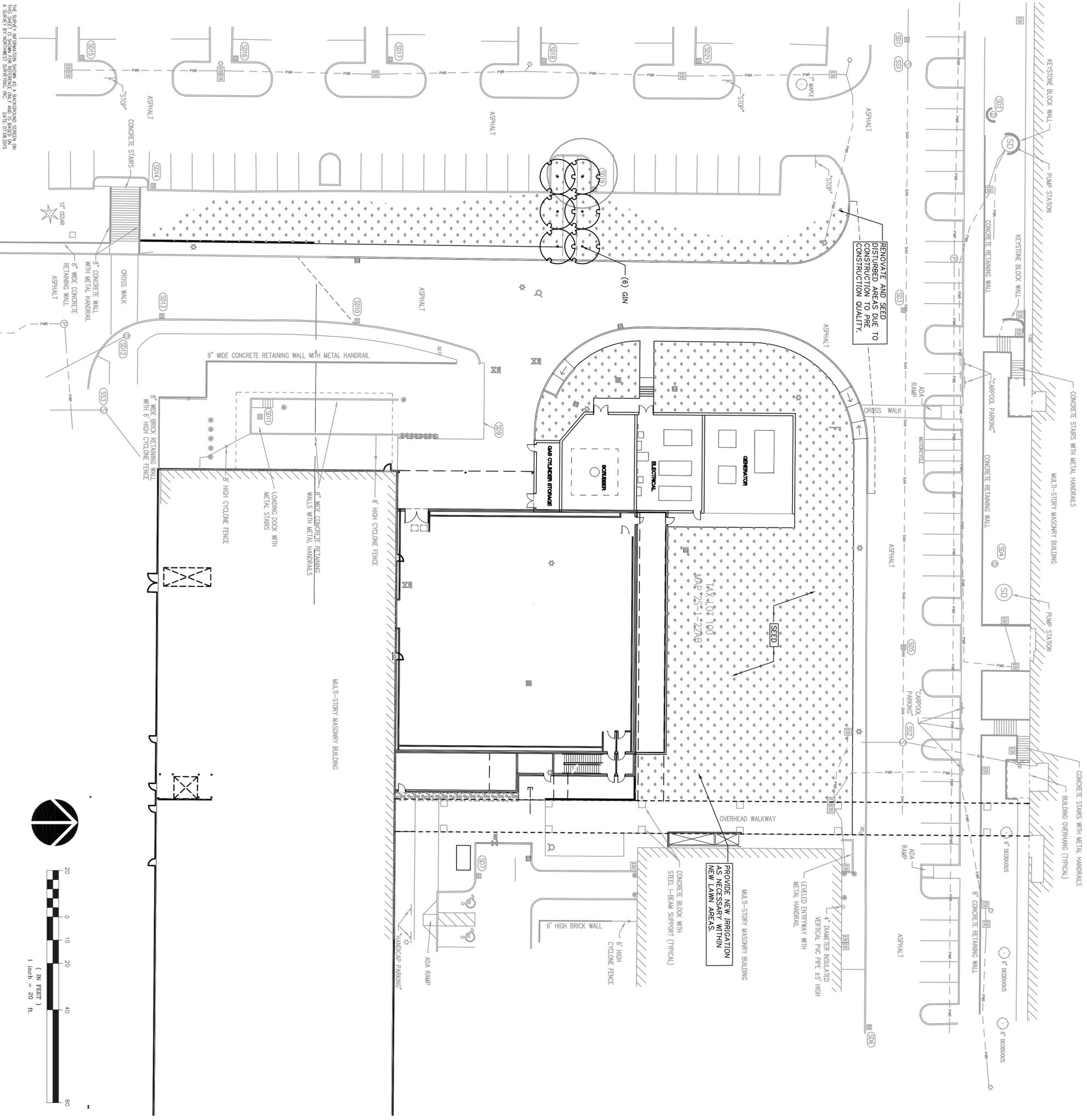
DRAWN BY: KMD  
 CHECKED BY: RAH  
 SHEET:

JOB NO. **215016300**

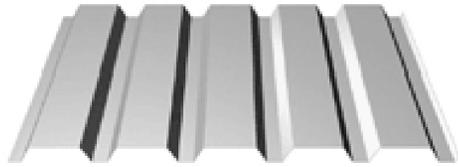
PLANT SCHEDULE		
TREES/GR. COVER	ABBREVIATION	BOTANICAL NAME / COMMON NAME
	1-1 1/2\"/>	ROUND RIVER HOOK, 4\"/>
	LL	LAWN SEED
	GIN	GINKGO BILoba PRINCETON SENTRY/ PRINCETON SENTRY GINKGO
	2\"/>	2\"/>

**NOTES**

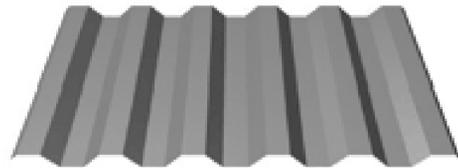
- GENERAL NOTES:**
- CONTRACTOR SHALL CONFIRM ALL EXISTING CONDITIONS PRIOR TO COMMENCING WORK AND NOTIFY THE OWNER OR OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES OR CONFLICTS.
  - CONTRACTOR SHALL VERIFY EXISTING TREES IN THE FIELD PRIOR TO COMMENCEMENT OF WORK. ELEVATIONS OF ALL UNDERGROUND UTILITIES AND NOTIFY LANDSCAPE ARCHITECT IF THERE ARE ANY DISCREPANCIES WITH PLANTING ROOT ZONES. TO LOCATE SITE UTILITIES PRIOR TO PROPOSED EXCAVATION CALL 1-800-332-2344.
  - CONTRACTOR SHALL COORDINATE WITH THE OWNER ANY DISRUPTION TO VEHICULAR CIRCULATION PRIOR TO COMMENCEMENT OF ANY WORK.
  - CONTRACTOR SHALL KEEP PEDESTRIAN TRAVEL WAYS AND ACCESS TO ALL STRUCTURES PROTECTED AT ALL TIMES.
  - CONTRACTOR SHALL REPLACE OR REPAIR DAMAGE TO EXISTING CONCRETE CURB, ASPHALT PAVING, OR OTHER STRUCTURES TO PRE CONSTRUCTION CONDITIONS.
  - ALL LANDSCAPE AREAS SHALL BE INSTALLED AND MAINTAINED AS A MINIMUM TO STANDARDS ACCORDING TO CITY REVISED CODE.
- UNDERGROUND UTILITY NOTES:**
- VERIFY AND LOCATE ALL UNDERGROUND PRING AND UTILITIES PRIOR TO CONSTRUCTION.
  - DURING THE CONSTRUCTION PROCESS, THE OWNER'S AGENTS SHALL PROVIDE ABOVE AND BELOW GROUND PROTECTION FOR EXISTING TREES AND PLANT MATERIALS TO REMAIN.
- PLANTING NOTES:**
- ALL EXISTING TREES, PLANTS, AND ROOTS IDENTIFIED TO REMAIN SHALL BE PROTECTED FROM DAMAGE DURING ANY CONSTRUCTION PREPARATION, REMOVAL OR INSTALLATION ACTIVITIES WITHIN AND ADJACENT TO PROJECT LIMITS.
  - IF DISTURBANCE IS NECESSARY AROUND EXISTING TREES, WITHIN THE TREE DRIPZONE THE CROWN AND ALL WORK OF HAND TOOLS AND MANUAL EQUIPMENT ONLY.
  - REPLACE, REPAIR AND RESTORE DISTURBED LANDSCAPE AREAS DUE TO GRADING, TRENCHING OR OTHER REASONS TO PRE CONSTRUCTION CONDITION AND PROVIDE MATERIAL APPROVED BY THE OWNER OR OWNER'S REPRESENTATIVE.
  - EXISTING AREAS PROPOSED FOR NEW PLANT MATERIAL SHALL BE CLEARED AND LEGALLY DISPOSED UNLESS NOTED OTHERWISE.
  - TOPSOIL SHALL BE AMENDED IN DISTURBED AREAS BY TILLING IN 2\"/>



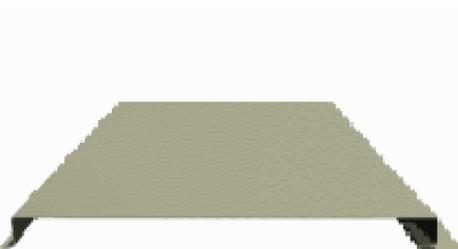
THIS SHEET IS PART OF THE SET OF ARCHITECTURAL DRAWINGS FOR THE PROJECT. IT IS NOT TO BE USED OR REPRODUCED IN ANY MANNER WITHOUT PRIOR WRITTEN PERMISSION FROM MACKENZIE.



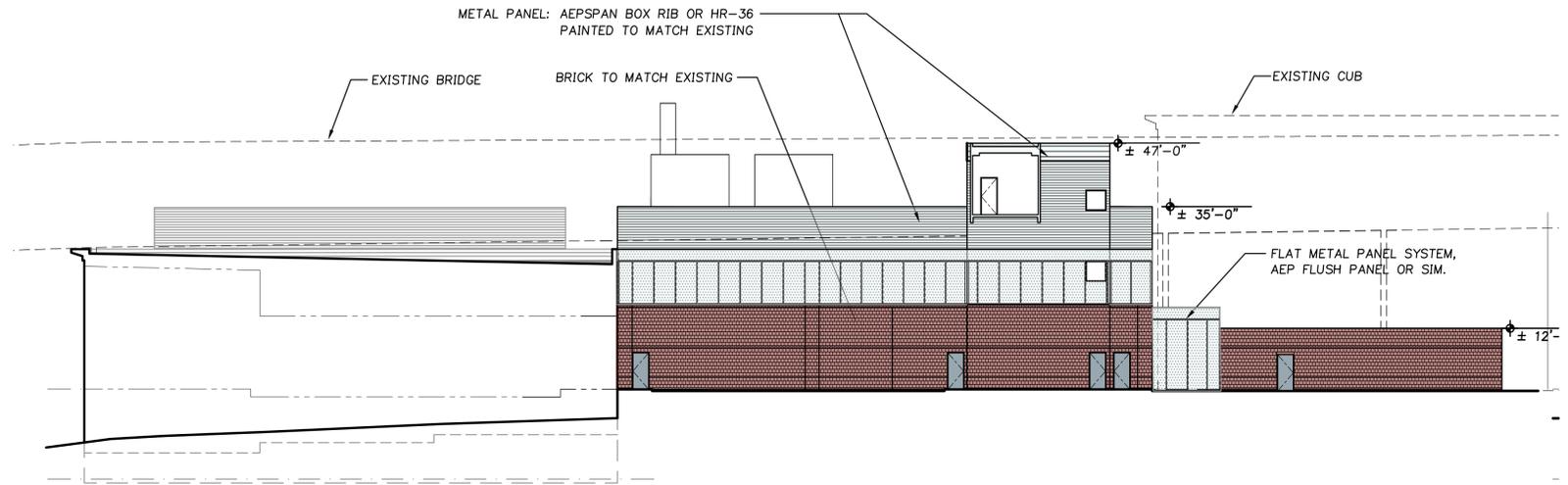
**AEPSPAN BOX RIB**



**AEPSPAN HR-36**

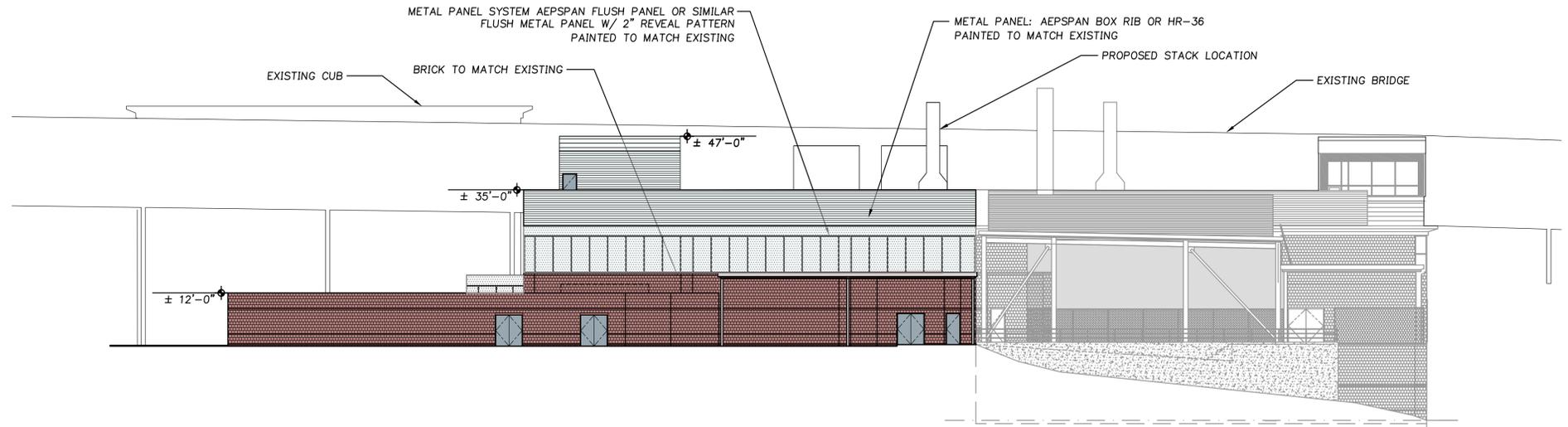


**AEPSPAN PRESTIGE PANEL**



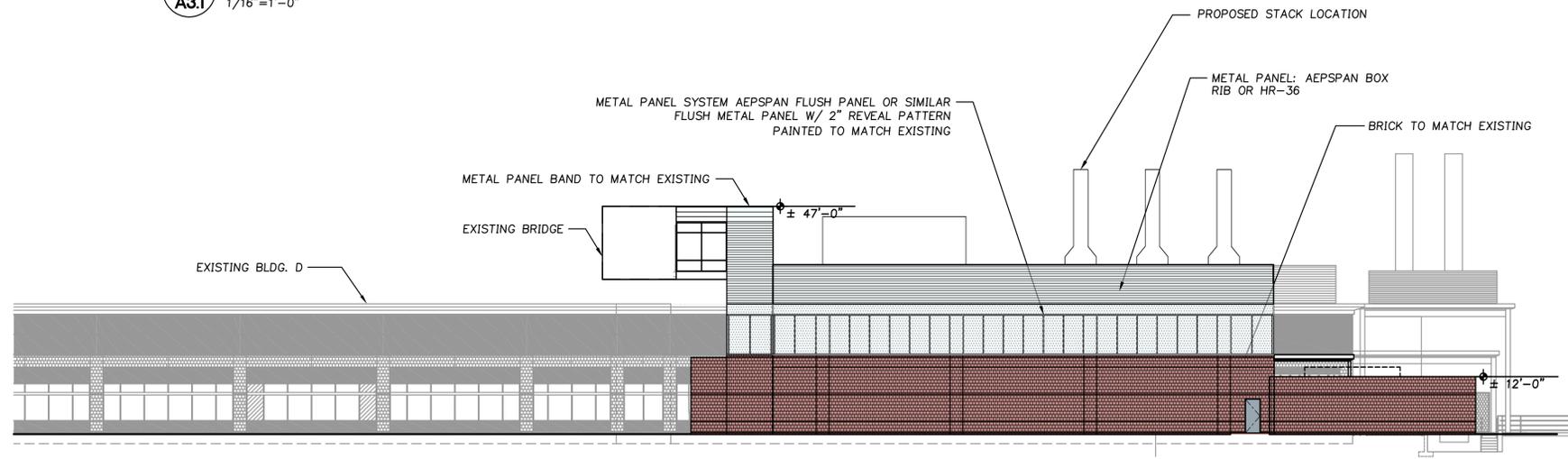
**1 EAST ELEVATION**

A3.1 1/16"=1'-0"



**2 WEST ELEVATION**

A3.1 1/16"=1'-0"



**3 NORTH ELEVATION**

A3.1 1/16"=1'-0"



10295 SW Ridder Road, Wilsonville, OR 97070  
O: 503.570.0626 F: 503.982.9307 republicservices.com

December 16, 2015

Nicole Lammeier, PE (CA), LEED AP  
Project Engineer  
Mackenzie Design  
RiverEast Center  
1515 SE Water Ave, Suite 100  
Portland OR 97214

Re: Lam Campus Building Addition  
Waste & Recycling Enclosure

Dear Nicole;

Thank you, for reaching out to us regarding the additional building being built for LAM, located at: 11155 SW Leveton Drive, Tualatin, OR.

My Company: Republic Services of Clackamas & Washington Counties has the franchise agreement to service this area with the City of Tualatin. We currently provide complete commercial waste removal and recycling services as needed on a weekly basis for this location.

Since we currently have no issues providing service at this location, and this addition will not be affecting the current enclosures, and as you stated that the people within this addition will be utilizing the current enclosures, Republic Services will not be affected by this new building.

Thank you Nicole for your help and concerns for our services prior to this project being developed!

Sincerely,

A handwritten signature in blue ink that reads "Frank J. Lonergan".

Frank J. Lonergan  
Operations Manager  
Republic Services Inc.

# MACKENZIE.

DESIGN DRIVEN | CLIENT FOCUSED

September 28, 2015

City of Tualatin  
Attention: Tony Doran  
18880 SW Martinazzi Avenue  
Tualatin, OR 97062

Re: **Lam Research R&D Building D Addition**  
*Trip Generation Letter*  
Project Number 2150163.00

Dear Mr. Doran:

Mackenzie has prepared this letter to present the anticipated trip generation of the proposed expansion of Building D on the Lam Research campus at 11357 SW Leveton Drive in Tualatin, Oregon, for purposes of determining the need for a Traffic Impact Analysis (TIA) report. For the reasons presented below, we do not believe a TIA would be needed.

## PROPOSED EXPANSION

The proposed building is to expand by 26,000 square feet and will support 30 employees. The expansion is proposed to be a two-story cleanroom with a sublevel containing the HVAC and associated machinery supporting the cleanroom. The Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 9th Edition*, was used to estimate the trip generation associated with the proposed development. Per the *Trip Generation Manual*, a 26,000 square foot Manufacturing (LUC 140) facility is estimated to generate 19 AM peak hour trips, 19 PM peak hour trips, and 99 average daily trips (ADT).

No other site changes are proposed with the building expansion.

## HISTORY

A transportation impact analysis (TIA) was prepared in 2001 by Mackenzie, which addressed a Master Plan with a total of 448,000 square feet of manufacturing and research and development uses. Although trips for the Master Plan were never recognized as "vested" by the City, it should be acknowledged that the proposed expansion is a very small percentage of the master plan development.

The TIA concluded that no intersections would be significantly impacted as a result of the master plan project trips, with the exception of the SW Herman Road/SW 108th Avenue intersection, which was anticipated to operate at LOS F with the project. The intersection has since been signalized as was recommended in the TIA; with signalization, the TIA anticipated operation at a level of service B.



P 503.224.9560 ■ F 503.228.1285 ■ W [MCKNZE.COM](http://MCKNZE.COM) ■ RiverEast Center, 1515 SE Water Avenue, #100, Portland, OR 97214  
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Portland, Oregon ■ Vancouver, Washington ■ Seattle, Washington

## TIA REQUIREMENT

The City of Tualatin does not have any specific trip thresholds for requiring a TIA, but does generally require one address all intersections within a ¼ mile of the site. The intersections within this distance include the following:

- Leveton Drive/SW 118th Avenue
- Leveton Drive/SW 108th Avenue
- Tualatin Road/SW 108th Avenue
- Tualatin Road/SW Teton Avenue
- Herman Road/SW 108th Avenue
- Herman Road/SW Teton Avenue

The two intersections on Herman Road at SW 108th Avenue and Teton Avenue have both been signalized since the 2001 TIA was prepared. All other intersections were anticipated to operate at acceptable levels in the TIA.

With the low number of peak hour trips anticipated with the expansion of Building D, impacts on these intersections will be minimal, and not trigger any offsite mitigation. Therefore, it is not anticipated a full TIA would be needed for the expansion.

If you have any questions regarding this trip generation letter and our recommendation to not require a TIA, please do not hesitate to contact me.

Sincerely,



Brent Ahrend, PE  
Senior Associate | Traffic Engineer

Enclosure(s): Plans

c: Janet Jones, Peter Alto, Lee Leighton – Mackenzie





Architecture • Interiors  
Planning • Engineering

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Seattle, WA  
206.749.9893

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Client



Project  
**DLA TUALATIN  
BUILDING D  
ADDITION**

**1857 SW LEVETON DR  
TUALATIN, OR 97062**

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REVISIONS:

NO. 1 REVISIONS  
DATE 11/11/15  
BY PPA  
CLOSING DATE

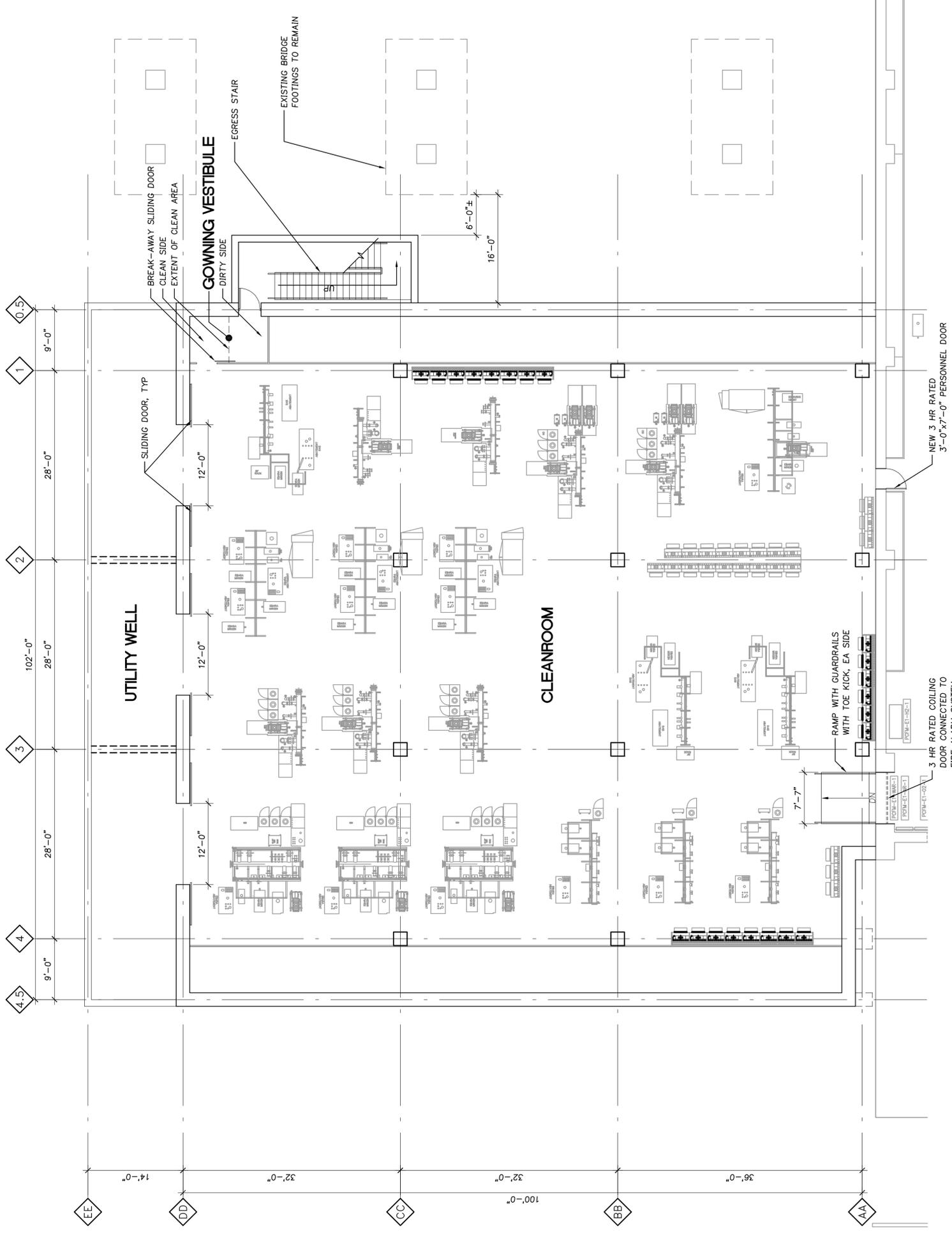
SHEET TITLE:  
**SUBFAB LEVEL  
ENLARGED PLAN**

DRAWN BY: ELJ  
CHECKED BY: PPA  
SHEET:

**A2.3**

JOB NO. **2150163.00**

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**1 SUBFAB LEVEL - ENLARGED PLAN**





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Project  
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BUILDING D  
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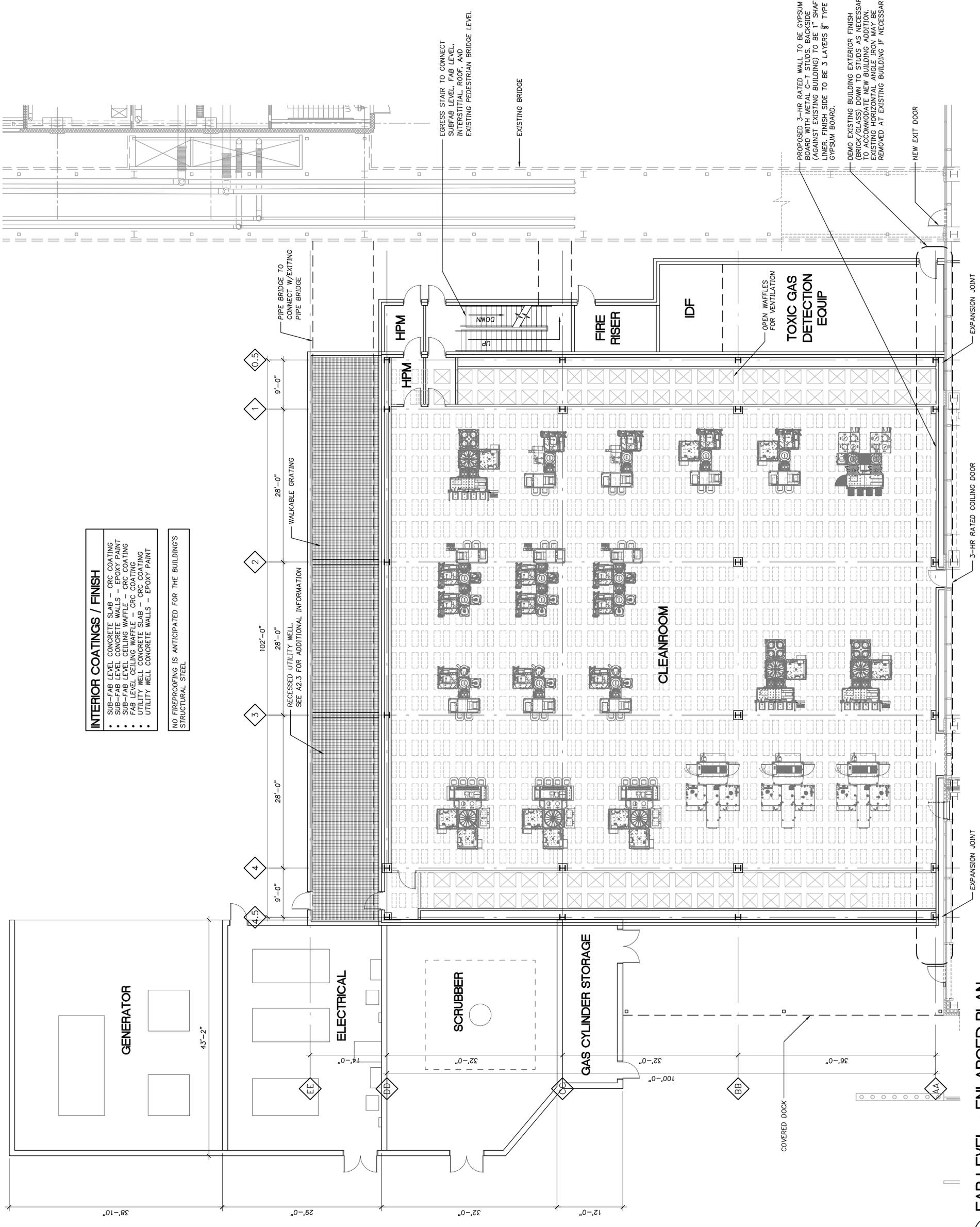
SHEET TITLE  
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2:00PM - 4:00PM (MACKENZIE) 10:30 - 12:00 (Lam) 08/19/15 11:55 1:00



- INTERIOR COATINGS / FINISH**
- SUB-FAB LEVEL CONCRETE SLAB - CRC COATING
  - SUB-FAB LEVEL CONCRETE WALLS - EPOXY PAINT
  - SUB-FAB LEVEL CEILING WAFFLE - CRC COATING
  - FAB LEVEL CEILING WAFFLE - CRC COATING
  - UTILITY WELL CONCRETE SLAB - CRC COATING
  - UTILITY WELL CONCRETE WALLS - EPOXY PAINT

NO FIREPROOFING IS ANTICIPATED FOR THE BUILDING'S STRUCTURAL STEEL

**1 FAB LEVEL - ENLARGED PLAN**



32

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## **STORMWATER REPORT**

**To**  
City of Tualatin

**For**  
Lam Research  
11357 SW Leveton Drive  
Tualatin, OR 97062

**Submitted**  
December 21, 2015

**Project Number**  
2150163.00



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## TABLE OF CONTENTS

I.	PROJECT INTRODUCTION .....	1
II.	STORMWATER QUALITY TREATMENT.....	2
III.	STORMWATER QUANTITY CONTROL .....	3
IV.	STORMWATER CONVEYANCE.....	4
V.	CONCLUSIONS .....	5

## ATTACHMENTS

1. Figure 1: C2.1 Site Plan
2. Figure 2: C2.2 Grading Plan
3. Figure 3: C2.3 Utility Plan
4. Appendix A: 2001-03-06 Revised Novellus Storm Calculations

## I. PROJECT INTRODUCTION

Lam Research is proposing to expand an existing building located within their campus at 11357 SW Leveton Drive in Tualatin, Oregon. The new building will be located on an approximately 1.3-acre undeveloped portion of their campus to the south of Building F, to the north of and attached to Building D, and to the west of the CUB. These existing buildings were constructed between 2000 and 2002. The vicinity map below shows the location and layout of the site relative to nearby geographic features.



The site development will also include realigning a current drive aisle and a new concrete sidewalk. Stormwater drainage and treatment will be provided in accordance with Clean Water Services (CWS) through an existing water quality and detention pond located to the south of the site. The following is in addition to the Stormwater Report and Storm Calculations approved for the main campus development in 2001.

## II. STORMWATER QUALITY TREATMENT

Water quality was designed using the still relevant CWS requirements as described in the Novellus Storm Calculations (first 0.36" of rainfall in a four hour period). Stormwater Quality Treatment will be provided through an existing water quality and detention pond, designated as 'Pond B' in the Novellus Storm Calculations, located directly south of Building C. Pond B has been sized to treat 11.66 acres of impervious area, including asphalt paving, concrete paving, and building roof areas within the drainage basin. The existing drainage basin has 8.02 acres of impervious area and the proposed site development will have a net increase of 0.37 acres of impervious area. The total impervious area draining to Pond B after the Building D expansion will be 8.39 acres, leaving 3.27 acres of the 11.66 acre drainage basin for future development. The following table summarizes the existing and proposed site coverage.

	2015 Existing Impervious (acres)	Proposed Impervious (acres)
Design Impervious	11.66	11.66
Constructed Impervious	8.02	8.39 (0.37 net gain)
Unutilized Capacity	3.65	3.27

Based on our review of the 2000 Novellus Storm Calculations, the existing treatment systems at Lam Research (formally Novellus) meet current Clean Water Services standards for water quality treatment for the expansion of Building D.

### **III. STORMWATER QUANTITY CONTROL**

The original Novellus site was designed to detain and release the developed site runoff to match peak pre-development runoff from the fully built out drainage basin. Stored rainfall volume will be stored above the expected water quality volume level in the basin. Runoff release from the pond will be controlled by an orifice control structure just downstream of the pond. Since Pond B was designed for an impervious area coverage greater than the proposed basin including the Building D Expansion, the pond has capacity to handle the runoff from the expansion.

Detailed runoff and pond detention calculations for Pond B are presented in the attached 2001 Storm Calculations.

#### **IV. STORMWATER CONVEYANCE**

The proposed Building D Expansion drainage system will collect runoff from the building roof and concrete sidewalk areas through catch basins and downspout scuppers. A network of storm pipes will convey runoff to the existing pond and then to the public storm line in SW Leveton Drive. The public line drains east from the site.

Per the Novellus Storm Calculations, all pipes have been designed to convey the 25-year storm using SCS methodology in accordance with CWS design standards. The runoff increase from the proposed Building D Expansion development is not expected to exceed the capacity of the existing onsite piping, so no conveyance changes are proposed. The piping design is presented in the attached 2001 Storm Calculations document.

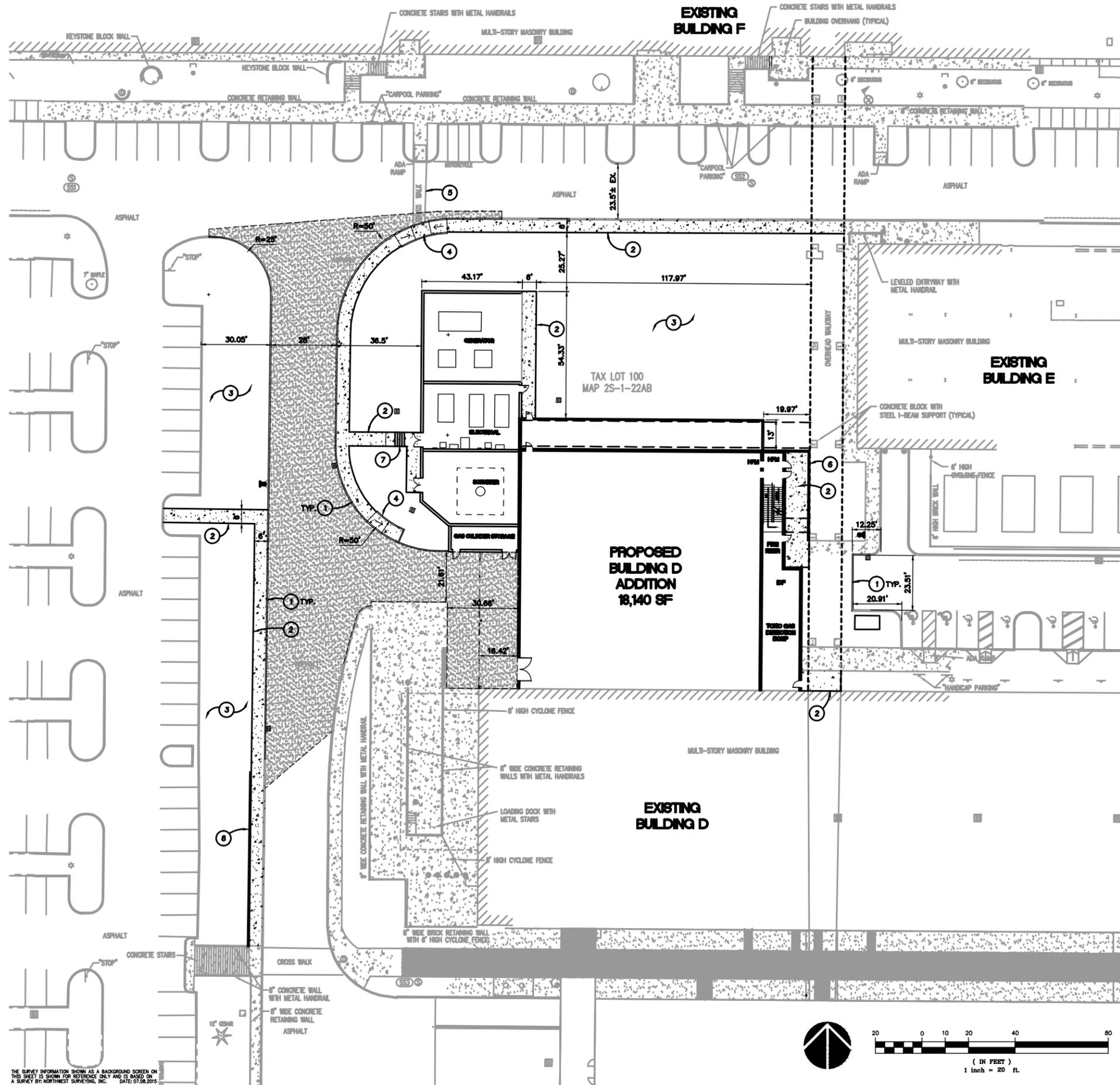
## **V. CONCLUSIONS**

The proposed expansion of Building D on the Lam Research campus includes an 18,140 SF fabrication building with associated paved access aisles and sidewalk areas. The existing stormwater management system has been designed to accommodate full build out of the drainage basin.

Runoff from the proposed impervious surfaces will be routed to an existing water quality treatment pond, which has been designed according the Clean Water Services standards for water quality treatment and flow control. Treated and detained runoff from the pond will be discharged to the storm drain in SW Leveton Drive.

FIGURE 1

**C2.1 SITE PLAN**



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY NORTHWEST SURVEYING, INC. DATE: 07.08.2015

**LEGEND**

- AC PAVING
- CONCRETE SIDEWALK
- VERTICAL CURB
- SAWCUT
- PROPOSED LIGHTPOLE
- EXISTING LIGHTPOLE
- RETAINING WALL

**GENERAL NOTES**

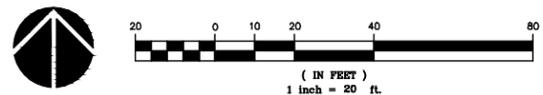
1. ALL WORK SHALL CONFORM TO THE STANDARD SPECIFICATIONS AND THE REQUIREMENTS OF THE CITY OF TUALATIN, CLEAN WATER SERVICES (CWS), AND THE CURRENT AMERICAN PUBLIC WORKS ASSOCIATION STANDARDS FOR PUBLIC WORKS CONSTRUCTION.
2. THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THEY DO NOT SHOW EVERY DIMENSION, COMPONENT PIECE, SECTION, JOINT OR FITTING REQUIRED TO COMPLETE THE PROJECT. ALL LOCATIONS FOR WORK SHALL BE CHECKED AND COORDINATED WITH EXISTING CONDITIONS IN THE FIELD BEFORE BEGINNING CONSTRUCTION. EXISTING UNDERGROUND UTILITIES LAYING WITHIN THE LIMITS OF EXCAVATION SHALL BE VERIFIED AS TO CONDITION, SIZE AND LOCATION BY UNCOVERING, PROVIDING SUCH IS PERMITTED BY LOCAL PUBLIC AUTHORITIES WITH JURISDICTION, BEFORE BEGINNING CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IF THERE ARE ANY DISCREPANCIES.
3. EFFECTIVE EROSION PREVENTION AND SEDIMENT CONTROL IS REQUIRED. EROSION CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED TO MEET CWS REQUIREMENTS. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE EROSION CONTROL.
4. EFFECTIVE DRAINAGE CONTROL IS REQUIRED. DRAINAGE SHALL BE CONTROLLED WITHIN THE WORK SITE AND SHALL BE ROUTED SO THAT ADJACENT PRIVATE PROPERTY, PUBLIC PROPERTY, AND THE RECEIVING SYSTEM ARE NOT ADVERSELY IMPACTED. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE DRAINAGE CONTROL.
5. CONTRACTOR SHALL ADJUST ALL STRUCTURES IMPACTED BY CONSTRUCTION IMPROVEMENTS TO NEW FINISH GRADES.
6. EXCAVATION: EXCAVATE FOR SLABS, PAVING, AND OTHER IMPROVEMENTS TO SIZES AND LEVELS SHOWN OR REQUIRED. ALLOW FOR FORM CLEARANCE AND FOR PROPER COMPACTION OF REQUIRED BACKFILLING MATERIAL. EXCAVATOR(S) MUST COMPLY WITH O.R.S. 757.541 THROUGH 757.571; EXCAVATOR(S) SHALL NOTIFY ALL UTILITY COMPANIES FOR LINE LOCATIONS SEVENTY-TWO (72) HOURS (MINIMUM) PRIOR TO START OF WORK. DAMAGE TO UTILITIES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. (ONE CALL LOCATE UTILITY NOTIFICATION CENTER - PORTLAND METRO AREA 246-6889, OREGON 896-4848, ALL OTHER AREAS 1-800-332-2344).
7. WHERE CONNECTING TO AN EXISTING PIPE, AND PRIOR TO ORDERING MATERIALS, THE CONTRACTOR SHALL EXPOSE THE END OF THE EXISTING PIPE VERIFY THE LOCATION, SIZE, AND ELEVATION. NOTIFY ENGINEER OF ANY DISCREPANCIES.
8. REQUEST BY THE CONTRACTOR FOR CHANGES TO THE PLANS MUST BE APPROVED BY THE ENGINEER.
9. PROTECT OVERHEAD WALKWAY DURING ALL CONSTRUCTION ACTIVITIES

**KEYNOTES:**

1. CONCRETE VERTICAL CURB
2. CONCRETE SIDEWALK
3. LANDSCAPE AREA, SEE LANDSCAPE PLANS
4. CURB RAMP
5. REPAIR EXISTING ACCESSIBLE CROSS WALK STRIPING
6. C.I.P. CONCRETE RETAINING WALL, MAX HEIGHT 2'
7. CONCRETE STAIRS WITH HANDRAIL

**SITE COVERAGE SUMMARY:**

PAVING AND SIDEWALK	17,245 SF
BUILDING	18,140 SF
LANDSCAPE	17,600 SF
TOTAL AFFECTED AREA	52,985 SF



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**SITE PLAN**

DRAWN BY: NKL  
CHECKED BY: BON  
SHEET:

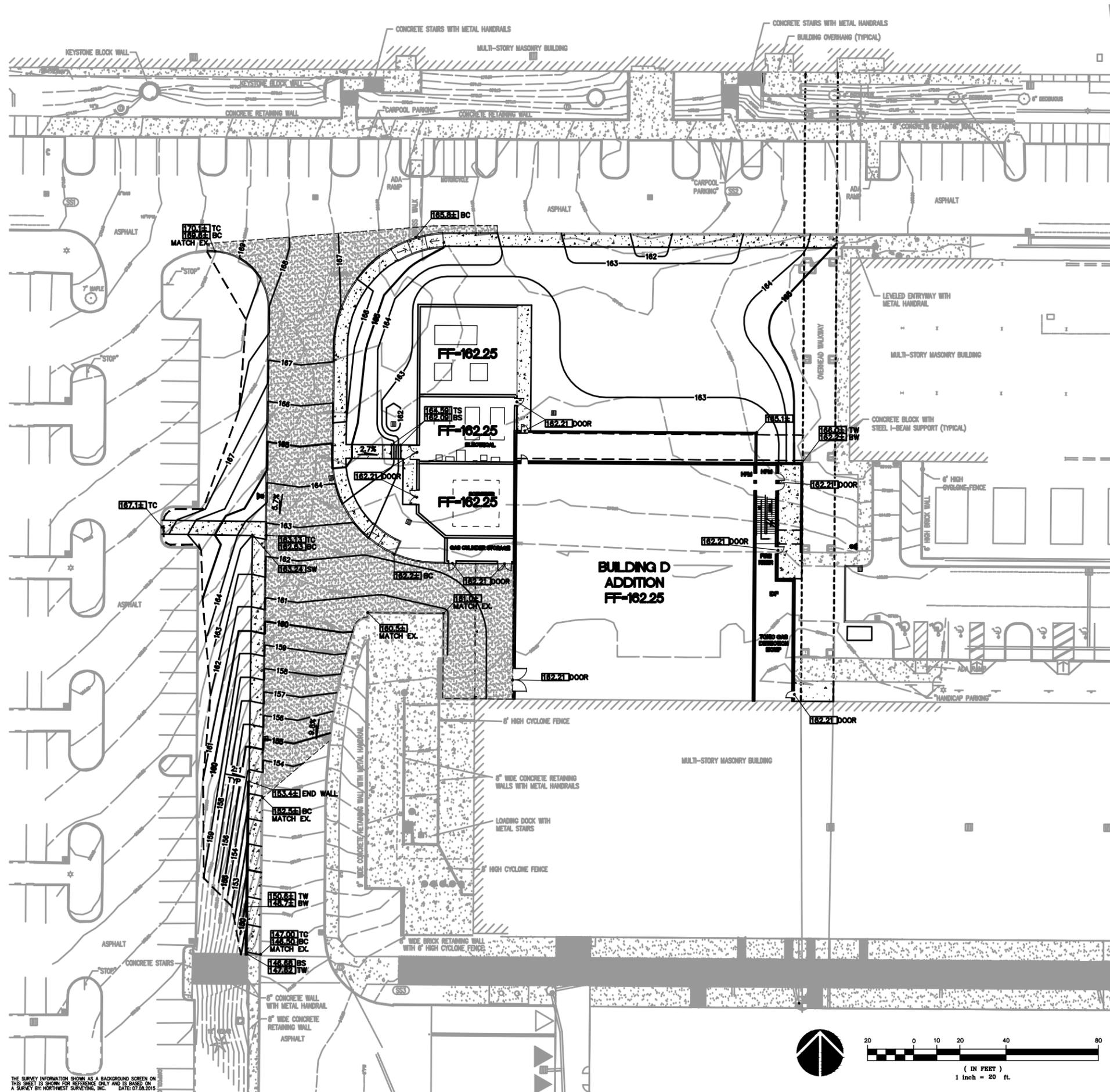
**C21**

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FIGURE 2

**C2.2 GRADING PLAN**



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY NORTHWEST SURVEYING, INC. DATE: 07.08.2015

**LEGEND**

- SURFACE ELEVATION SPOT GRADE
- SURFACE ELEVATION CONTOUR
- SWALE
- SAWCUT
- SLOPE ARROW

**GRADING NOTES**

1. ROUGH GRADING: BRING ALL FINISH GRADES TO APPROXIMATE LEVELS INDICATED. WHERE GRADES ARE NOT OTHERWISE INDICATED, FINISH GRADES ARE TO BE THE SAME AS ADJACENT SIDEWALKS, CURBS, OR THE OBVIOUS GRADE OF ADJACENT STRUCTURE. GRADE TO UNIFORM LEVELS OR SLOPES BETWEEN POINTS WHERE GRADES ARE GIVEN. ROUND OFF SURFACES. AVOID ABRUPT CHANGES IN LEVELS. ROUGH GRADE TO ALLOW FOR DEPTH OF CONCRETE SLABS, WALKS, AND THEIR BASE COURSES. GRADE FOR PAVED DRIVES AND PAVED PARKING AREAS AS INDICATED AND SPECIFIED HEREIN, AND PROVIDE FOR SURFACE DRAINAGE AS SHOWN, ALLOWING FOR THICKNESS OF SURFACING MATERIAL.
- FINISH GRADING: AT COMPLETION OF JOB AND AFTER BACKFILLING BY OTHER CRAFTS HAS BEEN COMPLETED, REFINISH AND COMPACT AREAS WHICH HAVE SETTLED OR ERODED TO BRING TO FINAL GRADES.
- GRADING TOLERANCES:  
ROUGH GRADE AT PAVED OR LANDSCAPED AREAS: ±0.1 FT.  
FINISH GRADE PRIOR TO PLACING FINAL SURFACING: ±0.03 FT.
2. EXCAVATION: EXCAVATE FOR SLABS, PAVING, AND OTHER IMPROVEMENTS TO SIZES AND LEVELS SHOWN OR REQUIRED. ALLOW FOR FORM CLEARANCE AND FOR PROPER COMPACTION OF REQUIRED BACKFILLING MATERIAL. EXCAVATOR(S) MUST COMPLY WITH O.R.S. 757.541 THROUGH 757.571; EXCAVATOR(S) SHALL NOTIFY ALL UTILITY COMPANIES FOR LINE LOCATIONS 72 HOURS (MINIMUM) PRIOR TO START OF WORK. DAMAGE TO UTILITIES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
3. EFFECTIVE EROSION PREVENTION AND SEDIMENT CONTROL IS REQUIRED. EROSION CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED MEETING CWS REQUIREMENTS. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE EROSION CONTROL.
4. EFFECTIVE DRAINAGE CONTROL IS REQUIRED. DRAINAGE SHALL BE CONTROLLED WITHIN THE WORK SITE AND SHALL BE SO ROUTED THAT ADJACENT PRIVATE PROPERTY, PUBLIC PROPERTY, AND THE RECEIVING SYSTEM ARE NOT ADVERSELY IMPACTED. THE GOVERNING JURISDICTION MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE DRAINAGE CONTROL.
5. SITE TOPSOIL SHALL BE STOCKPILED DURING CONSTRUCTION AND USED FOR LANDSCAPING.
6. THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS BASED ON A SURVEY BY NORTHWEST SURVEYING, AND IS SHOWN FOR REFERENCE ONLY. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS WITH HIS OWN RESOURCES PRIOR TO START OF ANY CONSTRUCTION.
7. CONTRACTOR TO COORDINATE GRADES AT ENTRANCE WITH ARCHITECTURAL PLANS PRIOR TO CONSTRUCTION.
8. 5% MAX SLOPE (EXCLUDING RAMPS) AT PEDESTRIAN SIDEWALK CONNECTIONS BETWEEN PUBLIC R.O.W. AND BUILDING ENTRANCES.
9. WHERE SLOPES ARE STEEPER THAN 3:1, CONTRACTOR SHALL INSTALL JUTE MATTING. SLOPE SHALL BE PREPARED TO ENSURE COMPLETE AND DIRECT CONTACT OF MATTING WITH SOIL. FOLLOW MANUFACTURER'S RECOMMENDATIONS.
10. ALL SPOT ELEVATIONS SHOWN ARE PAVEMENT GRADE UNLESS NOTED OTHERWISE ON PLANS.
11. GRADE ALL AREAS TO ENSURE POSITIVE DRAINAGE. NOTIFY ENGINEER IF ANY CONFLICTS.
12. PROTECT OVERHEAD WALKWAY DURING ALL CONSTRUCTION ACTIVITIES.



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**GRADING PLAN**

DRAWN BY: NKL

CHECKED BY: BON

SHEET:

**C2.2**

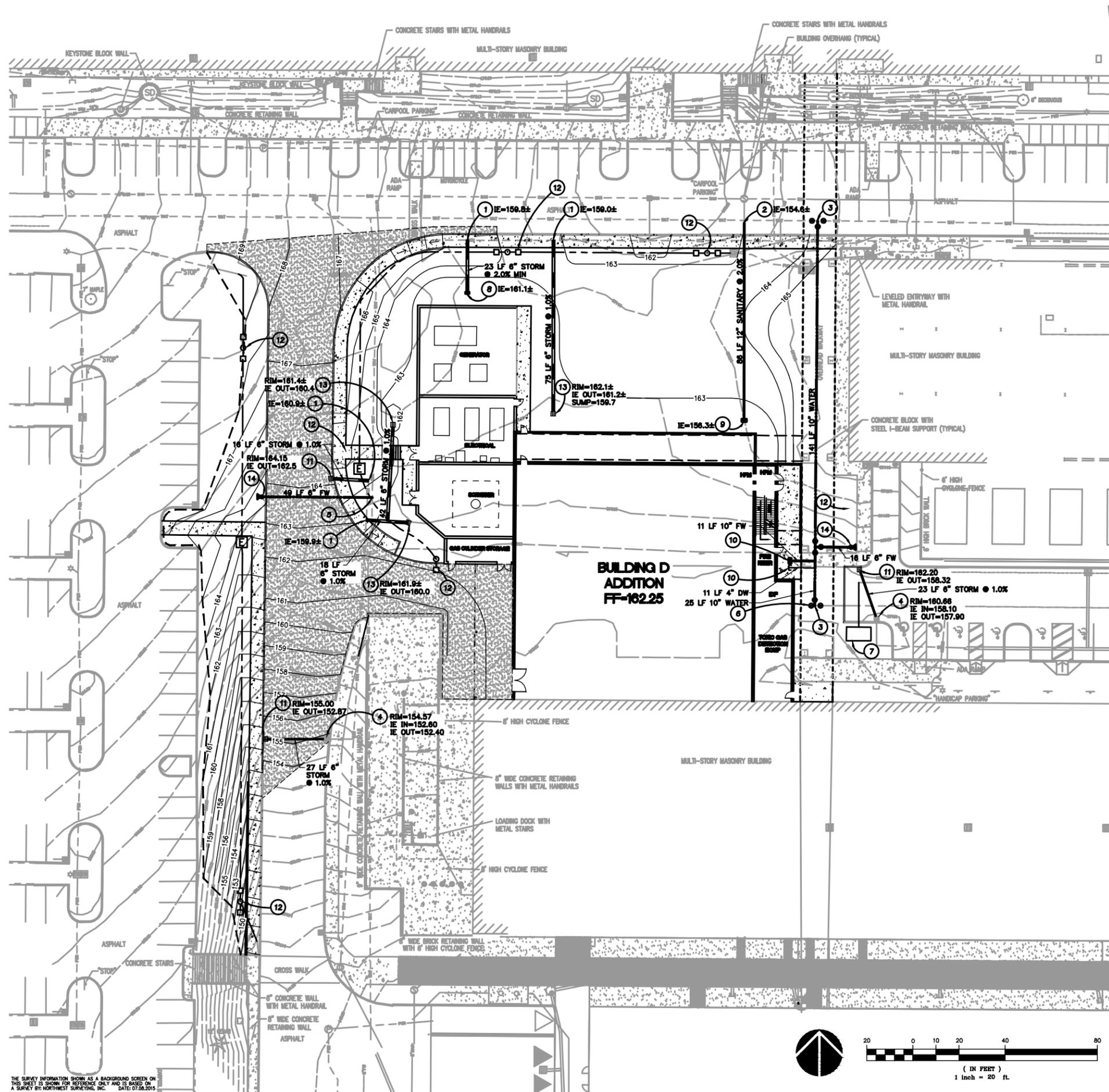
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FIGURE 3

**C2.3 UTILITY PLAN**



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY NORTHWEST SURVEYING, INC. DATE: 07.08.2015

**LEGEND**

- STORM LINE
- FIRE WATER LINE
- SWALE
- CATCH BASIN
- THRUST BLOCK
- FIRE HYDRANT ASSEMBLY
- WATER VALVE
- LIGHT POLE

**UTILITY NOTES**

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF CITY OF TUALATIN, CLEAN WATER SERVICES, AND THE CURRENT EDITION OF THE UNIFORM PLUMBING CODE AND THE INTERNATIONAL BUILDING CODE. ALL WORK WITHIN THE PUBLIC R.O.W. REQUIRES A PUBLIC WORKS PERMIT.
2. THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THEY DO NOT SHOW EVERY DIMENSION, COMPONENT, PIECE, SECTION, JOINT OR FITTING REQUIRED TO COMPLETE THE PROJECT. ALL LOCATIONS FOR WORK SHALL BE CHECKED AND COORDINATED WITH EXISTING CONDITIONS IN THE FIELD BEFORE BEGINNING CONSTRUCTION. EXISTING UNDERGROUND UTILITIES LAYING WITHIN THE LIMITS OF EXCAVATION SHALL BE VERIFIED AS TO CONDITION, SIZE AND LOCATION BY UNCOVERING, PROVIDING SUCH IS PERMITTED BY LOCAL PUBLIC AUTHORITIES WITH JURISDICTION, BEFORE BEGINNING CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IF THERE ARE ANY DISCREPANCIES.
3. PROVIDE CLEANOUTS AS REQUIRED IN THE CURRENT UNIFORM PLUMBING CODE CHAPTER 7, SECTIONS 707 AND 719, AND CHAPTER 11, SECTION 1101.12. NOTE: NOT ALL REQUIRED CLEANOUTS ARE SHOWN ON THE PLANS.
4. ALL STORM PIPING IS SIZED FOR A MANNING'S "N" VALUE = 0.013. ALL STORM PIPING IS DESIGNED USING CONCENTRIC PIPE TO PIPE AND WYE FITTINGS, UNLESS OTHERWISE NOTED.
5. SEE MECHANICAL DRAWINGS FOR UTILITIES LOCATED WITHIN THE BUILDING AND TO 5' OUTSIDE THE BUILDING.
6. ALL DOWNSPOUT LEADERS TO BE 6" AT 2.0% MIN. UNLESS NOTED OTHERWISE.
7. VERIFY LOCATION, SIZE AND DEPTH OF EXISTING UTILITIES BY POT-HOLING PRIOR TO CONSTRUCTION. NOTIFY ENGINEER OF DISCREPANCIES.
8. THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS BASED ON A SURVEY PREPARED BY NORTHWEST SURVEYING, DATED JULY 21, 2015.
9. CONTRACTOR TO PROVIDE POWER TO IRRIGATION CONTROLLER. SEE SPECIFICATIONS AND LANDSCAPE PLANS.
10. SEE BUILDING PLUMBING DRAWINGS FOR PIPING WITHIN THE BUILDING AND UP TO 5' OUTSIDE THE BUILDING, INCLUDING ANY FOUNDATION DRAINAGE PIPING.
11. CONTRACTOR TO MAINTAIN MINIMUM 3 FT OF COVER OVER ALL WATER LINE.
12. PROTECT OVERHEAD WALKWAY DURING ALL CONSTRUCTION ACTIVITIES.

**KEYNOTES**

1. CONNECT PROPOSED STORM LATERAL TO EXISTING STORM LINE. CONTRACTOR TO VERIFY LOCATION AND DEPTH PRIOR TO CONSTRUCTION.
2. CONNECT PROPOSED SANITARY SEWER SERVICE TO EXISTING 12" SANITARY SEWER STUB. CONTRACTOR TO VERIFY INVERTS PRIOR TO CONSTRUCTION.
3. CONNECT PROPOSED FIRE WATER TO EXISTING WATER LINE
4. CONNECT PROPOSED STORM WATER LATERAL TO EXISTING STORM WATER CATCH BASIN. CONTRACTOR TO VERIFY EXISTING INVERTS.
5. CONNECT PROPOSED FIRE HYDRANT TO EXISTING WATER LINE
6. CAP EXISTING WATER LINE AT VALVE
7. RELOCATE POWER VAULT, COORDINATE WITH MEP
8. CONNECT BUILDING DOWNSPOUT SYSTEM TO SITE STORM DRAIN SYSTEM.
9. CONNECT SEWER LATERAL TO BUILDING, SEE PLUMBING PLANS.
10. CONNECT FIRELINE & WATER SERVICE TO BUILDING COORDINATE SIZE & LOCATION WITH PLUMBING PLANS.
11. CONSTRUCT CATCH BASIN. CONTRACTOR TO VERIFY INVERTS PRIOR TO CONSTRUCTION.
12. INSTALL SALVAGED LIGHT POLE AND LUMINAIRE, SEE IL1.0
13. CONSTRUCT AREA DRAIN
14. INSTALL FIRE HYDRANT



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SHEET TITLE:  
**UTILITY PLAN**

DRAWN BY: NKL  
CHECKED BY: BON  
SHEET:

**C2.3**

JOB NO. **2150163.00**

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APPENDIX A

**2001-03-06 REVISED  
NOVELLUS STORM  
CALCULATIONS**

# Storm Calculations

Novellus  
Tualatin, Oregon

3.5



EXPIRES: 12/31/01

Project Number: 000321

Dated: 2/14/01

REVISED: 3/6/01

**Description:**

Novellus is located on the northwest corner of SW Leveton Drive and SW 108th Avenue. The site is comprised of approximately 58 acres. The site currently has two buildings remaining from the previous Oki site. The two buildings were purchased by Novellus along with the property.

Water quality will be provided for all of the site including the existing impervious areas. Water quality will be provided to meet USA requirements which are to treat the "summer" storm or the first 0.36" of rainfall falling in a four hour period. Dry detention ponds with a permanent pool will be the method employed to accomplish treatment. The ponds are sized for full build out of the Novellus Master Plan as submitted in the Industrial Master Plan with the City of Tualatin.

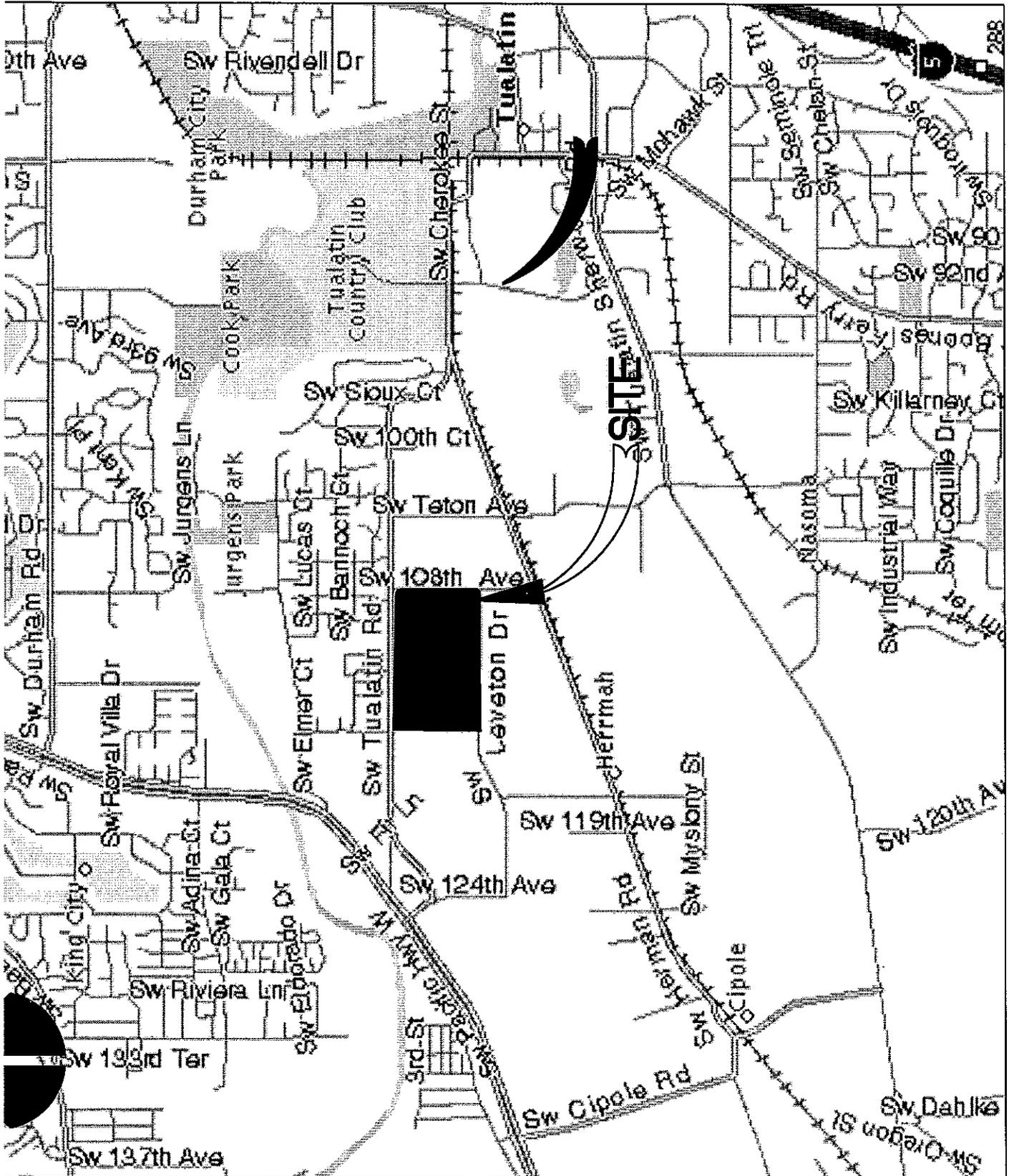
Detention will be provided to limit runoff from the site to match existing runoff for storms upto the 25yr event. Each pond will serve approximately 25% of the full built out site. The SCS based software program "WaterWorks" has been used to design the detention ponds.

All pipes have been designed to convey the 25yr storm using SCS methodology.

## Table of Contents

- A. Vicinity Map
- B. Site Map
- C. Areas with full 'build-out'
- D. Water Quality Volumes required
- E. Detention Summary
- F. SCS Soils Map
- G. SCS Soils Classification
- H. SCS Curve Number
- I. Pond 'A' Total Volume
- J. Pond 'A' Detention Volume
- K. Water Quality Orifice Sizing
- L. Pond 'A' Pond Outlet
- M. Pond 'A' computer detention calc's
- N. Pond 'B' Total Volume
- O. Pond 'B' Detention Volume
- P. Water Quality Orifice Sizing
- Q. Pond 'B' Pond Outlet
- R. Pond 'B' computer detention calc's
- S. Pond 'C' Total Volume
- T. Pond 'C' Detention Volume
- U. Water Quality Orifice Sizing
- V. Pond 'C' Pond Outlet
- W. Pond 'C' computer detention calc's
- X. Pipe sizing areas
- Y. Computer volumes for pipe sizing
- Z. Pipe sizing calc's

Attachment 'A'      Drainage Map



'A' VICINITY MAP



'C' AREAS W/ FULL 'BUILD-OUT'

POND 'A'

TOTAL AREA = 598,000  $\phi$  = 13.72 AC  
PERVIOUS AREA (15%) = 89,700  $\phi$  = 2.06 AC  
IMPERVIOUS AREA (85%) = 508,300  $\phi$  = 11.66 AC

POND 'B'

TOTAL AREA = 598,600  $\phi$  = 13.72 AC  
PERVIOUS AREA = 89,700  $\phi$  = 2.06 AC  
IMPERVIOUS = 508,300  $\phi$  = 11.66 AC

POND 'C'

TOTAL AREA = 643,500  $\phi$  = 14.77 AC  
PERVIOUS AREA = 96,525  $\phi$  = 2.22 AC  
IMPERVIOUS AREA = 546,975  $\phi$  = 12.55 AC

GROUP

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0690 SW Bancroft St/PO Box 69039 Portland, OR 97201-0039  
Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

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'D' WQ VOLUMES REQUIRED

POND 'A'

$$\text{VOL} = 508,300 \text{ ft}^2 \times 0.36 \text{ in} \times \frac{1\text{ft}}{12 \text{ in}} = \underline{\underline{15,250 \text{ ft}^3}}$$

POND 'B'

$$\text{VOL} = 508,300 \text{ ft}^2 \times 0.36 \text{ in} \times \frac{1\text{ft}}{12 \text{ in}} = \underline{\underline{15,249 \text{ ft}^3}}$$

POND 'C'

$$\text{VOL} = 546,975 \text{ ft}^2 \times 0.36 \text{ in} \times \frac{1\text{ft}}{12 \text{ in}} = \underline{\underline{16,409 \text{ ft}^3}}$$

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Date \_\_\_\_\_

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# 'E' DETENTION SUMMARY

## POND 'A'

	EXIST. (cfs)	DEVELOP. (cfs)	RELEASE (cfs)	PEAK STAGE
2 YR	1.36	5.52	1.36	140.80
10 YR	2.90	7.93	1.58	141.99
25 YR	5.52	9.08	1.59	142.00

## POND 'B'

	EXIST. (cfs)	DEVEL. (cfs)	RELEASE (cfs)	PEAK STAGE
2 YR	1.36	5.73	1.36	138.97
10 YR	2.90	8.23	1.67	140.91
25 YR	3.71	9.42	1.78	140.97

## POND 'C'

	EXIST. (cfs)	DEVEL. (cfs)	RELEASE (cfs)	PEAK STAGE
2 YR	1.46	6.14	1.46	137.70
10 YR	3.12	8.82	1.76	138.98
25 YR	3.99	10.10	1.98	140.66

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F' SOILS MAP

TABLE 13.—Soil and

[Absence of an entry indicates the feature is not a concern. See Glossary for descriptions of such

Soil name and map symbol	Hydro-logic group	Flooding		
		Frequency	Duration	Months
Aloha: 1	C	None		
Amity: 2	C	None		
Astoria: 3E, 3F	B	None		
Briedwell: 4B, 5B, 5C, 5D	B	None		
Carlton: 6B, 6C	B	None		
Cascade: 7B, 7C, 7D, 7E, 7F	C	None		
Cehalem: 8C	C	None		
Chehalis: 9, 10	B	Common	Brief	Nov-Mar
Cornelius: <sup>1</sup> 11B, <sup>1</sup> 11C, <sup>1</sup> 11D, <sup>1</sup> 11E, <sup>1</sup> 11F; Cornelius part	C	None		
Kinton part	C	None		
Cornelius Variant: 12A, 12B, 12C	C	None		
Cove: 13, 14	D	Common	Brief	Dec-Apr
Dayton: 15	D	None		
Delena: 16C	D	None		
Goble: 17B, 17C, 17D, 17E, 18E, 18F	C	None		
Helvetia: 19B, 19C, 19D, 19E	C	None		
Hembre: 20E, 20F, 20G	B	None		
Hillsboro: 21A, 21B, 21C, 21D	B	None		
Huberly: 22	D	None		
Jory: 23B, 23C, 23D, 23E, 23F	C	None		
Kilchis: <sup>1</sup> 24G: Kilchis part	C	None		
Klickitat part	B	None		

STORMWATER MANAGEMENT MANUAL FOR THE PUGET SOUND BASIN

Table III-1.3 SCS Western Washington Runoff Curve Numbers  
 (Published by SCS in 1982) Runoff curve numbers for selected agricultural, suburban and urban land use for Type 1A rainfall distribution, 24-hour storm duration.

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 & grasslands	74	82	89	92
Meadow or pasture:	65	78	85	89
Wood or forest land: undisturbed	42	64	76	81
Wood or forest land: young second growth or brush	55	72	81	86
Orchard: with cover crop	81	88	92	94
Open spaces, lawns, parks, golf courses, cemeteries, landscaping.				
Good condition: grass cover on ≥75% of the area	68	80	86	90
Fair condition: grass cover on 50-75% of the area	77	85	90	92
Gravel roads & parking lots:	76	85	89	91
Dirt roads & 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(2):				
Dwelling Unit/Gross Acre      %Impervious(3)				
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				
PUD's, condos, apartments, commercial businesses & industrial areas				
		%impervious must be computed		
		Separate curve number shall be selected for pervious & impervious portions of the site or basin		

- (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) Assumes roof and driveway runoff is directed into street/storm system.
- (3) The remaining pervious areas (lawn) are considered to be in good condition for these curve numbers.

'I' - POND 'A' TOTAL VOLUME

ELEV. (FT)	AREA (SF)	VOL (CF)	CUMM. VOL (CF)
138	7015		
139	8904	7960	7960
140	10,849	9876	17,836 ← WQ VOL @ 139.75
141	12,851	11,850	29,686
142	14,909	13,880	43,566
143	17,024	15,967	59,532

WQ RELEASE RATE

$$\frac{15,250 \text{ ft}^3}{48 \text{ HRS}} \times \frac{1 \text{ HR}}{3600 \text{ s}} = 0.088 \text{ CS/s}$$

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J - POND 'A' DETENTION VOLUME

ELEV (FT)	AREA (SF)	VOL (CCF)	CUMM VOL (CCF)
139.75	10,363		
.140	10,849	2652	2652
.141	12,851	11,850	14,501
.142	14,909	13,880	28,382
.143	17,024	15,967	44,348

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 Date \_\_\_\_\_  
 Job # \_\_\_\_\_  
 Sht. \_\_\_\_\_ of \_\_\_\_\_

'K' - WQ ORIFICE 'A'

$$Q = CA(2gh)^{1/2}$$

$$A = \frac{Q}{C(2gh)^{1/2}}$$

$$A = \frac{0.088}{0.62(2 \times 32.2 \times 2.10)^{1/2}}$$

$$A = 0.0122 \text{ ft}^2$$

$$d = \sqrt{\frac{4A}{\pi}} = 0.125' = \underline{\underline{1.50'' \text{ } \phi}}$$

$$Q = 0.088$$

$$C = 0.62$$

$$g = 32.2$$

$$h = 139.75 - 137.65 = 2.10'$$

$$A = \frac{\pi d^2}{4}$$

$$d = \sqrt{\frac{4A}{\pi}}$$

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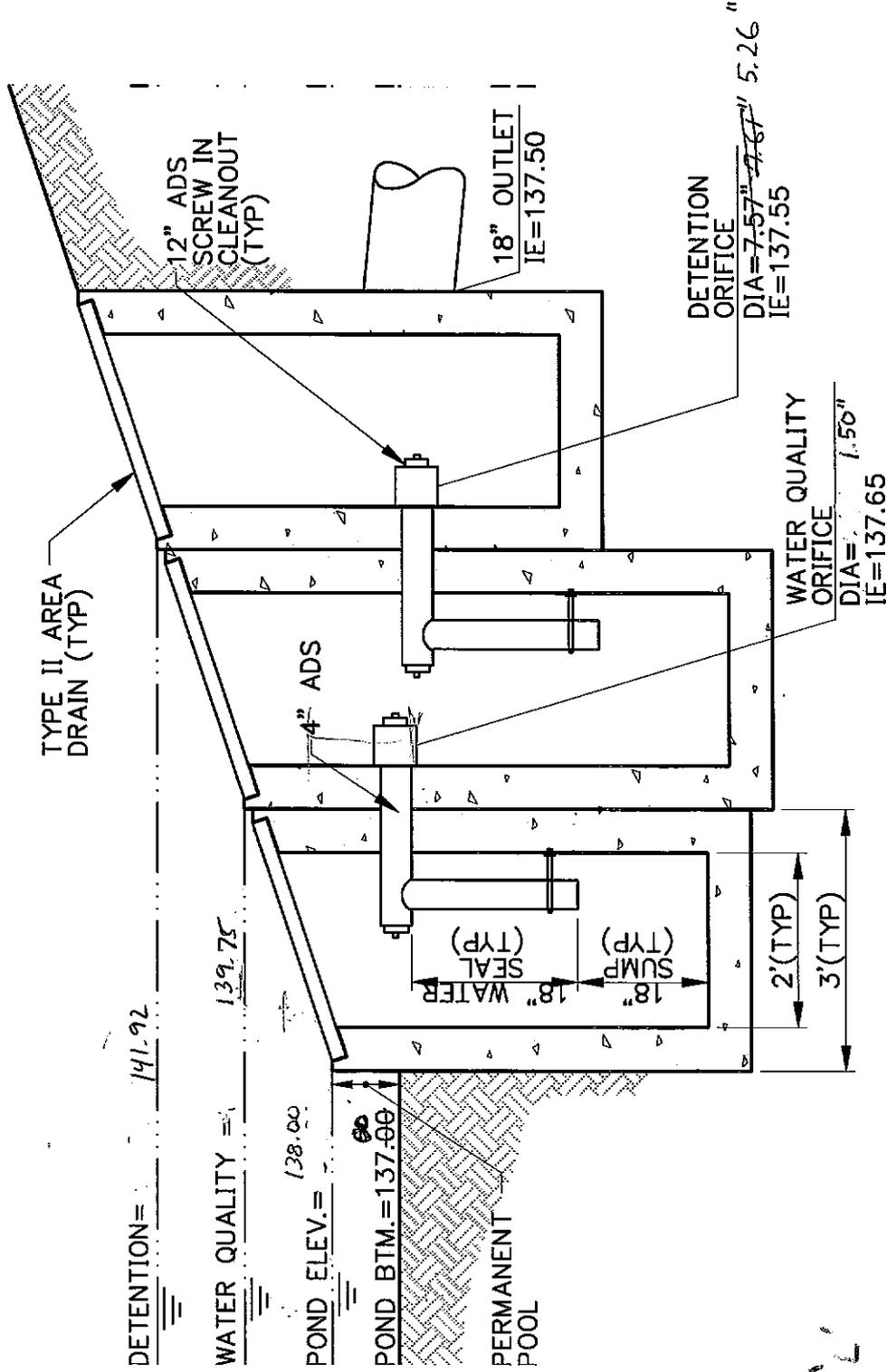
By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

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# 1 POND "A" OUTLET DETAIL

C8.1 N.T.S. OUTFLOW DEVICE

SD150  
DETINSET= 1:1



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=====
  
BASIN SUMMARY
  
=====

BASIN ID: E10                   NAME: EXISTING 10YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 13.72 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE.....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION.....: 3.45 inches           AREA..: 13.72 Acres  
 TIME INTERVAL.....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE:    2.90 cfs   VOL:    1.83 Ac-ft   TIME:    490 min

BASIN ID: E2                    NAME: EXISTING 2YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 13.72 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE.....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION.....: 2.50 inches           AREA..: 13.72 Acres  
 TIME INTERVAL.....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE:    1.36 cfs   VOL:    1.02 Ac-ft   TIME:    490 min

BASIN ID: E25                  NAME: EXISTING 25YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 13.72 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE.....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION.....: 3.90 inches           AREA..: 13.72 Acres  
 TIME INTERVAL.....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE:    3.71 cfs   VOL:    2.24 Ac-ft   TIME:    490 min

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HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
1	1.356	490	44270 cf	13.72
2	2.902	490	79526 cf	13.72
3	3.714	490	97581 cf	13.72
5	5.522	480	102758 cf	13.72
6	7.929	480	148087 cf	13.72
7	9.079	480	169790 cf	13.72
10	1.355	700	102983 cf	13.72
11	1.584	630	35096 cf	13.72
12	1.570	530	27536 cf	13.72

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=====

ROUTING REPORT

=====

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE            ID No.    A  
Description:  
Outlet Elev:    137.55  
Elev:    137.55 ft            Orifice Diameter:    5.2617 in.

ROUTING CURVE

STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min
137.55	0.0000	0.0000	0.0000	139.10	3837	0.9354	13.725	140.70	24218	1.3334	82.059
137.60	0.0000	0.1680	0.1680	139.20	5022	0.9651	17.704	140.80	25606	1.3544	86.707
137.70	0.0000	0.2910	0.2910	139.30	6207	0.9939	21.683	140.90	26994	1.3751	91.355
137.80	0.0000	0.3757	0.3757	139.40	7392	1.0219	25.661	141.00	28382	1.3955	96.002
137.90	0.0000	0.4445	0.4445	139.50	8577	1.0491	29.637	141.10	29979	1.4156	101.34
138.00	0.0000	0.5040	0.5040	139.60	9761	1.0757	33.614	141.20	31575	1.4354	106.69
138.10	0.0000	0.5572	0.5572	139.70	10946	1.1016	37.589	141.30	33172	1.4549	112.03
138.20	0.0000	0.6057	0.6057	139.80	12131	1.1270	41.564	141.40	34768	1.4742	117.37
138.30	0.0000	0.6507	0.6507	139.90	13316	1.1517	45.539	141.50	36365	1.4932	122.71
138.40	0.0000	0.6927	0.6927	140.00	14501	1.1760	49.513	141.60	37962	1.5120	128.05
138.50	0.0000	0.7323	0.7323	140.10	15889	1.1997	54.163	141.70	39558	1.5305	133.39
138.60	0.0000	0.7699	0.7699	140.20	17277	1.2230	58.814	141.80	41155	1.5489	138.73
138.70	0.0000	0.8057	0.8057	140.30	18665	1.2459	63.464	141.90	42751	1.5670	144.07
138.80	530.40	0.8400	2.6080	140.40	20053	1.2684	68.113				
138.90	1591	0.8729	6.1769	140.50	21442	1.2904	72.762				
139.00	2652	0.9047	9.7447	140.60	22830	1.3121	77.411				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 1.36 INFLOW Q (cfs): 5.52  
 PEAK STAGE (ft): 140.80 PEAK OUTFLOW : 1.36  
 PEAK TIME: 700.00 min.  
 INFLOW HYD No. : 5 OUTFLOW HYD No.: 10

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
=====							
0.0000	0.0001	0.0000	0.0001	0.0000	0.0001	137.55	50.00
0.0001	0.0062	0.0000	0.0063	0.0001	0.0062	137.55	60.00
0.0062	0.0358	0.0000	0.0420	0.0062	0.0358	137.55	70.00
0.0358	0.0902	0.0000	0.1259	0.0358	0.0902	137.55	80.00
0.0902	0.1532	0.0000	0.2434	0.0902	0.1532	137.55	90.00
0.1532	0.2163	0.0000	0.3695	0.1532	0.2163	137.55	100.00
0.2163	0.2756	0.0000	0.4919	0.2163	0.2756	137.55	110.00
0.2756	0.3295	0.0000	0.6051	0.2756	0.3295	137.55	120.00
0.3295	0.3947	0.0000	0.7242	0.3295	0.3947	137.55	130.00
0.3947	0.4686	0.0000	0.8633	0.3947	0.4686	137.55	140.00
0.4686	0.5284	0.0000	0.9970	0.4686	0.5284	137.55	150.00
0.5284	0.5757	0.0000	1.1042	0.5284	0.5757	137.55	160.00
0.5757	0.6188	0.0000	1.1946	0.5757	0.6188	137.55	170.00
0.6188	0.6554	0.0000	1.2742	0.6188	0.6554	137.55	180.00
0.6554	0.6842	0.0000	1.3396	0.6554	0.6842	137.55	190.00
0.6842	0.7129	0.0000	1.3971	0.6842	0.7129	137.55	200.00
0.7129	0.7378	0.0000	1.4507	0.7129	0.7378	137.55	210.00
0.7378	0.7566	0.0000	1.4944	0.7378	0.7566	137.55	220.00
0.7566	0.7773	0.0000	1.5339	0.7566	0.7773	137.55	230.00
0.7773	0.7952	0.0000	1.5725	0.7773	0.7952	137.55	240.00
0.7952	0.8366	0.0000	1.6319	0.7952	0.8366	137.55	250.00
0.8366	0.8912	0.0304	1.7583	0.8063	0.9520	138.70	260.00
0.8912	0.9280	0.1435	1.9627	0.8085	1.1543	138.71	270.00
0.9280	0.9574	0.3419	2.2273	0.8123	1.4150	138.72	280.00
0.9574	0.9756	0.5977	2.5306	0.8173	1.7133	138.73	290.00
0.9756	0.9904	0.8904	2.8563	0.8230	2.0334	138.75	300.00
0.9904	1.1189	1.2043	3.3136	0.8291	2.4846	138.77	310.00
1.1189	1.3095	1.6469	4.0754	0.8376	3.2377	138.79	320.00
1.3095	1.4235	2.3919	5.1249	0.8458	4.2791	138.82	330.00
1.4235	1.4938	3.4237	6.3410	0.8554	5.4856	138.85	340.00
1.4938	1.5398	4.6191	7.6527	0.8666	6.7861	138.88	350.00
1.5398	1.5727	5.9077	9.0202	0.8784	8.1418	138.92	360.00
1.5727	1.5694	7.2514	10.393	0.8904	9.5031	138.96	370.00
1.5694	1.5448	8.6005	11.715	0.9025	10.812	138.99	380.00
1.5448	1.5328	9.8993	12.977	0.9129	12.064	139.03	390.00
1.5328	1.5311	11.141	14.205	0.9226	13.283	139.06	400.00
1.5311	1.5386	12.351	15.421	0.9320	14.489	139.09	410.00
1.5386	1.5435	13.548	16.630	0.9411	15.689	139.12	420.00
1.5435	1.9599	14.739	18.242	0.9500	17.292	139.15	430.00
1.9599	2.6167	16.330	20.907	0.9620	19.945	139.19	440.00
2.6167	3.0001	18.963	24.580	0.9813	23.599	139.26	450.00

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 =====  
 LEVEL POOL ROUTING TABLE
 =====

## LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
3.0001	3.8181	22.591	29.410	1.0074	28.402	139.35	460.00	
3.8181	4.8896	27.362	36.069	1.0407	35.029	139.47	470.00	
4.8896	5.5224	33.944	44.356	1.0849	43.271	139.64	480.00	
5.5224	5.0947	42.133	52.750	1.1376	51.613	139.84	490.00	
5.0947	4.0608	50.426	59.582	1.1867	58.395	140.05	500.00	
4.0608	3.4876	57.174	64.722	1.2209	63.501	140.19	510.00	
3.4876	3.1022	62.255	68.845	1.2461	67.599	140.30	520.00	
3.1022	2.8252	66.333	72.261	1.2659	70.995	140.39	530.00	
2.8252	2.6735	69.713	75.211	1.2820	73.929	140.46	540.00	
2.6735	2.4188	72.633	77.726	1.2959	76.430	140.53	550.00	
2.4188	2.1056	75.122	79.647	1.3075	78.339	140.58	560.00	
2.1056	1.9318	77.023	81.060	1.3164	79.744	140.62	570.00	
1.9318	1.8402	78.421	82.193	1.3228	80.870	140.65	580.00	
1.8402	1.7861	79.542	83.169	1.3280	81.841	140.67	590.00	
1.7861	1.7572	80.508	84.052	1.3324	82.719	140.70	600.00	
1.7572	1.7089	81.383	84.849	1.3364	83.512	140.71	610.00	
1.7089	1.6498	82.172	85.531	1.3400	84.191	140.73	620.00	
1.6498	1.6177	82.848	86.115	1.3431	84.772	140.75	630.00	
1.6177	1.5965	83.427	86.641	1.3457	85.295	140.76	640.00	
1.5965	1.5897	83.947	87.133	1.3481	85.785	140.77	650.00	
1.5897	1.5869	84.435	87.612	1.3503	86.261	140.78	660.00	
1.5869	1.5149	84.909	88.011	1.3524	86.658	140.79	670.00	
1.5149	1.4041	85.304	88.223	1.3542	86.869	140.80	680.00	
1.4041	1.3427	85.514	88.260	1.3552	86.905	140.80	690.00	
1.3427	1.3131	85.550	88.206	1.3553	86.850	140.80	700.00	
1.3131	1.2929	85.495	88.101	1.3551	86.746	140.80	710.00	
1.2929	1.2822	85.392	87.967	1.3546	86.612	140.80	720.00	
1.2822	1.2808	85.258	87.821	1.3540	86.467	140.80	730.00	
1.2808	1.2764	85.114	87.671	1.3534	86.318	140.79	740.00	
1.2764	1.2744	84.965	87.516	1.3527	86.163	140.79	750.00	
1.2744	1.2780	84.811	87.364	1.3520	86.012	140.79	760.00	
1.2780	1.2762	84.660	87.214	1.3513	85.863	140.79	770.00	
1.2762	1.2757	84.513	87.065	1.3506	85.714	140.78	780.00	
1.2757	1.2081	84.364	86.848	1.3499	85.498	140.78	790.00	
1.2081	1.0987	84.149	86.456	1.3490	85.107	140.77	800.00	
1.0987	1.0378	83.759	85.896	1.3472	84.549	140.77	810.00	
1.0378	1.0040	83.204	85.246	1.3447	83.901	140.75	820.00	
1.0040	0.9854	82.559	84.549	1.3418	83.207	140.74	830.00	
0.9854	0.9752	81.868	83.829	1.3386	82.490	140.72	840.00	
0.9752	1.0037	81.155	83.134	1.3354	81.798	140.71	850.00	
1.0037	1.0582	80.466	82.528	1.3322	81.196	140.69	860.00	
1.0582	1.0890	79.866	82.014	1.3295	80.684	140.68	870.00	
1.0890	1.1022	79.357	81.548	1.3271	80.221	140.67	880.00	
1.1022	1.1142	78.896	81.112	1.3250	79.787	140.66	890.00	
1.1142	1.1212	78.464	80.700	1.3230	79.377	140.65	900.00	
1.1212	1.1211	78.056	80.298	1.3211	78.977	140.64	910.00	
1.1211	1.1257	77.658	79.904	1.3193	78.585	140.63	920.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE								
I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<-----			cfs min	----->			(ft)	(min)
=====								
1.1257	1.1285	77.268	79.522	1.3175	78.204	140.63	930.00	
1.1285	1.1261	76.889	79.143	1.3157	77.828	140.62	940.00	
1.1261	1.1293	76.513	78.769	1.3140	77.455	140.61	950.00	
1.1293	1.1314	76.143	78.403	1.3123	77.091	140.60	960.00	
1.1314	1.0216	75.780	77.933	1.3106	76.623	140.59	970.00	
1.0216	0.8577	75.314	77.194	1.3084	75.885	140.58	980.00	
0.8577	0.7661	74.580	76.204	1.3050	74.899	140.57	990.00	
0.7661	0.7108	73.599	75.076	1.3004	73.775	140.55	1000.00	
0.7108	0.6842	72.480	73.875	1.2951	72.580	140.52	1010.00	
0.6842	0.6695	71.290	72.644	1.2895	71.355	140.50	1020.00	
0.6695	0.7299	70.071	71.470	1.2837	70.187	140.47	1030.00	
0.7299	0.8367	68.908	70.475	1.2782	69.197	140.44	1040.00	
0.8367	0.8966	67.923	69.657	1.2735	68.383	140.42	1050.00	
0.8966	0.9303	67.113	68.940	1.2696	67.671	140.41	1060.00	
0.9303	0.9493	66.404	68.284	1.2662	67.018	140.39	1070.00	
0.9493	0.9601	65.755	67.664	1.2631	66.401	140.38	1080.00	
0.9601	0.9319	65.141	67.033	1.2601	65.773	140.36	1090.00	
0.9319	0.8776	64.516	66.325	1.2571	65.068	140.35	1100.00	
0.8776	0.8474	63.815	65.540	1.2536	64.286	140.33	1110.00	
0.8474	0.9641	63.036	64.848	1.2499	63.598	140.32	1120.00	
0.9641	0.8960	62.351	64.211	1.2465	62.965	140.30	1130.00	
0.8960	0.7289	61.721	63.346	1.2434	62.103	140.29	1140.00	
0.7289	0.7691	60.863	62.361	1.2392	61.122	140.27	1150.00	
0.7691	0.7874	59.888	61.444	1.2344	60.210	140.25	1160.00	
0.7874	0.7977	58.980	60.565	1.2299	59.335	140.23	1170.00	
0.7977	0.8079	58.110	59.715	1.2256	58.490	140.21	1180.00	
0.8079	0.8094	57.268	58.885	1.2214	57.664	140.19	1190.00	
0.8094	0.8104	56.447	58.067	1.2173	56.849	140.18	1200.00	
0.8104	0.8153	55.636	57.262	1.2132	56.049	140.16	1210.00	
0.8153	0.8139	54.839	56.469	1.2092	55.259	140.14	1220.00	
0.8139	0.8132	54.054	55.681	1.2052	54.476	140.12	1230.00	
0.8132	0.8173	53.275	54.905	1.2013	53.704	140.11	1240.00	
0.8173	0.8153	52.507	54.139	1.1974	52.942	140.09	1250.00	
0.8153	0.8143	51.748	53.378	1.1935	52.184	140.07	1260.00	
0.8143	0.8182	50.995	52.627	1.1896	51.438	140.06	1270.00	
0.8182	0.8162	50.252	51.886	1.1858	50.701	140.04	1280.00	
0.8162	0.8152	49.519	51.150	1.1820	49.968	140.03	1290.00	
0.8152	0.8190	48.790	50.424	1.1783	49.245	140.01	1300.00	
0.8190	0.8169	48.071	49.707	1.1744	48.533	139.99	1310.00	
0.8169	0.8159	47.363	48.995	1.1700	47.825	139.98	1320.00	
0.8159	0.7808	46.660	48.256	1.1657	47.091	139.96	1330.00	
0.7808	0.7266	45.930	47.437	1.1612	46.276	139.94	1340.00	
0.7266	0.6963	45.119	46.542	1.1562	45.386	139.92	1350.00	
0.6963	0.6752	44.235	45.607	1.1508	44.456	139.90	1360.00	
0.6752	0.6677	43.311	44.654	1.1450	43.509	139.87	1370.00	
0.6677	0.6637	42.370	43.701	1.1391	42.562	139.85	1380.00	
0.6637	0.6571	41.429	42.750	1.1332	41.617	139.83	1390.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.6571	0.6578	40.489	41.804	1.1273	40.677	139.80	1400.00
0.6578	0.6583	39.556	40.872	1.1213	39.751	139.78	1410.00
0.6583	0.6543	38.635	39.948	1.1154	38.832	139.75	1420.00
0.6543	0.6565	37.723	39.034	1.1096	37.924	139.73	1430.00
0.6565	0.6577	36.820	38.135	1.1038	37.031	139.71	1440.00
0.6577	0.5109	35.933	37.101	1.0980	36.003	139.69	1450.00
0.5109	0.2855	34.912	35.709	1.0913	34.617	139.66	1460.00
0.2855	0.1596	33.535	33.980	1.0823	32.898	139.63	1470.00
0.1596	0.0892	31.827	32.076	1.0709	31.005	139.58	1480.00
0.0892	0.0499	29.947	30.086	1.0583	29.027	139.53	1490.00
0.0499	0.0279	27.982	28.060	1.0450	27.015	139.48	1500.00
0.0279	0.0156	25.984	26.027	1.0312	24.996	139.43	1510.00
0.0156	0.0087	23.979	24.003	1.0172	22.986	139.38	1520.00
0.0087	0.0049	21.983	21.997	1.0031	20.993	139.33	1530.00
0.0049	0.0027	20.005	20.012	0.9889	19.023	139.28	1540.00
0.0027	0.0015	18.049	18.053	0.9746	17.078	139.23	1550.00
0.0015	0.0008	16.118	16.120	0.9604	15.160	139.18	1560.00
0.0008	0.0005	14.214	14.215	0.9461	13.269	139.14	1570.00
0.0005	0.0003	12.337	12.338	0.9319	11.406	139.09	1580.00
0.0003	0.0001	10.489	10.489	0.9175	9.5714	139.04	1590.00
0.0001	0.0001	8.6683	8.6685	0.9032	7.7654	139.00	1600.00
0.0001	0.0000	6.8783	6.8784	0.8871	5.9913	138.94	1610.00
0.0000	0.0000	5.1201	5.1202	0.8712	4.2490	138.89	1620.00
0.0000	0.0000	3.3938	3.3939	0.8551	2.5387	138.85	1630.00
0.0000	0.0000	1.7001	1.7001	0.8387	0.8614	138.80	1640.00
0.0000	0.0000	0.0547	0.0547	0.8067	-0.7521	138.70	1650.00

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    137.55  
Elev:    137.55 ft        Orifice Diameter:    5.2617 in.

ROUTING CURVE

STAGE	STORAGE	OUTFLOW	O+2S	STAGE	STORAGE	OUTFLOW	O+2S	STAGE	STORAGE	OUTFLOW	O+2S
(ft)	(cf)	(cfs)	cfs-min	(ft)	(cf)	(cfs)	cfs-min	(ft)	(cf)	(cfs)	cfs-min
137.55	0.0000	0.0000	0.0000	139.10	3837	0.9354	13.725	140.70	24218	1.3334	82.059
137.60	0.0000	0.1680	0.1680	139.20	5022	0.9651	17.704	140.80	25606	1.3544	86.707
137.70	0.0000	0.2910	0.2910	139.30	6207	0.9939	21.683	140.90	26994	1.3751	91.355
137.80	0.0000	0.3757	0.3757	139.40	7392	1.0219	25.661	141.00	28382	1.3955	96.002
137.90	0.0000	0.4445	0.4445	139.50	8577	1.0491	29.637	141.10	29979	1.4156	101.34
138.00	0.0000	0.5040	0.5040	139.60	9761	1.0757	33.614	141.20	31575	1.4354	106.69
138.10	0.0000	0.5572	0.5572	139.70	10946	1.1016	37.589	141.30	33172	1.4549	112.03
138.20	0.0000	0.6057	0.6057	139.80	12131	1.1270	41.564	141.40	34768	1.4742	117.37
138.30	0.0000	0.6507	0.6507	139.90	13316	1.1517	45.539	141.50	36365	1.4932	122.71
138.40	0.0000	0.6927	0.6927	140.00	14501	1.1760	49.513	141.60	37962	1.5120	128.05
138.50	0.0000	0.7323	0.7323	140.10	15889	1.1997	54.163	141.70	39558	1.5305	133.39
138.60	0.0000	0.7699	0.7699	140.20	17277	1.2230	58.814	141.80	41155	1.5489	138.73
138.70	0.0000	0.8057	0.8057	140.30	18665	1.2459	63.464	141.90	42751	1.5670	144.07
138.80	530.40	0.8400	2.6080	140.40	20053	1.2684	68.113				
138.90	1591	0.8729	6.1769	140.50	21442	1.2904	72.762				
139.00	2652	0.9047	9.7447	140.60	22830	1.3121	77.411				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 2.90 INFLOW Q (cfs): 7.93  
 PEAK STAGE (ft): 141.99 PEAK OUTFLOW : 1.58  
 PEAK TIME: 630.00 min.  
 INFLOW HYD No. : 6 OUTFLOW HYD No.: 11

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE (ft)	TIME (min)
<----- cfs min ----->							
0.0000	0.0019	0.0000	0.0019	0.0000	0.0019	137.55	40.00
0.0019	0.0209	0.0000	0.0229	0.0019	0.0209	137.55	50.00
0.0209	0.0630	0.0000	0.0839	0.0209	0.0630	137.55	60.00
0.0630	0.1440	0.0000	0.2070	0.0630	0.1440	137.55	70.00
0.1440	0.2565	0.0000	0.4005	0.1440	0.2565	137.55	80.00
0.2565	0.3646	0.0000	0.6211	0.2565	0.3646	137.55	90.00
0.3646	0.4624	0.0000	0.8270	0.3646	0.4624	137.55	100.00
0.4624	0.5481	0.0000	1.0104	0.4624	0.5481	137.55	110.00
0.5481	0.6221	0.0000	1.1701	0.5481	0.6221	137.55	120.00
0.6221	0.7143	0.0000	1.3364	0.6221	0.7143	137.55	130.00
0.7143	0.8201	0.0000	1.5344	0.7143	0.8201	137.55	140.00
0.8201	0.9008	0.0142	1.7351	0.8060	0.9291	138.70	150.00
0.9008	0.9604	0.1211	1.9823	0.8080	1.1743	138.71	160.00
0.9604	1.0135	0.3615	2.3355	0.8127	1.5228	138.72	170.00
1.0135	1.0568	0.7035	2.7738	0.8193	1.9544	138.74	180.00
1.0568	1.0886	1.1269	3.2723	0.8275	2.4447	138.76	190.00
1.0886	1.1211	1.6078	3.8176	0.8369	2.9807	138.79	200.00
1.1211	1.1484	2.1373	4.4068	0.8434	3.5634	138.81	210.00
1.1484	1.1673	2.7146	5.0303	0.8488	4.1814	138.83	220.00
1.1673	1.1896	3.3269	5.6838	0.8545	4.8293	138.84	230.00
1.1896	1.2085	3.9688	6.3669	0.8605	5.5064	138.86	240.00
1.2085	1.2628	4.6396	7.1110	0.8667	6.2442	138.88	250.00
1.2628	1.3370	5.3707	7.9705	0.8735	7.0970	138.90	260.00
1.3370	1.3845	6.2159	8.9374	0.8811	8.0563	138.93	270.00
1.3845	1.4213	7.1667	9.9725	0.8897	9.0828	138.95	280.00
1.4213	1.4427	8.1840	11.048	0.8988	10.149	138.98	290.00
1.4427	1.4610	9.2414	12.145	0.9078	11.237	139.01	300.00
1.4610	1.6480	10.321	13.430	0.9162	12.514	139.04	310.00
1.6480	1.9273	11.588	15.163	0.9260	14.237	139.07	320.00
1.9273	2.0950	13.298	17.320	0.9392	16.381	139.11	330.00
2.0950	2.1991	15.426	19.720	0.9552	18.765	139.17	340.00
2.1991	2.2669	17.792	22.258	0.9728	21.285	139.23	350.00
2.2669	2.3136	20.294	24.875	0.9910	23.884	139.29	360.00
2.3136	2.3054	22.874	27.493	1.0094	26.484	139.36	370.00
2.3054	2.2653	25.456	30.027	1.0275	29.000	139.42	380.00
2.2653	2.2436	27.955	32.464	1.0448	31.419	139.48	390.00
2.2436	2.2370	30.358	34.838	1.0610	33.777	139.54	400.00
2.2370	2.2440	32.701	37.182	1.0768	36.105	139.60	410.00
2.2440	2.2474	35.013	39.504	1.0920	38.412	139.66	420.00
2.2474	2.8471	37.305	42.400	1.1069	41.293	139.72	430.00
2.8471	3.7928	40.168	46.808	1.1252	45.683	139.79	440.00

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## LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE								
I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
=====								
3.7928	4.3398	44.530	52.663	1.1526	51.510	139.90	450.00	
4.3398	5.5086	50.324	60.172	1.1862	58.986	140.04	460.00	
5.5086	7.0369	57.762	70.308	1.2239	69.084	140.20	470.00	
7.0369	7.9294	67.811	82.777	1.2730	81.504	140.42	480.00	
7.9294	7.3040	80.173	95.407	1.3309	94.076	140.69	490.00	
7.3040	5.8151	92.689	105.81	1.3870	104.42	140.96	500.00	
5.8151	4.9882	102.99	113.80	1.4270	112.37	141.16	510.00	
4.9882	4.4319	110.91	120.33	1.4561	118.88	141.31	520.00	
4.4319	4.0321	117.40	125.86	1.4795	124.38	141.43	530.00	
4.0321	3.8122	122.88	130.73	1.4991	129.23	141.53	540.00	
3.8122	3.4466	127.71	134.97	1.5161	133.46	141.62	550.00	
3.4466	2.9985	131.92	138.37	1.5307	136.84	141.70	560.00	
2.9985	2.7496	135.30	141.04	1.5424	139.50	141.76	570.00	
2.7496	2.6178	137.95	143.32	1.5515	141.77	141.81	580.00	
2.6178	2.5397	140.21	145.37	1.5592	143.81	141.86	590.00	
2.5397	2.4974	142.24	147.28	1.5661	145.71	141.90	600.00	
2.4974	2.4279	144.14	149.06	1.5725	147.49	141.93	610.00	
2.4279	2.3430	145.91	150.68	1.5784	149.11	141.96	620.00	
2.3430	2.2966	147.52	152.16	1.5839	150.58	141.99	630.00	
2.2966	2.2658	150.58	155.14	0.0000	155.14	0.00	640.00	
2.2658	2.2555	155.14	159.66	0.0000	159.66	0.00	650.00	
2.2555	2.2507	159.66	164.17	0.0000	164.17	0.00	660.00	
2.2507	2.1480	164.17	168.57	0.0000	168.57	0.00	670.00	
2.1480	1.9905	168.57	172.70	0.0000	172.70	0.00	680.00	
1.9905	1.9030	172.70	176.60	0.0000	176.60	0.00	690.00	
1.9030	1.8606	176.60	180.36	0.0000	180.36	0.00	700.00	
1.8606	1.8315	180.36	184.05	0.0000	184.05	0.00	710.00	
1.8315	1.8159	184.05	187.70	0.0000	187.70	0.00	720.00	
1.8159	1.8136	187.70	191.33	0.0000	191.33	0.00	730.00	
1.8136	1.8069	191.33	194.95	0.0000	194.95	0.00	740.00	
1.8069	1.8037	194.95	198.56	0.0000	198.56	0.00	750.00	
1.8037	1.8084	198.56	202.17	0.0000	202.17	0.00	760.00	
1.8084	1.8056	202.17	205.79	0.0000	205.79	0.00	770.00	
1.8056	1.8045	205.79	209.40	0.0000	209.40	0.00	780.00	
1.8045	1.7086	209.40	212.91	0.0000	212.91	0.00	790.00	
1.7086	1.5536	212.91	216.17	0.0000	216.17	0.00	800.00	
1.5536	1.4672	216.17	219.19	0.0000	219.19	0.00	810.00	
1.4672	1.4192	219.19	222.08	0.0000	222.08	0.00	820.00	
1.4192	1.3927	222.08	224.89	0.0000	224.89	0.00	830.00	
1.3927	1.3781	224.89	227.66	0.0000	227.66	0.00	840.00	
1.3781	1.4182	227.66	230.46	0.0000	230.46	0.00	850.00	
1.4182	1.4949	230.46	233.37	0.0000	233.37	0.00	860.00	
1.4949	1.5382	233.37	236.40	0.0000	236.40	0.00	870.00	
1.5382	1.5567	236.40	239.50	0.0000	239.50	0.00	880.00	
1.5567	1.5733	239.50	242.63	0.0000	242.63	0.00	890.00	
1.5733	1.5830	242.63	245.79	0.0000	245.79	0.00	900.00	
1.5830	1.5827	245.79	248.95	0.0000	248.95	0.00	910.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
1.5827	1.5888	248.95	252.12	0.0000	252.12	0.00	920.00
1.5888	1.5926	252.12	255.30	0.0000	255.30	0.00	930.00
1.5926	1.5890	255.30	258.49	0.0000	258.49	0.00	940.00
1.5890	1.5933	258.49	261.67	0.0000	261.67	0.00	950.00
1.5933	1.5960	261.67	264.86	0.0000	264.86	0.00	960.00
1.5960	1.4409	264.86	267.89	0.0000	267.89	0.00	970.00
1.4409	1.2096	267.89	270.55	0.0000	270.55	0.00	980.00
1.2096	1.0804	270.55	272.84	0.0000	272.84	0.00	990.00
1.0804	1.0023	272.84	274.92	0.0000	274.92	0.00	1000.00
1.0023	0.9647	274.92	276.88	0.0000	276.88	0.00	1010.00
0.9647	0.9438	276.88	278.79	0.0000	278.79	0.00	1020.00
0.9438	1.0289	278.79	280.77	0.0000	280.77	0.00	1030.00
1.0289	1.1794	280.77	282.97	0.0000	282.97	0.00	1040.00
1.1794	1.2636	282.97	285.42	0.0000	285.42	0.00	1050.00
1.2636	1.3110	285.42	287.99	0.0000	287.99	0.00	1060.00
1.3110	1.3376	287.99	290.64	0.0000	290.64	0.00	1070.00
1.3376	1.3527	290.64	293.33	0.0000	293.33	0.00	1080.00
1.3527	1.3129	293.33	296.00	0.0000	296.00	0.00	1090.00
1.3129	1.2363	296.00	298.55	0.0000	298.55	0.00	1100.00
1.2363	1.1936	298.55	300.98	0.0000	300.98	0.00	1110.00
1.1936	1.3577	300.98	303.53	0.0000	303.53	0.00	1120.00
1.3577	1.2617	303.53	306.15	0.0000	306.15	0.00	1130.00
1.2617	1.0264	306.15	308.43	0.0000	308.43	0.00	1140.00
1.0264	1.0829	308.43	310.54	0.0000	310.54	0.00	1150.00
1.0829	1.1085	310.54	312.74	0.0000	312.74	0.00	1160.00
1.1085	1.1230	312.74	314.97	0.0000	314.97	0.00	1170.00
1.1230	1.1372	314.97	317.23	0.0000	317.23	0.00	1180.00
1.1372	1.1392	317.23	319.50	0.0000	319.50	0.00	1190.00
1.1392	1.1405	319.50	321.78	0.0000	321.78	0.00	1200.00
1.1405	1.1474	321.78	324.07	0.0000	324.07	0.00	1210.00
1.1474	1.1453	324.07	326.36	0.0000	326.36	0.00	1220.00
1.1453	1.1442	326.36	328.65	0.0000	328.65	0.00	1230.00
1.1442	1.1498	328.65	330.95	0.0000	330.95	0.00	1240.00
1.1498	1.1470	330.95	333.24	0.0000	333.24	0.00	1250.00
1.1470	1.1455	333.24	335.54	0.0000	335.54	0.00	1260.00
1.1455	1.1509	335.54	337.83	0.0000	337.83	0.00	1270.00
1.1509	1.1479	337.83	340.13	0.0000	340.13	0.00	1280.00
1.1479	1.1464	340.13	342.43	0.0000	342.43	0.00	1290.00
1.1464	1.1517	342.43	344.72	0.0000	344.72	0.00	1300.00
1.1517	1.1487	344.72	347.02	0.0000	347.02	0.00	1310.00
1.1487	1.1472	347.02	349.32	0.0000	349.32	0.00	1320.00
1.1472	1.0977	349.32	351.57	0.0000	351.57	0.00	1330.00
1.0977	1.0214	351.57	353.68	0.0000	353.68	0.00	1340.00
1.0214	0.9789	353.68	355.69	0.0000	355.69	0.00	1350.00
0.9789	0.9491	355.69	357.61	0.0000	357.61	0.00	1360.00
0.9491	0.9386	357.61	359.50	0.0000	359.50	0.00	1370.00
0.9386	0.9327	359.50	361.37	0.0000	361.37	0.00	1380.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
=====							
0.9327	0.9235	361.37	363.23	0.0000	363.23	0.00	1390.00
0.9235	0.9245	363.23	365.08	0.0000	365.08	0.00	1400.00
0.9245	0.9251	365.08	366.93	0.0000	366.93	0.00	1410.00
0.9251	0.9194	366.93	368.77	0.0000	368.77	0.00	1420.00
0.9194	0.9224	368.77	370.61	0.0000	370.61	0.00	1430.00
0.9224	0.9241	370.61	372.46	0.0000	372.46	0.00	1440.00
0.9241	0.7177	372.46	374.10	0.0000	374.10	0.00	1450.00
0.7177	0.4011	374.10	375.22	0.0000	375.22	0.00	1460.00
0.4011	0.2242	375.22	375.84	0.0000	375.84	0.00	1470.00
0.2242	0.1253	375.84	376.19	0.0000	376.19	0.00	1480.00
0.1253	0.0700	376.19	376.39	0.0000	376.39	0.00	1490.00
0.0700	0.0391	376.39	376.50	0.0000	376.50	0.00	1500.00

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    137.55  
Elev:    137.55 ft        Orifice Diameter:    5.2617 in.

ROUTING CURVE

STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min
137.55	0.0000	0.0000	0.0000	139.10	3837	0.9354	13.725	140.70	24218	1.3334	82.059
137.60	0.0000	0.1680	0.1680	139.20	5022	0.9651	17.704	140.80	25606	1.3544	86.707
137.70	0.0000	0.2910	0.2910	139.30	6207	0.9939	21.683	140.90	26994	1.3751	91.355
137.80	0.0000	0.3757	0.3757	139.40	7392	1.0219	25.661	141.00	28382	1.3955	96.002
137.90	0.0000	0.4445	0.4445	139.50	8577	1.0491	29.637	141.10	29979	1.4156	101.34
138.00	0.0000	0.5040	0.5040	139.60	9761	1.0757	33.614	141.20	31575	1.4354	106.69
138.10	0.0000	0.5572	0.5572	139.70	10946	1.1016	37.589	141.30	33172	1.4549	112.03
138.20	0.0000	0.6057	0.6057	139.80	12131	1.1270	41.564	141.40	34768	1.4742	117.37
138.30	0.0000	0.6507	0.6507	139.90	13316	1.1517	45.539	141.50	36365	1.4932	122.71
138.40	0.0000	0.6927	0.6927	140.00	14501	1.1760	49.513	141.60	37962	1.5120	128.05
138.50	0.0000	0.7323	0.7323	140.10	15889	1.1997	54.163	141.70	39558	1.5305	133.39
138.60	0.0000	0.7699	0.7699	140.20	17277	1.2230	58.814	141.80	41155	1.5489	138.73
138.70	0.0000	0.8057	0.8057	140.30	18665	1.2459	63.464	141.90	42751	1.5670	144.07
138.80	530.40	0.8400	2.6080	140.40	20053	1.2684	68.113				
138.90	1591	0.8729	6.1769	140.50	21442	1.2904	72.762				
139.00	2652	0.9047	9.7447	140.60	22830	1.3121	77.411				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 3.71 INFLOW Q (cfs): 9.08  
 PEAK STAGE (ft): 141.92 PEAK OUTFLOW : 1.57  
 PEAK TIME: 530.00 min.  
 INFLOW HYD No. : 7 OUTFLOW HYD No.: 12

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE (ft)	TIME (min)
<----- cfs min ----->							
=====							
0.0000	0.0088	0.0000	0.0088	0.0000	0.0088	137.55	40.00
0.0088	0.0452	0.0000	0.0540	0.0088	0.0452	137.55	50.00
0.0452	0.1056	0.0000	0.1508	0.0452	0.1056	137.55	60.00
0.1056	0.2104	-0.0000	0.3160	0.1056	0.2104	137.55	70.00
0.2104	0.3506	0.0000	0.5611	0.2104	0.3506	137.55	80.00
0.3506	0.4795	0.0000	0.8301	0.3506	0.4795	137.55	90.00
0.4795	0.5923	0.0000	1.0718	0.4795	0.5923	137.55	100.00
0.5923	0.6890	0.0000	1.2813	0.5923	0.6890	137.55	110.00
0.6890	0.7709	0.0000	1.4598	0.6890	0.7709	137.55	120.00
0.7709	0.8746	0.0000	1.6455	0.7709	0.8746	137.55	130.00
0.8746	0.9944	0.0676	1.9367	0.8070	1.1297	138.70	140.00
0.9944	1.0837	0.3178	2.3959	0.8119	1.5841	138.72	150.00
1.0837	1.1479	0.7636	2.9952	0.8205	2.1747	138.74	160.00
1.1479	1.2047	1.3430	3.6956	0.8317	2.8638	138.78	170.00
1.2047	1.2502	2.0215	4.4763	0.8423	3.6340	138.81	180.00
1.2502	1.2826	2.7845	5.3172	0.8495	4.4678	138.83	190.00
1.2826	1.3162	3.6106	6.2093	0.8572	5.3522	138.85	200.00
1.3162	1.3440	4.4868	7.1470	0.8653	6.2817	138.88	210.00
1.3440	1.3624	5.4078	8.1142	0.8739	7.2404	138.90	220.00
1.3624	1.3851	6.3580	9.1054	0.8824	8.2230	138.93	230.00
1.3851	1.4041	7.3319	10.121	0.8912	9.2299	138.96	240.00
1.4041	1.4642	8.3298	11.198	0.9001	10.298	138.99	250.00
1.4642	1.5479	9.3890	12.401	0.9090	11.492	139.01	260.00
1.5479	1.6023	10.574	13.724	0.9182	12.806	139.04	270.00
1.6023	1.6463	11.878	15.126	0.9283	14.198	139.08	280.00
1.6463	1.6727	13.259	16.578	0.9389	15.639	139.11	290.00
1.6727	1.6944	14.690	18.057	0.9497	17.107	139.15	300.00
1.6944	1.9105	16.147	19.751	0.9606	18.791	139.18	310.00
1.9105	2.2325	17.818	21.961	0.9729	20.988	139.23	320.00
2.2325	2.4245	19.999	24.656	0.9889	23.667	139.28	330.00
2.4245	2.5427	22.659	27.626	1.0079	26.619	139.35	340.00
2.5427	2.6187	25.590	30.751	1.0285	29.723	139.42	350.00
2.6187	2.6704	28.673	33.962	1.0497	32.913	139.50	360.00
2.6704	2.6589	31.842	37.171	1.0710	36.100	139.58	370.00
2.6589	2.6109	35.008	40.278	1.0919	39.186	139.66	380.00
2.6109	2.5841	38.074	43.269	1.1118	42.157	139.74	390.00
2.5841	2.5751	41.027	46.186	1.1307	45.055	139.81	400.00
2.5751	2.5817	43.907	49.063	1.1487	47.915	139.89	410.00
2.5817	2.5844	46.748	51.914	1.1662	50.748	139.96	420.00
2.5844	3.2716	49.566	55.422	1.1823	54.240	140.03	430.00
3.2716	4.3554	53.039	60.667	1.2001	59.466	140.10	440.00

NOVELLUS

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
4.3554	4.9805	58.240	67.576	1.2262	66.350	140.21	450.00	
4.9805	6.3168	65.090	76.387	1.2598	75.128	140.36	460.00	
6.3168	8.0629	73.826	88.206	1.3014	86.904	140.55	470.00	
8.0629	9.0790	85.549	102.69	1.3553	101.34	140.80	480.00	
9.0790	8.3587	99.920	117.36	1.4155	115.94	141.10	490.00	
8.3587	6.6523	114.47	129.48	1.4690	128.02	141.37	500.00	
6.6523	5.7040	126.50	138.86	1.5119	137.35	141.60	510.00	
5.7040	5.0661	135.80	146.57	1.5441	145.03	141.77	520.00	
5.0661	4.6075	143.46	153.13	1.5702	151.56	141.92	530.00	
4.6075	4.3549	151.56	160.53	0.0000	160.53	0.00	540.00	
4.3549	3.9363	160.53	168.82	0.0000	168.82	0.00	550.00	
3.9363	3.4238	168.82	176.18	0.0000	176.18	0.00	560.00	
3.4238	3.1390	176.18	182.74	0.0000	182.74	0.00	570.00	
3.1390	2.9880	182.74	188.87	0.0000	188.87	0.00	580.00	
2.9880	2.8984	188.87	194.75	0.0000	194.75	0.00	590.00	
2.8984	2.8497	194.75	200.50	0.0000	200.50	0.00	600.00	
2.8497	2.7700	200.50	206.12	0.0000	206.12	0.00	610.00	
2.7700	2.6728	206.12	211.56	0.0000	211.56	0.00	620.00	
2.6728	2.6196	211.56	216.86	0.0000	216.86	0.00	630.00	
2.6196	2.5842	216.86	222.06	0.0000	222.06	0.00	640.00	
2.5842	2.5722	222.06	227.22	0.0000	227.22	0.00	650.00	
2.5722	2.5664	227.22	232.35	0.0000	232.35	0.00	660.00	
2.5664	2.4491	232.35	237.37	0.0000	237.37	0.00	670.00	
2.4491	2.2693	237.37	242.09	0.0000	242.09	0.00	680.00	
2.2693	2.1693	242.09	246.53	0.0000	246.53	0.00	690.00	
2.1693	2.1209	246.53	250.82	0.0000	250.82	0.00	700.00	
2.1209	2.0876	250.82	255.03	0.0000	255.03	0.00	710.00	
2.0876	2.0695	255.03	259.18	0.0000	259.18	0.00	720.00	
2.0695	2.0668	259.18	263.32	0.0000	263.32	0.00	730.00	
2.0668	2.0590	263.32	267.45	0.0000	267.45	0.00	740.00	
2.0590	2.0552	267.45	271.56	0.0000	271.56	0.00	750.00	
2.0552	2.0604	271.56	275.68	0.0000	275.68	0.00	760.00	
2.0604	2.0571	275.68	279.79	0.0000	279.79	0.00	770.00	
2.0571	2.0557	279.79	283.91	0.0000	283.91	0.00	780.00	
2.0557	1.9463	283.91	287.91	0.0000	287.91	0.00	790.00	
1.9463	1.7696	287.91	291.62	0.0000	291.62	0.00	800.00	
1.7696	1.6712	291.62	295.06	0.0000	295.06	0.00	810.00	
1.6712	1.6164	295.06	298.35	0.0000	298.35	0.00	820.00	
1.6164	1.5861	298.35	301.55	0.0000	301.55	0.00	830.00	
1.5861	1.5694	301.55	304.71	0.0000	304.71	0.00	840.00	
1.5694	1.6150	304.71	307.89	0.0000	307.89	0.00	850.00	
1.6150	1.7023	307.89	311.21	0.0000	311.21	0.00	860.00	
1.7023	1.7514	311.21	314.66	0.0000	314.66	0.00	870.00	
1.7514	1.7724	314.66	318.19	0.0000	318.19	0.00	880.00	
1.7724	1.7913	318.19	321.75	0.0000	321.75	0.00	890.00	
1.7913	1.8022	321.75	325.35	0.0000	325.35	0.00	900.00	
1.8022	1.8018	325.35	328.95	0.0000	328.95	0.00	910.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE								
I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
----- cfs			min	-----			(ft)	(min)
1.8018	1.8087	328.95	332.56	0.0000	332.56	0.00	920.00	
1.8087	1.8129	332.56	336.18	0.0000	336.18	0.00	930.00	
1.8129	1.8087	336.18	339.80	0.0000	339.80	0.00	940.00	
1.8087	1.8135	339.80	343.43	0.0000	343.43	0.00	950.00	
1.8135	1.8165	343.43	347.06	0.0000	347.06	0.00	960.00	
1.8165	1.6399	347.06	350.51	0.0000	350.51	0.00	970.00	
1.6399	1.3766	350.51	353.53	0.0000	353.53	0.00	980.00	
1.3766	1.2295	353.53	356.13	0.0000	356.13	0.00	990.00	
1.2295	1.1406	356.13	358.50	0.0000	358.50	0.00	1000.00	
1.1406	1.0978	358.50	360.74	0.0000	360.74	0.00	1010.00	
1.0978	1.0740	360.74	362.91	0.0000	362.91	0.00	1020.00	
1.0740	1.1708	362.91	365.16	0.0000	365.16	0.00	1030.00	
1.1708	1.3419	365.16	367.67	0.0000	367.67	0.00	1040.00	
1.3419	1.4378	367.67	370.45	0.0000	370.45	0.00	1050.00	
1.4378	1.4915	370.45	373.38	0.0000	373.38	0.00	1060.00	
1.4915	1.5218	373.38	376.39	0.0000	376.39	0.00	1070.00	
1.5218	1.5389	376.39	379.46	0.0000	379.46	0.00	1080.00	
1.5389	1.4935	379.46	382.49	0.0000	382.49	0.00	1090.00	
1.4935	1.4064	382.49	385.39	0.0000	385.39	0.00	1100.00	
1.4064	1.3578	385.39	388.15	0.0000	388.15	0.00	1110.00	
1.3578	1.5444	388.15	391.05	0.0000	391.05	0.00	1120.00	
1.5444	1.4352	391.05	394.03	0.0000	394.03	0.00	1130.00	
1.4352	1.1675	394.03	396.64	0.0000	396.64	0.00	1140.00	
1.1675	1.2317	396.64	399.04	0.0000	399.04	0.00	1150.00	
1.2317	1.2608	399.04	401.53	0.0000	401.53	0.00	1160.00	
1.2608	1.2772	401.53	404.07	0.0000	404.07	0.00	1170.00	
1.2772	1.2934	404.07	406.64	0.0000	406.64	0.00	1180.00	
1.2934	1.2956	406.64	409.23	0.0000	409.23	0.00	1190.00	
1.2956	1.2970	409.23	411.82	0.0000	411.82	0.00	1200.00	
1.2970	1.3048	411.82	414.42	0.0000	414.42	0.00	1210.00	
1.3048	1.3024	414.42	417.03	0.0000	417.03	0.00	1220.00	
1.3024	1.3012	417.03	419.63	0.0000	419.63	0.00	1230.00	
1.3012	1.3075	419.63	422.24	0.0000	422.24	0.00	1240.00	
1.3075	1.3042	422.24	424.85	0.0000	424.85	0.00	1250.00	
1.3042	1.3025	424.85	427.46	0.0000	427.46	0.00	1260.00	
1.3025	1.3086	427.46	430.07	0.0000	430.07	0.00	1270.00	
1.3086	1.3052	430.07	432.68	0.0000	432.68	0.00	1280.00	
1.3052	1.3034	432.68	435.29	0.0000	435.29	0.00	1290.00	
1.3034	1.3094	435.29	437.90	0.0000	437.90	0.00	1300.00	
1.3094	1.3060	437.90	440.52	0.0000	440.52	0.00	1310.00	
1.3060	1.3042	440.52	443.13	0.0000	443.13	0.00	1320.00	
1.3042	1.2479	443.13	445.68	0.0000	445.68	0.00	1330.00	
1.2479	1.1612	445.68	448.09	0.0000	448.09	0.00	1340.00	
1.1612	1.1128	448.09	450.37	0.0000	450.37	0.00	1350.00	
1.1128	1.0789	450.37	452.56	0.0000	452.56	0.00	1360.00	
1.0789	1.0669	452.56	454.70	0.0000	454.70	0.00	1370.00	
1.0669	1.0603	454.70	456.83	0.0000	456.83	0.00	1380.00	

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LEVEL POOL ROUTING TABLE

## LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
1.0603	1.0497	456.83	458.94	0.0000	458.94	0.00	1390.00
1.0497	1.0508	458.94	461.04	0.0000	461.04	0.00	1400.00
1.0508	1.0515	461.04	463.14	0.0000	463.14	0.00	1410.00
1.0515	1.0450	463.14	465.24	0.0000	465.24	0.00	1420.00
1.0450	1.0484	465.24	467.33	0.0000	467.33	0.00	1430.00
1.0484	1.0503	467.33	469.43	0.0000	469.43	0.00	1440.00
1.0503	0.8158	469.43	471.30	0.0000	471.30	0.00	1450.00
0.8158	0.4559	471.30	472.57	0.0000	472.57	0.00	1460.00
0.4559	0.2548	472.57	473.28	0.0000	473.28	0.00	1470.00
0.2548	0.1424	473.28	473.68	0.0000	473.68	0.00	1480.00
0.1424	0.0796	473.68	473.90	0.0000	473.90	0.00	1490.00
0.0796	0.0445	473.90	474.02	0.0000	474.02	0.00	1500.00

N' - POND 'B' TOTAL VOLUME

ELEV (FT)	AREA (SF)	VOL (CF)	CUMM VOL (CCF)
135	7015		
136	8904	7960	7960
137	10,849	9877	17,836 ← WQ VOL @ 136.75'
138	12,851	11,550	29,686
139	14,909	15,966	45,652
140	17,023	15,966	61,618

WQ RELEASE RATE

$$\frac{15,249 \text{ ft}^3}{48 \text{ HRS}} \times \frac{1 \text{ HR}}{3600 \text{ s}} = 0.088 \text{ cfs}$$

GROUP  
**MACKENZIE**

0690 SW Bancroft St / PO Box 69039 Portland, OR 97201-0039  
Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

By \_\_\_\_\_  
Date \_\_\_\_\_  
Job # \_\_\_\_\_  
Sht. \_\_\_\_\_ of \_\_\_\_\_

0' - POND 'B' DETENTION VOLUME

ELEV (FT)	AREA (SF)	VOL (CF)	CUMM. VOL. (CF)
136.75	10,363		
137	10,849	2652	2652
138	12,851	11,850	14,502
139	14,909	13,880	28,382
140	17,023	15,452	43,834

GROUP

**MACKENZIE**

0690 SW Bancroft St / PO Box 69039 Portland, OR 97201-0039  
 Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

'P' WQ ORIFICE 'B'

---

$$Q = CA (2gh)^{1/2}$$

$$A = \frac{Q}{C (2gh)^{1/2}}$$

$$A = \frac{0.088 \text{ cfs}}{0.62 (2 \times 32.2 \times 0.5)^{1/2}}$$

$$A = 0.025 \text{ } \phi$$

$$d = \sqrt{\frac{4A}{\pi}} = 0.178' = \underline{\underline{2.14'' \phi}}$$

$$Q = 0.088 \text{ cfs}$$

$$C = 0.6$$

$$h = 136.75 - 136.25 = 0.5'$$

$$g = 32.2$$

$$A = \frac{\pi d^2}{4}$$

$$d = \sqrt{\frac{4A}{\pi}}$$

---

GROUP

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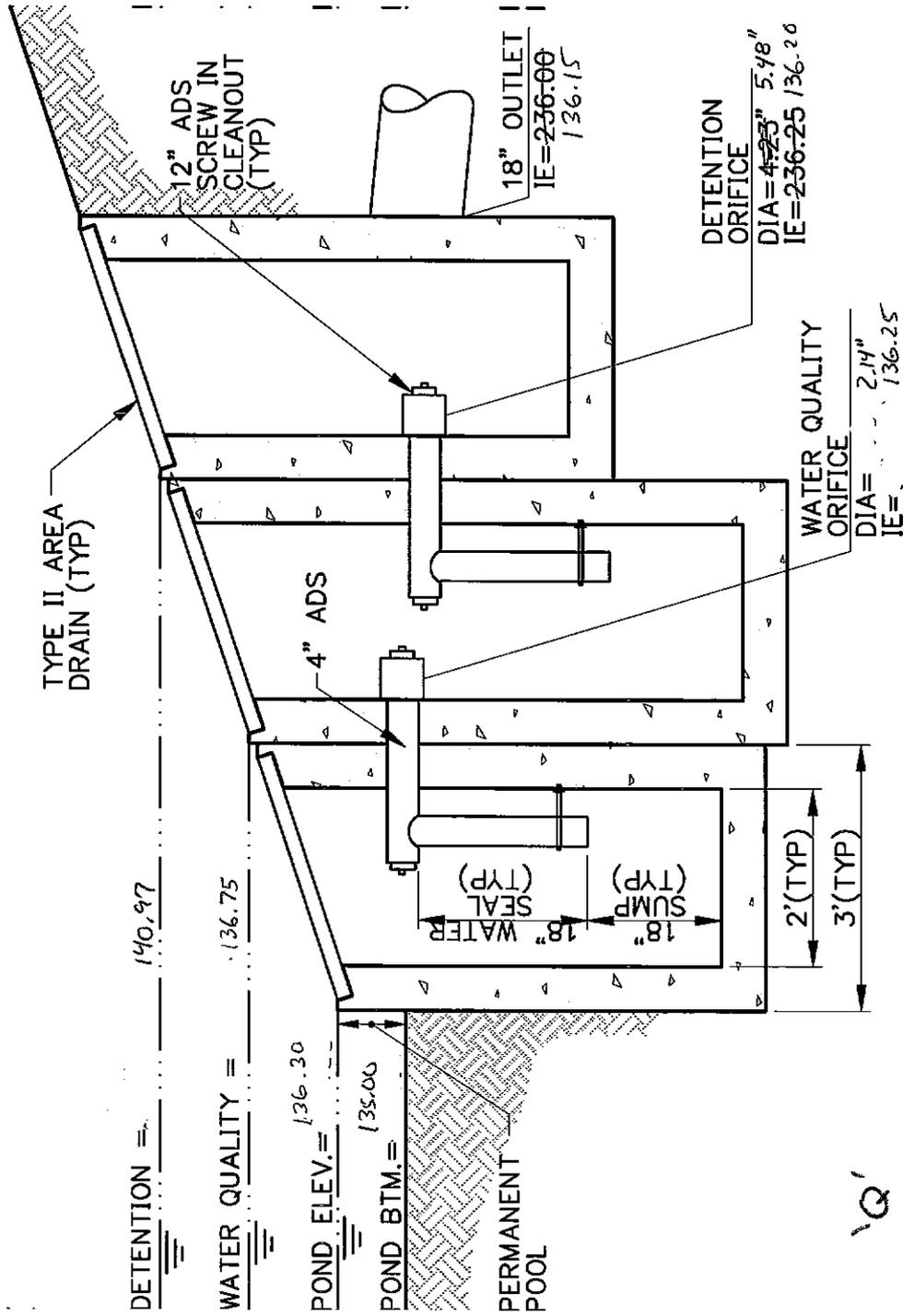
By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

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# 2 POND "B" OUTLET DETAIL

C8.1  
 N.T.S.  
 OUTFLOW DEVICE

SD150  
 DETINSET= 1:1



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BASIN SUMMARY

BASIN ID: E10                   NAME: EXISTING 10YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 13.72 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION....: 3.45 inches           AREA..: 13.72 Acres  
 TIME INTERVAL....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE: 2.90 cfs VOL: 1.83 Ac-ft TIME: 490 min

BASIN ID: E2                   NAME: EXISTING 2YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 13.72 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION....: 2.50 inches           AREA..: 13.72 Acres  
 TIME INTERVAL....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE: 1.36 cfs VOL: 1.02 Ac-ft TIME: 490 min

BASIN ID: E25                  NAME: EXISTING 25YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 13.72 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION....: 3.90 inches           AREA..: 13.72 Acres  
 TIME INTERVAL....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE: 3.71 cfs VOL: 2.24 Ac-ft TIME: 490 min

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## =====

## HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
1	1.356	490	44270 cf	13.72
2	2.902	490	79526 cf	13.72
3	3.714	490	97581 cf	13.72
5	5.734	480	102758 cf	13.72
6	8.230	480	148087 cf	13.72
7	9.422	480	169790 cf	13.72
10	1.356	690	102847 cf	13.72
11	1.670	800	148142 cf	13.72
12	1.779	660	39111 cf	13.72

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    136.20  
Elev:    136.20 ft        Orifice Diameter:    5.4785 in.

ROUTING CURVE

STAGE	STORAGE	OUTFLOW	O+2S	STAGE	STORAGE	OUTFLOW	O+2S	STAGE	STORAGE	OUTFLOW	O+2S
(ft)	(cf)	(cfs)	cfs-min	(ft)	(cf)	(cfs)	cfs-min	(ft)	(cf)	(cfs)	cfs-min
136.20	0.0000	0.0000	0.0000	137.90	13317	1.0620	45.452	139.60	37653	1.5019	127.01
136.30	0.0000	0.2576	0.2576	138.00	14502	1.0928	49.433	139.70	39198	1.5238	132.19
136.40	0.0000	0.3643	0.3643	138.10	15890	1.1227	54.089	139.80	40744	1.5454	137.36
136.50	0.0000	0.4461	0.4461	138.20	17278	1.1519	58.745	139.90	42289	1.5667	142.53
136.60	0.0000	0.5151	0.5151	138.30	18666	1.1803	63.400	140.00	43834	1.5877	147.70
136.70	0.0000	0.5759	0.5759	138.40	20054	1.2081	68.055	140.10	45251	1.6085	152.44
136.80	530.40	0.6309	2.3989	138.50	21442	1.2352	72.709	140.20	46667	1.6290	157.19
136.90	1591	0.6815	5.9855	138.60	22830	1.2618	77.362	140.30	48084	1.6492	161.93
137.00	2652	0.7285	9.5685	138.70	24218	1.2878	82.014	140.40	49500	1.6692	166.67
137.10	3837	0.7727	13.563	138.80	25606	1.3133	86.667	140.50	50917	1.6890	171.41
137.20	5022	0.8145	17.554	138.90	26994	1.3384	91.318	140.60	52334	1.7085	176.15
137.30	6207	0.8542	21.544	139.00	28382	1.3629	95.970	140.70	53750	1.7278	180.90
137.40	7392	0.8922	25.532	139.10	29927	1.3870	101.14	140.80	55167	1.7469	185.64
137.50	8577	0.9287	29.519	139.20	31472	1.4107	106.32	140.90	56583	1.7658	190.38
137.60	9762	0.9637	33.504	139.30	33018	1.4341	111.49				
137.70	10947	0.9975	37.488	139.40	34563	1.4570	116.67				
137.80	12132	1.0303	41.470	139.50	36108	1.4796	121.84				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 1.36 INFLOW Q (cfs): 5.73  
 PEAK STAGE (ft): 138.97 PEAK OUTFLOW : 1.36  
 PEAK TIME: 690.00 min.  
 INFLOW HYD No. : 5 OUTFLOW HYD No.: 10

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE (ft)	TIME (min)
----- cfs min ----->							
0.0000	0.0001	0.0000	0.0001	0.0000	0.0001	136.20	50.00
0.0001	0.0071	0.0000	0.0072	0.0001	0.0071	136.20	60.00
0.0071	0.0405	0.0000	0.0476	0.0071	0.0405	136.20	70.00
0.0405	0.1004	0.0000	0.1409	0.0405	0.1004	136.20	80.00
0.1004	0.1674	0.0000	0.2677	0.1004	0.1674	136.20	90.00
0.1674	0.2325	0.0000	0.3999	0.1674	0.2325	136.20	100.00
0.2325	0.2922	0.0000	0.5246	0.2325	0.2922	136.20	110.00
0.2922	0.3455	0.0000	0.6377	0.2922	0.3455	136.20	120.00
0.3455	0.4121	0.0000	0.7576	0.3455	0.4121	136.20	130.00
0.4121	0.4879	0.0000	0.8999	0.4121	0.4879	136.20	140.00
0.4879	0.5466	0.0000	1.0345	0.4879	0.5466	136.20	150.00
0.5466	0.5916	0.0000	1.1382	0.5466	0.5916	136.20	160.00
0.5916	0.6329	0.0152	1.2397	0.5764	0.6633	136.70	170.00
0.6329	0.6676	0.0847	1.3853	0.5786	0.8067	136.70	180.00
0.6676	0.6944	0.2238	1.5859	0.5829	1.0030	136.71	190.00
0.6944	0.7222	0.4142	1.8308	0.5888	1.2420	136.72	200.00
0.7222	0.7459	0.6460	2.1141	0.5960	1.5181	136.74	210.00
0.7459	0.7634	0.9137	2.4231	0.6043	1.8187	136.75	220.00
0.7634	0.7836	1.2053	2.7523	0.6134	2.1389	136.77	230.00
0.7836	0.8010	1.5159	3.1005	0.6231	2.4774	136.79	240.00
0.8010	0.8455	1.8454	3.4918	0.6320	2.8598	136.80	250.00
0.8455	0.9035	2.2224	3.9714	0.6374	3.3340	136.81	260.00
0.9035	0.9394	2.6899	4.5328	0.6441	3.8888	136.83	270.00
0.9394	0.9673	3.2369	5.1435	0.6519	4.4916	136.84	280.00
0.9673	0.9831	3.8312	5.7815	0.6604	5.1211	136.86	290.00
0.9831	0.9963	4.4519	6.4312	0.6693	5.7620	136.88	300.00
0.9963	1.1404	5.0837	7.2204	0.6783	6.5421	136.89	310.00
1.1404	1.3477	5.8533	8.3415	0.6888	7.6527	136.92	320.00
1.3477	1.4589	6.9494	9.7560	0.7033	9.0527	136.95	330.00
1.4589	1.5216	8.3309	11.311	0.7217	10.590	136.99	340.00
1.5216	1.5601	9.8499	12.932	0.7398	12.192	137.03	350.00
1.5601	1.5875	11.434	14.582	0.7575	13.824	137.07	360.00
1.5875	1.5763	13.049	16.213	0.7754	15.437	137.11	370.00
1.5763	1.5447	14.645	17.766	0.7923	16.974	137.15	380.00
1.5447	1.5310	16.165	19.241	0.8084	18.433	137.19	390.00
1.5310	1.5300	17.609	20.670	0.8232	19.847	137.22	400.00
1.5300	1.5391	19.010	22.079	0.8373	21.241	137.26	410.00
1.5391	1.5444	20.390	23.474	0.8512	22.623	137.29	420.00
1.5444	2.0207	21.758	25.323	0.8645	24.459	137.33	430.00
2.0207	2.7418	23.577	28.339	0.8820	27.457	137.37	440.00
2.7418	3.1175	26.547	32.407	0.9098	31.497	137.45	450.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->			----->		(ft)	(min)	
3.1175	3.9947	30.551	37.663	0.9461	36.717	137.55	460.00
3.9947	5.1321	35.726	44.853	0.9910	43.862	137.68	470.00
5.1321	5.7341	42.812	53.679	1.0493	52.629	137.86	480.00
5.7341	5.1376	51.516	62.388	1.1133	61.274	138.07	490.00
5.1376	3.9324	60.107	69.177	1.1673	68.010	138.25	500.00
3.9324	3.3411	66.802	74.075	1.2078	72.867	138.40	510.00
3.3411	2.9739	71.631	77.946	1.2361	76.710	138.50	520.00
2.9739	2.7215	75.452	81.147	1.2581	79.889	138.59	530.00
2.7215	2.6003	78.613	83.935	1.2759	82.659	138.65	540.00
2.6003	2.3457	81.368	86.314	1.2914	85.022	138.71	550.00
2.3457	2.0240	83.718	88.088	1.3043	86.783	138.76	560.00
2.0240	1.8663	85.469	89.360	1.3140	88.046	138.80	570.00
1.8663	1.7945	86.725	90.386	1.3207	89.065	138.83	580.00
1.7945	1.7557	87.739	91.289	1.3262	89.963	138.85	590.00
1.7557	1.7379	88.632	92.125	1.3311	90.794	138.87	600.00
1.7379	1.6924	89.459	92.889	1.3355	91.554	138.89	610.00
1.6924	1.6330	90.214	93.539	1.3396	92.200	138.91	620.00
1.6330	1.6047	90.857	94.095	1.3430	92.752	138.92	630.00
1.6047	1.5870	91.406	94.597	1.3459	93.251	138.93	640.00
1.5870	1.5841	91.903	95.074	1.3486	93.725	138.94	650.00
1.5841	1.5836	92.374	95.542	1.3511	94.191	138.95	660.00
1.5836	1.5029	92.838	95.924	1.3535	94.571	138.96	670.00
1.5029	1.3821	93.215	96.100	1.3555	94.744	138.97	680.00
1.3821	1.3230	93.388	96.093	1.3564	94.737	138.97	690.00
1.3230	1.2991	93.380	96.002	1.3564	94.646	138.97	700.00
1.2991	1.2830	93.290	95.872	1.3559	94.516	138.97	710.00
1.2830	1.2757	93.161	95.720	1.3552	94.364	138.97	720.00
1.2757	1.2775	93.010	95.563	1.3544	94.209	138.97	730.00
1.2775	1.2741	92.855	95.407	1.3536	94.053	138.96	740.00
1.2741	1.2730	92.700	95.247	1.3528	93.894	138.96	750.00
1.2730	1.2778	92.543	95.093	1.3520	93.741	138.96	760.00
1.2778	1.2759	92.390	94.944	1.3511	93.593	138.95	770.00
1.2759	1.2755	92.242	94.794	1.3504	93.443	138.95	780.00
1.2755	1.1982	92.094	94.567	1.3496	93.218	138.95	790.00
1.1982	1.0780	91.869	94.146	1.3484	92.797	138.94	800.00
1.0780	1.0187	91.451	93.548	1.3462	92.202	138.93	810.00
1.0187	0.9897	90.859	92.867	1.3430	91.524	138.92	820.00
0.9897	0.9756	90.185	92.150	1.3394	90.810	138.90	830.00
0.9756	0.9689	89.475	91.419	1.3356	90.083	138.89	840.00
0.9689	1.0047	88.752	90.725	1.3317	89.394	138.87	850.00
1.0047	1.0666	88.066	90.137	1.3280	88.809	138.86	860.00
1.0666	1.0976	87.484	89.648	1.3249	88.323	138.85	870.00
1.0976	1.1084	87.001	89.207	1.3222	87.885	138.84	880.00
1.1084	1.1190	86.565	88.792	1.3199	87.473	138.83	890.00
1.1190	1.1246	86.155	88.398	1.3177	87.081	138.82	900.00
1.1246	1.1228	85.765	88.013	1.3156	86.697	138.81	910.00
1.1228	1.1272	85.384	87.634	1.3135	86.320	138.80	920.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
			cfs min				(ft)	(min)
----->								
1.1272	1.1296	85.009	87.265	1.3114	85.954	138.79	930.00	
1.1296	1.1263	84.645	86.901	1.3094	85.591	138.78	940.00	
1.1263	1.1299	84.284	86.540	1.3074	85.232	138.78	950.00	
1.1299	1.1320	83.927	86.189	1.3055	84.883	138.77	960.00	
1.1320	1.0060	83.580	85.718	1.3036	84.414	138.76	970.00	
1.0060	0.8262	83.113	84.945	1.3010	83.644	138.75	980.00	
0.8262	0.7373	82.348	83.911	1.2968	82.614	138.74	990.00	
0.7373	0.6885	81.323	82.749	1.2911	81.458	138.71	1000.00	
0.6885	0.6694	80.173	81.531	1.2847	80.247	138.69	1010.00	
0.6694	0.6600	78.969	80.298	1.2779	79.020	138.66	1020.00	
0.6600	0.7340	77.749	79.143	1.2711	77.872	138.64	1030.00	
0.7340	0.8542	76.607	78.195	1.2647	76.931	138.61	1040.00	
0.8542	0.9139	75.671	77.439	1.2593	76.180	138.59	1050.00	
0.9139	0.9437	74.925	76.783	1.2551	75.527	138.57	1060.00	
0.9437	0.9587	74.276	76.179	1.2513	74.927	138.56	1070.00	
0.9587	0.9663	73.679	75.604	1.2479	74.356	138.55	1080.00	
0.9663	0.9309	73.112	75.009	1.2446	73.764	138.54	1090.00	
0.9309	0.8693	72.523	74.323	1.2413	73.082	138.52	1100.00	
0.8693	0.8389	71.844	73.553	1.2374	72.315	138.51	1110.00	
0.8389	0.9767	71.082	72.898	1.2329	71.665	138.49	1120.00	
0.9767	0.8924	70.436	72.305	1.2292	71.076	138.48	1130.00	
0.8924	0.7030	69.850	71.446	1.2257	70.220	138.46	1140.00	
0.7030	0.7621	68.999	70.464	1.2207	69.243	138.45	1150.00	
0.7621	0.7865	68.028	69.577	1.2150	68.362	138.43	1160.00	
0.7865	0.7988	67.152	68.737	1.2099	67.528	138.41	1170.00	
0.7988	0.8099	66.323	67.931	1.2049	66.726	138.39	1180.00	
0.8099	0.8106	65.526	67.147	1.2002	65.947	138.37	1190.00	
0.8106	0.8111	64.751	66.373	1.1955	65.177	138.35	1200.00	
0.8111	0.8164	63.986	65.614	1.1909	64.423	138.34	1210.00	
0.8164	0.8142	63.236	64.867	1.1864	63.681	138.32	1220.00	
0.8142	0.8133	62.499	64.126	1.1820	62.944	138.31	1230.00	
0.8133	0.8179	61.767	63.398	1.1775	62.220	138.29	1240.00	
0.8179	0.8153	61.047	62.681	1.1731	61.507	138.27	1250.00	
0.8153	0.8142	60.339	61.968	1.1687	60.799	138.26	1260.00	
0.8142	0.8187	59.635	61.268	1.1644	60.104	138.24	1270.00	
0.8187	0.8161	58.943	60.578	1.1602	59.418	138.23	1280.00	
0.8161	0.8150	58.262	59.893	1.1560	58.737	138.21	1290.00	
0.8150	0.8195	57.585	59.220	1.1518	58.068	138.20	1300.00	
0.8195	0.8169	56.921	58.557	1.1476	57.409	138.19	1310.00	
0.8169	0.8157	56.266	57.898	1.1435	56.755	138.17	1320.00	
0.8157	0.7756	55.615	57.207	1.1394	56.067	138.16	1330.00	
0.7756	0.7162	54.932	56.424	1.1351	55.289	138.14	1340.00	
0.7162	0.6868	54.159	55.562	1.1302	54.431	138.13	1350.00	
0.6868	0.6674	53.307	54.661	1.1248	53.536	138.11	1360.00	
0.6674	0.6628	52.417	53.747	1.1191	52.628	138.09	1370.00	
0.6628	0.6606	51.515	52.838	1.1133	51.725	138.07	1380.00	
0.6606	0.6547	50.617	51.932	1.1075	50.825	138.05	1390.00	

NOVELLUS

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
0.6547	0.6567	49.723	51.035	1.1017	49.933	138.03	1400.00	
0.6567	0.6578	48.837	50.152	1.0960	49.056	138.01	1410.00	
0.6578	0.6535	47.966	49.277	1.0898	48.187	137.99	1420.00	
0.6535	0.6564	47.104	48.414	1.0831	47.331	137.97	1430.00	
0.6564	0.6579	46.254	47.569	1.0765	46.492	137.95	1440.00	
0.6579	0.4897	45.422	46.570	1.0700	45.500	137.93	1450.00	
0.4897	0.2424	44.437	45.169	1.0623	44.107	137.90	1460.00	
0.2424	0.1200	43.056	43.418	1.0513	42.367	137.87	1470.00	
0.1200	0.0594	41.330	41.509	1.0374	40.472	137.82	1480.00	
0.0594	0.0294	39.450	39.538	1.0221	38.516	137.77	1490.00	
0.0294	0.0146	37.510	37.554	1.0060	36.548	137.73	1500.00	
0.0146	0.0072	35.559	35.581	0.9896	34.591	137.68	1510.00	
0.0072	0.0036	33.618	33.629	0.9730	32.656	137.63	1520.00	
0.0036	0.0018	31.700	31.705	0.9563	30.749	137.58	1530.00	
0.0018	0.0009	29.809	29.812	0.9395	28.872	137.53	1540.00	
0.0009	0.0004	27.950	27.951	0.9228	27.028	137.48	1550.00	
0.0004	0.0002	26.122	26.123	0.9059	25.217	137.44	1560.00	
0.0002	0.0001	24.328	24.328	0.8892	23.439	137.39	1570.00	
0.0001	0.0001	22.566	22.567	0.8723	21.694	137.35	1580.00	
0.0001	0.0000	20.839	20.839	0.8557	19.983	137.30	1590.00	
0.0000	0.0000	19.144	19.144	0.8387	18.306	137.26	1600.00	
0.0000	0.0000	17.484	17.484	0.8220	16.662	137.22	1610.00	
0.0000	0.0000	15.857	15.857	0.8051	15.051	137.18	1620.00	
0.0000	0.0000	14.263	14.263	0.7883	13.475	137.14	1630.00	
0.0000	0.0000	12.703	12.703	0.7717	11.931	137.10	1640.00	
0.0000	0.0000	11.177	11.177	0.7546	10.422	137.06	1650.00	
0.0000	0.0000	9.6842	9.6842	0.7380	8.9463	137.02	1660.00	
0.0000	0.0000	8.2259	8.2259	0.7203	7.5056	136.98	1670.00	
0.0000	0.0000	6.8042	6.8042	0.7014	6.1028	136.94	1680.00	
0.0000	0.0000	5.4198	5.4198	0.6830	4.7368	136.90	1690.00	
0.0000	0.0000	4.0729	4.0729	0.6639	3.4091	136.87	1700.00	
0.0000	0.0000	2.7639	2.7639	0.6451	2.1188	136.83	1710.00	
0.0000	0.0000	1.4963	1.4963	0.6225	0.8739	136.78	1720.00	
0.0000	0.0000	0.2890	0.2890	0.5849	-0.2960	136.72	1730.00	

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    136.20  
Elev:    136.20 ft        Orifice Diameter:    5.4785 in.

ROUTING CURVE

STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min
136.20	0.0000	0.0000	0.0000	137.90	13317	1.0620	45.452	139.60	37653	1.5019	127.01
136.30	0.0000	0.2576	0.2576	138.00	14502	1.0928	49.433	139.70	39198	1.5238	132.19
136.40	0.0000	0.3643	0.3643	138.10	15890	1.1227	54.089	139.80	40744	1.5454	137.36
136.50	0.0000	0.4461	0.4461	138.20	17278	1.1519	58.745	139.90	42289	1.5667	142.53
136.60	0.0000	0.5151	0.5151	138.30	18666	1.1803	63.400	140.00	43834	1.5877	147.70
136.70	0.0000	0.5759	0.5759	138.40	20054	1.2081	68.055	140.10	45251	1.6085	152.44
136.80	530.40	0.6309	2.3989	138.50	21442	1.2352	72.709	140.20	46667	1.6290	157.19
136.90	1591	0.6815	5.9855	138.60	22830	1.2618	77.362	140.30	48084	1.6492	161.93
137.00	2652	0.7285	9.5685	138.70	24218	1.2878	82.014	140.40	49500	1.6692	166.67
137.10	3837	0.7727	13.563	138.80	25606	1.3133	86.667	140.50	50917	1.6890	171.41
137.20	5022	0.8145	17.554	138.90	26994	1.3384	91.318	140.60	52334	1.7085	176.15
137.30	6207	0.8542	21.544	139.00	28382	1.3629	95.970	140.70	53750	1.7278	180.90
137.40	7392	0.8922	25.532	139.10	29927	1.3870	101.14	140.80	55167	1.7469	185.64
137.50	8577	0.9287	29.519	139.20	31472	1.4107	106.32	140.90	56583	1.7658	190.38
137.60	9762	0.9637	33.504	139.30	33018	1.4341	111.49				
137.70	10947	0.9975	37.488	139.40	34563	1.4570	116.67				
137.80	12132	1.0303	41.470	139.50	36108	1.4796	121.84				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 2.90 INFLOW Q (cfs): 8.23  
 PEAK STAGE (ft): 140.41 PEAK OUTFLOW : 1.67  
 PEAK TIME: 800.00 min.  
 INFLOW HYD No. : 6 OUTFLOW HYD No.: 11

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE (ft)	TIME (min)
<----- cfs min ----->							
0.0000	0.0022	0.0000	0.0022	0.0000	0.0022	136.20	40.00
0.0022	0.0238	0.0000	0.0260	0.0022	0.0238	136.20	50.00
0.0238	0.0705	0.0000	0.0944	0.0238	0.0705	136.20	60.00
0.0705	0.1595	0.0000	0.2300	0.0705	0.1595	136.20	70.00
0.1595	0.2804	0.0000	0.4399	0.1595	0.2804	136.20	80.00
0.2804	0.3921	0.0000	0.6725	0.2804	0.3921	136.20	90.00
0.3921	0.4901	0.0000	0.8823	0.3921	0.4901	136.20	100.00
0.4901	0.5742	0.0000	1.0643	0.4901	0.5742	136.20	110.00
0.5742	0.6457	0.0000	1.2199	0.5742	0.6457	136.20	120.00
0.6457	0.7394	0.0677	1.4528	0.5780	0.8747	136.70	130.00
0.7394	0.8479	0.2898	1.8770	0.5849	1.2921	136.72	140.00
0.8479	0.9262	0.6945	2.4686	0.5975	1.8711	136.74	150.00
0.9262	0.9816	1.2561	3.1639	0.6150	2.5489	136.77	160.00
0.9816	1.0317	1.9159	3.9292	0.6330	3.2962	136.80	170.00
1.0317	1.0721	2.6526	4.7564	0.6436	4.1128	136.83	180.00
1.0721	1.1008	3.4578	5.6306	0.6551	4.9755	136.85	190.00
1.1008	1.1318	4.3083	6.5409	0.6672	5.8737	136.87	200.00
1.1318	1.1577	5.1938	7.4834	0.6799	6.8035	136.90	210.00
1.1577	1.1746	6.1113	8.4436	0.6922	7.7514	136.92	220.00
1.1746	1.1964	7.0467	9.4178	0.7046	8.7131	136.95	230.00
1.1964	1.2146	7.9958	10.407	0.7173	9.6896	136.98	240.00
1.2146	1.2737	8.9598	11.448	0.7298	10.718	137.00	250.00
1.2737	1.3532	9.9771	12.604	0.7412	11.863	137.03	260.00
1.3532	1.3994	11.109	13.861	0.7539	13.108	137.06	270.00
1.3994	1.4340	12.340	15.173	0.7677	14.406	137.09	280.00
1.4340	1.4521	13.624	16.510	0.7815	15.729	137.12	290.00
1.4521	1.4683	14.933	17.854	0.7954	17.058	137.15	300.00
1.4683	1.6787	16.249	19.396	0.8093	18.587	137.19	310.00
1.6787	1.9830	17.762	21.423	0.8248	20.599	137.23	320.00
1.9830	2.1467	19.754	23.884	0.8448	23.039	137.28	330.00
2.1467	2.2398	22.170	26.557	0.8685	25.688	137.34	340.00
2.2398	2.2969	24.795	29.331	0.8937	28.438	137.40	350.00
2.2969	2.3352	27.519	32.151	0.9188	31.232	137.47	360.00
2.3352	2.3149	30.288	34.939	0.9437	33.995	137.54	370.00
2.3149	2.2642	33.027	37.606	0.9679	36.638	137.61	380.00
2.2642	2.2399	35.648	40.152	0.9903	39.162	137.68	390.00
2.2399	2.2342	38.150	42.624	1.0113	41.613	137.74	400.00
2.2342	2.2436	40.582	45.059	1.0314	44.028	137.80	410.00
2.2436	2.2477	42.977	47.469	1.0506	46.418	137.86	420.00
2.2477	2.9341	45.349	50.531	1.0694	49.461	137.92	430.00
2.9341	3.9727	48.368	55.275	1.0929	54.182	138.00	440.00

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 LEVEL POOL ROUTING TABLE  
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## LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
=====							
3.9727	4.5081	53.059	61.540	1.1233	60.416	138.10	450.00
4.5081	5.7611	59.254	69.523	1.1621	68.361	138.24	460.00
5.7611	7.3831	67.151	80.296	1.2099	79.086	138.41	470.00
7.3831	8.2300	77.814	93.427	1.2714	92.156	138.64	480.00
8.2300	7.3623	90.813	106.41	1.3428	105.06	138.92	490.00
7.3623	5.6284	103.66	116.65	1.4050	115.24	139.18	500.00
5.6284	4.7761	113.79	124.20	1.4507	122.75	139.37	510.00
4.7761	4.2464	121.26	130.29	1.4835	128.80	139.52	520.00
4.2464	3.8824	127.29	135.42	1.5094	133.91	139.63	530.00
3.8824	3.7062	132.38	139.97	1.5310	138.44	139.73	540.00
3.7062	3.3412	136.89	143.94	1.5498	142.39	139.82	550.00
3.3412	2.8814	140.82	147.04	1.5661	145.48	139.90	560.00
2.8814	2.6556	143.90	149.44	1.5787	147.86	139.96	570.00
2.6556	2.5522	146.27	151.48	1.5884	149.89	140.00	580.00
2.5522	2.4959	148.29	153.34	1.5973	151.74	140.05	590.00
2.4959	2.4696	150.14	155.10	1.6054	153.50	140.09	600.00
2.4696	2.4040	151.88	156.76	1.6130	155.14	140.12	610.00
2.4040	2.3189	153.52	158.25	1.6202	156.63	140.16	620.00
2.3189	2.2779	155.00	159.60	1.6266	157.97	140.19	630.00
2.2779	2.2521	156.34	160.87	1.6323	159.23	140.22	640.00
2.2521	2.2472	157.60	162.10	1.6377	160.46	140.24	650.00
2.2472	2.2459	158.82	163.31	1.6430	161.67	140.27	660.00
2.2459	2.1308	160.02	164.39	1.6481	162.75	140.29	670.00
2.1308	1.9591	161.09	165.18	1.6527	163.53	140.32	680.00
1.9591	1.8748	161.87	165.71	1.6560	164.05	140.33	690.00
1.8748	1.8405	162.39	166.11	1.6582	164.45	140.34	700.00
1.8405	1.8174	162.79	166.45	1.6599	164.79	140.35	710.00
1.8174	1.8066	163.13	166.75	1.6613	165.09	140.36	720.00
1.8066	1.8087	163.43	167.04	1.6626	165.38	140.37	730.00
1.8087	1.8035	163.72	167.33	1.6638	165.67	140.37	740.00
1.8035	1.8016	164.00	167.61	1.6650	165.94	140.38	750.00
1.8016	1.8080	164.28	167.88	1.6661	166.22	140.38	760.00
1.8080	1.8050	164.55	168.16	1.6673	166.50	140.39	770.00
1.8050	1.8040	164.83	168.44	1.6685	166.77	140.40	780.00
1.8040	1.6945	165.10	168.60	1.6696	166.93	140.40	790.00
1.6945	1.5242	165.26	168.48	1.6703	166.81	140.41	800.00
1.5242	1.4402	165.14	168.10	1.6698	166.43	140.40	810.00
1.4402	1.3989	164.76	167.60	1.6682	165.93	140.39	820.00
1.3989	1.3787	164.27	167.04	1.6661	165.38	140.38	830.00
1.3787	1.3691	163.72	166.46	1.6638	164.80	140.37	840.00
1.3691	1.4195	163.14	165.93	1.6613	164.27	140.36	850.00
1.4195	1.5067	162.61	165.53	1.6591	163.87	140.35	860.00
1.5067	1.5503	162.22	165.27	1.6574	163.62	140.34	870.00
1.5503	1.5653	161.96	165.07	1.6563	163.42	140.34	880.00
1.5653	1.5800	161.76	164.91	1.6555	163.25	140.33	890.00
1.5800	1.5877	161.60	164.77	1.6548	163.11	140.33	900.00
1.5877	1.5850	161.46	164.63	1.6542	162.97	140.32	910.00

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LEVEL POOL ROUTING TABLE

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LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->			<----->		>----->		
							(ft)
							(min)
=====							
1.5850	1.5909	161.32	164.50	1.6536	162.84	140.32	920.00
1.5909	1.5941	161.19	164.38	1.6531	162.72	140.32	930.00
1.5941	1.5892	161.07	164.25	1.6526	162.60	140.32	940.00
1.5892	1.5940	160.95	164.13	1.6521	162.48	140.31	950.00
1.5940	1.5968	160.83	164.02	1.6515	162.37	140.31	960.00
1.5968	1.4188	160.72	163.73	1.6511	162.08	140.31	970.00
1.4188	1.1652	160.43	163.01	1.6499	161.37	140.30	980.00
1.1652	1.0397	159.72	161.92	1.6468	160.28	140.29	990.00
1.0397	0.9708	158.63	160.64	1.6422	159.00	140.27	1000.00
0.9708	0.9437	157.37	159.28	1.6367	157.64	140.24	1010.00
0.9437	0.9304	156.01	157.89	1.6309	156.26	140.21	1020.00
0.9304	1.0346	154.63	156.60	1.6250	154.97	140.18	1030.00
1.0346	1.2040	153.35	155.59	1.6194	153.97	140.15	1040.00
1.2040	1.2880	152.36	154.85	1.6151	153.23	140.13	1050.00
1.2880	1.3299	151.62	154.24	1.6119	152.63	140.12	1060.00
1.3299	1.3508	151.02	153.70	1.6093	152.09	140.10	1070.00
1.3508	1.3614	150.48	153.19	1.6069	151.59	140.09	1080.00
1.3614	1.3114	149.98	152.66	1.6047	151.05	140.08	1090.00
1.3114	1.2245	149.45	151.98	1.6024	150.38	140.07	1100.00
1.2245	1.1816	148.78	151.19	1.5995	149.59	140.06	1110.00
1.1816	1.3755	147.99	150.55	1.5960	148.95	140.04	1120.00
1.3755	1.2567	147.36	149.99	1.5932	148.40	140.03	1130.00
1.2567	0.9899	146.81	149.06	1.5908	147.46	140.01	1140.00
0.9899	1.0730	145.88	147.94	1.5868	146.35	140.00	1150.00
1.0730	1.1073	144.77	146.95	1.5823	145.37	139.97	1160.00
1.1073	1.1245	143.79	146.02	1.5783	144.44	139.95	1170.00
1.1245	1.1400	142.87	145.13	1.5745	143.56	139.94	1180.00
1.1400	1.1409	141.99	144.27	1.5709	142.70	139.92	1190.00
1.1409	1.1415	141.13	143.41	1.5674	141.85	139.90	1200.00
1.1415	1.1489	140.28	142.57	1.5639	141.01	139.89	1210.00
1.1489	1.1457	139.45	141.74	1.5604	140.18	139.87	1220.00
1.1457	1.1443	138.63	140.92	1.5570	139.36	139.85	1230.00
1.1443	1.1507	137.81	140.10	1.5536	138.55	139.84	1240.00
1.1507	1.1470	137.00	139.29	1.5503	137.74	139.82	1250.00
1.1470	1.1453	136.20	138.49	1.5470	136.94	139.81	1260.00
1.1453	1.1516	135.40	137.70	1.5437	136.15	139.79	1270.00
1.1516	1.1479	134.61	136.91	1.5404	135.37	139.78	1280.00
1.1479	1.1461	133.83	136.13	1.5371	134.59	139.76	1290.00
1.1461	1.1524	133.06	135.36	1.5338	133.82	139.75	1300.00
1.1524	1.1486	132.29	134.59	1.5306	133.06	139.73	1310.00
1.1486	1.1469	131.53	133.83	1.5274	132.30	139.72	1320.00
1.1469	1.0904	130.78	133.01	1.5243	131.49	139.70	1330.00
1.0904	1.0068	129.97	132.07	1.5208	130.55	139.69	1340.00
1.0068	0.9654	129.03	131.00	1.5168	129.48	139.67	1350.00
0.9654	0.9381	127.97	129.88	1.5123	128.36	139.65	1360.00
0.9381	0.9316	126.86	128.73	1.5076	127.22	139.63	1370.00
0.9316	0.9285	125.72	127.58	1.5027	126.07	139.60	1380.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE
I1 I2 2S1 SUM O1 O2+2S2 STAGE TIME
<----- cfs min -----> (ft) (min)
=====
0.9285 0.9200 124.57 126.42 1.4978 124.93 139.58 1390.00
0.9200 0.9229 123.43 125.28 1.4929 123.78 139.56 1400.00
0.9229 0.9244 122.29 124.14 1.4880 122.65 139.54 1410.00
0.9244 0.9182 121.17 123.01 1.4831 121.53 139.52 1420.00
0.9182 0.9222 120.05 121.89 1.4783 120.41 139.49 1430.00
0.9222 0.9243 118.94 120.79 1.4734 119.31 139.47 1440.00
0.9243 0.6880 117.85 119.46 1.4686 117.99 139.45 1450.00
0.6880 0.3406 116.53 117.55 1.4628 116.09 139.43 1460.00
0.3406 0.1686 114.64 115.15 1.4545 113.69 139.39 1470.00
0.1686 0.0835 112.25 112.50 1.4438 111.06 139.34 1480.00
0.0835 0.0413 109.62 109.75 1.4321 108.32 139.29 1490.00
0.0413 0.0205 106.90 106.96 1.4198 105.54 139.24 1500.00
0.0205 0.0101 104.13 104.16 1.4072 102.76 139.18 1510.00
0.0101 0.0050 101.36 101.38 1.3944 99.982 139.13 1520.00
0.0050 0.0025 98.601 98.608 1.3816 97.226 139.08 1530.00
0.0025 0.0012 95.858 95.861 1.3688 94.493 139.02 1540.00
0.0012 0.0006 93.137 93.139 1.3551 91.784 138.97 1550.00
0.0006 0.0003 90.443 90.444 1.3408 89.104 138.91 1560.00
0.0003 0.0001 87.777 87.778 1.3264 86.451 138.85 1570.00
0.0001 0.0001 85.139 85.139 1.3122 83.827 138.80 1580.00
0.0001 0.0000 82.529 82.529 1.2978 81.232 138.74 1590.00
0.0000 0.0000 79.948 79.948 1.2834 78.665 138.68 1600.00
0.0000 0.0000 77.396 77.396 1.2691 76.127 138.63 1610.00
0.0000 0.0000 74.872 74.872 1.2548 73.617 138.57 1620.00
0.0000 0.0000 72.377 72.377 1.2404 71.136 138.52 1630.00
0.0000 0.0000 69.910 69.910 1.2261 68.684 138.47 1640.00
0.0000 0.0000 67.472 67.472 1.2118 66.261 138.41 1650.00
0.0000 0.0000 65.063 65.063 1.1974 63.866 138.36 1660.00
0.0000 0.0000 62.683 62.683 1.1831 61.500 138.31 1670.00
0.0000 0.0000 60.331 60.331 1.1687 59.162 138.26 1680.00
0.0000 0.0000 58.008 58.008 1.1544 56.853 138.21 1690.00
0.0000 0.0000 55.713 55.713 1.1400 54.573 138.16 1700.00
0.0000 0.0000 53.448 53.448 1.1257 52.322 138.11 1710.00
0.0000 0.0000 51.211 51.211 1.1113 50.099 138.06 1720.00
0.0000 0.0000 49.002 49.002 1.0970 47.905 138.01 1730.00
0.0000 0.0000 46.824 46.824 1.0809 45.743 137.96 1740.00
0.0000 0.0000 44.679 44.679 1.0642 43.615 137.91 1750.00
0.0000 0.0000 42.567 42.567 1.0473 41.520 137.85 1760.00
0.0000 0.0000 40.489 40.489 1.0307 39.459 137.80 1770.00
0.0000 0.0000 38.445 38.445 1.0137 37.431 137.75 1780.00
0.0000 0.0000 36.434 36.434 0.9971 35.437 137.70 1790.00
0.0000 0.0000 34.457 34.457 0.9801 33.477 137.65 1800.00
0.0000 0.0000 32.513 32.513 0.9635 31.550 137.60 1810.00
0.0000 0.0000 30.603 30.603 0.9465 29.657 137.55 1820.00
0.0000 0.0000 28.727 28.727 0.9299 27.797 137.50 1830.00
0.0000 0.0000 26.884 26.884 0.9129 25.971 137.46 1840.00
0.0000 0.0000 25.075 25.075 0.8962 24.179 137.41 1850.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
		cfs min				(ft)	(min)
----->							
0.0000	0.0000	23.299	23.299	0.8793	22.420	137.37	1860.00
0.0000	0.0000	21.557	21.557	0.8626	20.695	137.32	1870.00
0.0000	0.0000	19.849	19.849	0.8458	19.003	137.28	1880.00
0.0000	0.0000	18.174	18.174	0.8289	17.345	137.24	1890.00
0.0000	0.0000	16.533	16.533	0.8123	15.721	137.19	1900.00
0.0000	0.0000	14.926	14.926	0.7953	14.130	137.15	1910.00
0.0000	0.0000	13.352	13.352	0.7786	12.573	137.11	1920.00
0.0000	0.0000	11.811	11.811	0.7617	11.049	137.08	1930.00
0.0000	0.0000	10.305	10.305	0.7449	9.5597	137.04	1940.00
0.0000	0.0000	8.8313	8.8313	0.7284	8.1029	137.00	1950.00
0.0000	0.0000	7.3937	7.3937	0.7093	6.6844	136.96	1960.00
0.0000	0.0000	5.9938	5.9938	0.6906	5.3031	136.92	1970.00
0.0000	0.0000	4.6313	4.6313	0.6718	3.9595	136.88	1980.00
0.0000	0.0000	3.3066	3.3066	0.6529	2.6537	136.84	1990.00
0.0000	0.0000	2.0192	2.0192	0.6345	1.3847	136.81	2000.00
0.0000	0.0000	0.7843	0.7843	0.6003	0.1840	136.74	2010.00
0.0000	0.0000	0.0000	0.0000	0.1840	-0.1840	136.70	2020.00

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    136.20  
Elev:    136.20 ft        Orifice Diameter:    5.4785 in.

ROUTING CURVE

STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min
136.20	0.0000	0.0000	0.0000	137.90	13317	1.0620	45.452	139.60	37653	1.5019	127.01
136.30	0.0000	0.2576	0.2576	138.00	14502	1.0928	49.433	139.70	39198	1.5238	132.19
136.40	0.0000	0.3643	0.3643	138.10	15890	1.1227	54.089	139.80	40744	1.5454	137.36
136.50	0.0000	0.4461	0.4461	138.20	17278	1.1519	58.745	139.90	42289	1.5667	142.53
136.60	0.0000	0.5151	0.5151	138.30	18666	1.1803	63.400	140.00	43834	1.5877	147.70
136.70	0.0000	0.5759	0.5759	138.40	20054	1.2081	68.055	140.10	45251	1.6085	152.44
136.80	530.40	0.6309	2.3989	138.50	21442	1.2352	72.709	140.20	46667	1.6290	157.19
136.90	1591	0.6815	5.9855	138.60	22830	1.2618	77.362	140.30	48084	1.6492	161.93
137.00	2652	0.7285	9.5685	138.70	24218	1.2878	82.014	140.40	49500	1.6692	166.67
137.10	3837	0.7727	13.563	138.80	25606	1.3133	86.667	140.50	50917	1.6890	171.41
137.20	5022	0.8145	17.554	138.90	26994	1.3384	91.318	140.60	52334	1.7085	176.15
137.30	6207	0.8542	21.544	139.00	28382	1.3629	95.970	140.70	53750	1.7278	180.90
137.40	7392	0.8922	25.532	139.10	29927	1.3870	101.14	140.80	55167	1.7469	185.64
137.50	8577	0.9287	29.519	139.20	31472	1.4107	106.32	140.90	56583	1.7658	190.38
137.60	9762	0.9637	33.504	139.30	33018	1.4341	111.49				
137.70	10947	0.9975	37.488	139.40	34563	1.4570	116.67				
137.80	12132	1.0303	41.470	139.50	36108	1.4796	121.84				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 3.71 INFLOW Q (cfs): 9.42  
 PEAK STAGE (ft): 140.97 PEAK OUTFLOW : 1.78  
 PEAK TIME: 660.00 min.  
 INFLOW HYD No. : 7 OUTFLOW HYD No.: 12

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.0000	0.0101	0.0000	0.0101	0.0000	0.0101	136.20	40.00
0.0101	0.0511	0.0000	0.0612	0.0101	0.0511	136.20	50.00
0.0511	0.1172	0.0000	0.1684	0.0511	0.1172	136.20	60.00
0.1172	0.2314	0.0000	0.3486	0.1172	0.2314	136.20	70.00
0.2314	0.3813	0.0000	0.6127	0.2314	0.3813	136.20	80.00
0.3813	0.5133	0.0000	0.8946	0.3813	0.5133	136.20	90.00
0.5133	0.6254	0.0000	1.1387	0.5133	0.6254	136.20	100.00
0.6254	0.7193	0.0480	1.3927	0.5774	0.8152	136.70	110.00
0.7193	0.7978	0.2321	1.7492	0.5832	1.1660	136.71	120.00
0.7978	0.9030	0.5723	2.2730	0.5937	1.6793	136.73	130.00
0.9030	1.0258	1.0701	2.9989	0.6092	2.3897	136.76	140.00
1.0258	1.1121	1.7590	3.8970	0.6306	3.2663	136.80	150.00
1.1121	1.1713	2.6232	4.9067	0.6431	4.2635	136.82	160.00
1.1713	1.2245	3.6063	6.0021	0.6572	5.3449	136.85	170.00
1.2245	1.2665	4.6725	7.1635	0.6724	6.4911	136.88	180.00
1.2665	1.2954	5.8030	8.3649	0.6881	7.6768	136.91	190.00
1.2954	1.3274	6.9731	9.5958	0.7037	8.8922	136.95	200.00
1.3274	1.3536	8.1725	10.854	0.7196	10.134	136.98	210.00
1.3536	1.3698	9.3991	12.123	0.7348	11.388	137.01	220.00
1.3698	1.3920	10.639	13.401	0.7486	12.652	137.05	230.00
1.3920	1.4103	11.890	14.692	0.7626	13.929	137.08	240.00
1.4103	1.4760	13.153	16.039	0.7765	15.263	137.11	250.00
1.4760	1.5658	14.472	17.514	0.7905	16.723	137.14	260.00
1.5658	1.6191	15.918	19.102	0.8058	18.297	137.18	270.00
1.6191	1.6610	17.475	20.755	0.8219	19.933	137.22	280.00
1.6610	1.6838	19.095	22.440	0.8382	21.601	137.26	290.00
1.6838	1.7030	20.747	24.133	0.8548	23.279	137.30	300.00
1.7030	1.9460	22.408	26.057	0.8708	25.186	137.34	310.00
1.9460	2.2967	24.297	28.540	0.8889	27.651	137.39	320.00
2.2967	2.4840	26.739	31.520	0.9116	30.609	137.45	330.00
2.4840	2.5893	29.670	34.744	0.9383	33.805	137.53	340.00
2.5893	2.6528	32.839	38.081	0.9663	37.115	137.61	350.00
2.6528	2.6948	36.120	41.468	0.9944	40.474	137.69	360.00
2.6948	2.6693	39.452	44.816	1.0221	43.794	137.77	370.00
2.6693	2.6091	42.745	48.023	1.0488	46.974	137.86	380.00
2.6091	2.5794	45.901	51.089	1.0737	50.015	137.94	390.00
2.5794	2.5714	48.919	54.070	1.0965	52.973	138.01	400.00
2.5714	2.5808	51.858	57.010	1.1155	55.894	138.08	410.00
2.5808	2.5843	54.760	59.925	1.1340	58.791	138.14	420.00
2.5843	3.3711	57.639	63.595	1.1522	62.443	138.20	430.00
3.3711	4.5616	61.268	69.201	1.1745	68.026	138.28	440.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
4.5616	5.1730	66.818	76.553	1.2079	75.345	138.40	450.00	
5.1730	6.6055	74.095	85.873	1.2503	84.623	138.56	460.00	
6.6055	8.4586	83.321	98.385	1.3021	97.083	138.76	470.00	
8.4586	9.4219	95.715	113.60	1.3681	112.23	139.02	480.00	
9.4219	8.4243	110.79	128.64	1.4373	127.20	139.31	490.00	
8.4243	6.4378	125.70	140.56	1.5026	139.06	139.60	500.00	
6.4378	5.4605	137.50	149.40	1.5524	147.85	139.83	510.00	
5.4605	4.8532	146.26	156.57	1.5884	154.99	140.00	520.00	
4.8532	4.4357	153.37	162.66	1.6195	161.04	140.15	530.00	
4.4357	4.2333	159.39	168.06	1.6454	166.41	140.28	540.00	
4.2333	3.8155	164.75	172.79	1.6681	171.13	140.39	550.00	
3.8155	3.2899	169.44	176.54	1.6878	174.86	140.49	560.00	
3.2899	3.0315	173.15	179.47	1.7032	177.77	140.57	570.00	
3.0315	2.9129	176.06	182.00	1.7151	180.29	140.63	580.00	
2.9129	2.8482	178.56	184.32	1.7253	182.60	140.69	590.00	
2.8482	2.8179	180.86	186.53	1.7347	184.79	140.74	600.00	
2.8179	2.7427	183.05	188.61	1.7435	186.87	140.78	610.00	
2.7427	2.6453	185.11	190.50	1.7518	188.75	140.83	620.00	
2.6453	2.5983	186.99	192.23	1.7593	190.48	140.87	630.00	
2.5983	2.5685	188.71	193.88	1.7662	192.11	140.90	640.00	
2.5685	2.5626	190.34	195.47	1.7726	193.70	140.94	650.00	
2.5626	2.5609	191.92	197.04	1.7789	195.26	140.97	660.00	
2.5609	2.4294	195.26	200.25	0.0000	200.25	0.00	670.00	
2.4294	2.2335	200.25	204.91	0.0000	204.91	0.00	680.00	
2.2335	2.1372	204.91	209.29	0.0000	209.29	0.00	690.00	
2.1372	2.0979	209.29	213.52	0.0000	213.52	0.00	700.00	
2.0979	2.0714	213.52	217.69	0.0000	217.69	0.00	710.00	
2.0714	2.0589	217.69	221.82	0.0000	221.82	0.00	720.00	
2.0589	2.0611	221.82	225.94	0.0000	225.94	0.00	730.00	
2.0611	2.0551	225.94	230.06	0.0000	230.06	0.00	740.00	
2.0551	2.0527	230.06	234.16	0.0000	234.16	0.00	750.00	
2.0527	2.0599	234.16	238.28	0.0000	238.28	0.00	760.00	
2.0599	2.0563	238.28	242.39	0.0000	242.39	0.00	770.00	
2.0563	2.0551	242.39	246.50	0.0000	246.50	0.00	780.00	
2.0551	1.9302	246.50	250.49	0.0000	250.49	0.00	790.00	
1.9302	1.7361	250.49	254.16	0.0000	254.16	0.00	800.00	
1.7361	1.6403	254.16	257.53	0.0000	257.53	0.00	810.00	
1.6403	1.5932	257.53	260.77	0.0000	260.77	0.00	820.00	
1.5932	1.5702	260.77	263.93	0.0000	263.93	0.00	830.00	
1.5702	1.5591	263.93	267.06	0.0000	267.06	0.00	840.00	
1.5591	1.6165	267.06	270.23	0.0000	270.23	0.00	850.00	
1.6165	1.7157	270.23	273.57	0.0000	273.57	0.00	860.00	
1.7157	1.7652	273.57	277.05	0.0000	277.05	0.00	870.00	
1.7652	1.7822	277.05	280.60	0.0000	280.60	0.00	880.00	
1.7822	1.7989	280.60	284.18	0.0000	284.18	0.00	890.00	
1.7989	1.8075	284.18	287.78	0.0000	287.78	0.00	900.00	
1.8075	1.8043	287.78	291.39	0.0000	291.39	0.00	910.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE							
I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<-----		cfs	min	----->		(ft)	(min)
=====							
1.8043	1.8110	291.39	295.01	0.0000	295.01	0.00	920.00
1.8110	1.8146	295.01	298.64	0.0000	298.64	0.00	930.00
1.8146	1.8089	298.64	302.26	0.0000	302.26	0.00	940.00
1.8089	1.8143	302.26	305.88	0.0000	305.88	0.00	950.00
1.8143	1.8173	305.88	309.51	0.0000	309.51	0.00	960.00
1.8173	1.6148	309.51	312.95	0.0000	312.95	0.00	970.00
1.6148	1.3260	312.95	315.89	0.0000	315.89	0.00	980.00
1.3260	1.1832	315.89	318.40	0.0000	318.40	0.00	990.00
1.1832	1.1048	318.40	320.68	0.0000	320.68	0.00	1000.00
1.1048	1.0739	320.68	322.86	0.0000	322.86	0.00	1010.00
1.0739	1.0587	322.86	325.00	0.0000	325.00	0.00	1020.00
1.0587	1.1772	325.00	327.23	0.0000	327.23	0.00	1030.00
1.1772	1.3699	327.23	329.78	0.0000	329.78	0.00	1040.00
1.3699	1.4655	329.78	332.61	0.0000	332.61	0.00	1050.00
1.4655	1.5130	332.61	335.59	0.0000	335.59	0.00	1060.00
1.5130	1.5368	335.59	338.64	0.0000	338.64	0.00	1070.00
1.5368	1.5488	338.64	341.73	0.0000	341.73	0.00	1080.00
1.5488	1.4919	341.73	344.77	0.0000	344.77	0.00	1090.00
1.4919	1.3929	344.77	347.65	0.0000	347.65	0.00	1100.00
1.3929	1.3441	347.65	350.39	0.0000	350.39	0.00	1110.00
1.3441	1.5647	350.39	353.30	0.0000	353.30	0.00	1120.00
1.5647	1.4294	353.30	356.29	0.0000	356.29	0.00	1130.00
1.4294	1.1259	356.29	358.85	0.0000	358.85	0.00	1140.00
1.1259	1.2204	358.85	361.19	0.0000	361.19	0.00	1150.00
1.2204	1.2594	361.19	363.67	0.0000	363.67	0.00	1160.00
1.2594	1.2789	363.67	366.21	0.0000	366.21	0.00	1170.00
1.2789	1.2965	366.21	368.79	0.0000	368.79	0.00	1180.00
1.2965	1.2975	368.79	371.38	0.0000	371.38	0.00	1190.00
1.2975	1.2982	371.38	373.98	0.0000	373.98	0.00	1200.00
1.2982	1.3065	373.98	376.58	0.0000	376.58	0.00	1210.00
1.3065	1.3029	376.58	379.19	0.0000	379.19	0.00	1220.00
1.3029	1.3012	379.19	381.80	0.0000	381.80	0.00	1230.00
1.3012	1.3084	381.80	384.41	0.0000	384.41	0.00	1240.00
1.3084	1.3042	384.41	387.02	0.0000	387.02	0.00	1250.00
1.3042	1.3023	387.02	389.62	0.0000	389.62	0.00	1260.00
1.3023	1.3094	389.62	392.24	0.0000	392.24	0.00	1270.00
1.3094	1.3051	392.24	394.85	0.0000	394.85	0.00	1280.00
1.3051	1.3031	394.85	397.46	0.0000	397.46	0.00	1290.00
1.3031	1.3102	397.46	400.07	0.0000	400.07	0.00	1300.00
1.3102	1.3059	400.07	402.69	0.0000	402.69	0.00	1310.00
1.3059	1.3038	402.69	405.30	0.0000	405.30	0.00	1320.00
1.3038	1.2396	405.30	407.84	0.0000	407.84	0.00	1330.00
1.2396	1.1445	407.84	410.23	0.0000	410.23	0.00	1340.00
1.1445	1.0975	410.23	412.47	0.0000	412.47	0.00	1350.00
1.0975	1.0664	412.47	414.63	0.0000	414.63	0.00	1360.00
1.0664	1.0590	414.63	416.76	0.0000	416.76	0.00	1370.00
1.0590	1.0554	416.76	418.87	0.0000	418.87	0.00	1380.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
=====								
1.0554	1.0458	418.87	420.97	0.0000	420.97	0.00	1390.00	
1.0458	1.0490	420.97	423.07	0.0000	423.07	0.00	1400.00	
1.0490	1.0507	423.07	425.17	0.0000	425.17	0.00	1410.00	
1.0507	1.0437	425.17	427.26	0.0000	427.26	0.00	1420.00	
1.0437	1.0482	427.26	429.35	0.0000	429.35	0.00	1430.00	
1.0482	1.0505	429.35	431.45	0.0000	431.45	0.00	1440.00	
1.0505	0.7819	431.45	433.28	0.0000	433.28	0.00	1450.00	
0.7819	0.3871	433.28	434.45	0.0000	434.45	0.00	1460.00	
0.3871	0.1916	434.45	435.03	0.0000	435.03	0.00	1470.00	
0.1916	0.0949	435.03	435.32	0.0000	435.32	0.00	1480.00	
0.0949	0.0470	435.32	435.46	0.0000	435.46	0.00	1490.00	
0.0470	0.0233	435.46	435.53	0.0000	435.53	0.00	1500.00	

'S' - POND 'C' TOTAL VOLUME

ELEV (FT)	AREA (SF)	VOL (CF)	CUMM VOL (CCF)
133.5	6500		
134	7015	3379	3379
135	8904	7960	11,339
136	10,849	9697	21,036
137	14,909	12,879	33,915
138	17,023	15966	49881
139	21,230	19,127	69,007

← WQ VOL @ 135.52

WQ RELEASE RATE

$$\frac{16,409 \text{ ft}^3}{48 \text{ HRS}} \times \frac{1 \text{ HR}}{3600 \text{ S}} = 0.095 \text{ cfs}$$

GROUP  
**MACKENZIE**

0690 SW Bancroft St / PO Box 69039 Portland, OR 97201-0039  
Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

By \_\_\_\_\_  
Date \_\_\_\_\_  
Job # \_\_\_\_\_  
Sht. \_\_\_\_\_ of \_\_\_\_\_

'T' - POND 'C' DETENTION VOLUME

ELEV (FT)	AREA (SF)	VOL (CF)	CUMM. VOL (CF)
135.52	9,915		
136	10,819	4983	4983
137	14,909	12,879	17,862
138	17,023	15,966	33,828
139	21,230	19,127	52,955

GROUP  
**MACKENZIE**

0690 SW Bancroft St / PO Box 69039 Portland, OR 97201-0039  
 Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

'U' - WQ ORIFICE 'C'

$$Q = CA(2gh)^{1/2}$$

$$A = \frac{Q}{C(2gh)^{1/2}}$$

$$A = \frac{0.095}{0.62(2 \times 32.2 \times 0.62)^{1/2}}$$

$$A = 0.024 \text{ ft}^2$$

$$Q = 0.095 \text{ cfs}$$

$$C = 0.62$$

$$g = 32.2$$

$$h = 135.52' - 134.90' = 0.62'$$

$$A = \frac{\pi d^2}{4}$$

$$d = \sqrt{\frac{4A}{\pi}}$$

$$d = \sqrt{\frac{4A}{\pi}} = 0.178' = \underline{\underline{2.10'' \phi}}$$

GROUP

**MACKENZIE**

0690 SW Bancroft St / PO Box 69039 Portland, OR 97201-0039  
Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

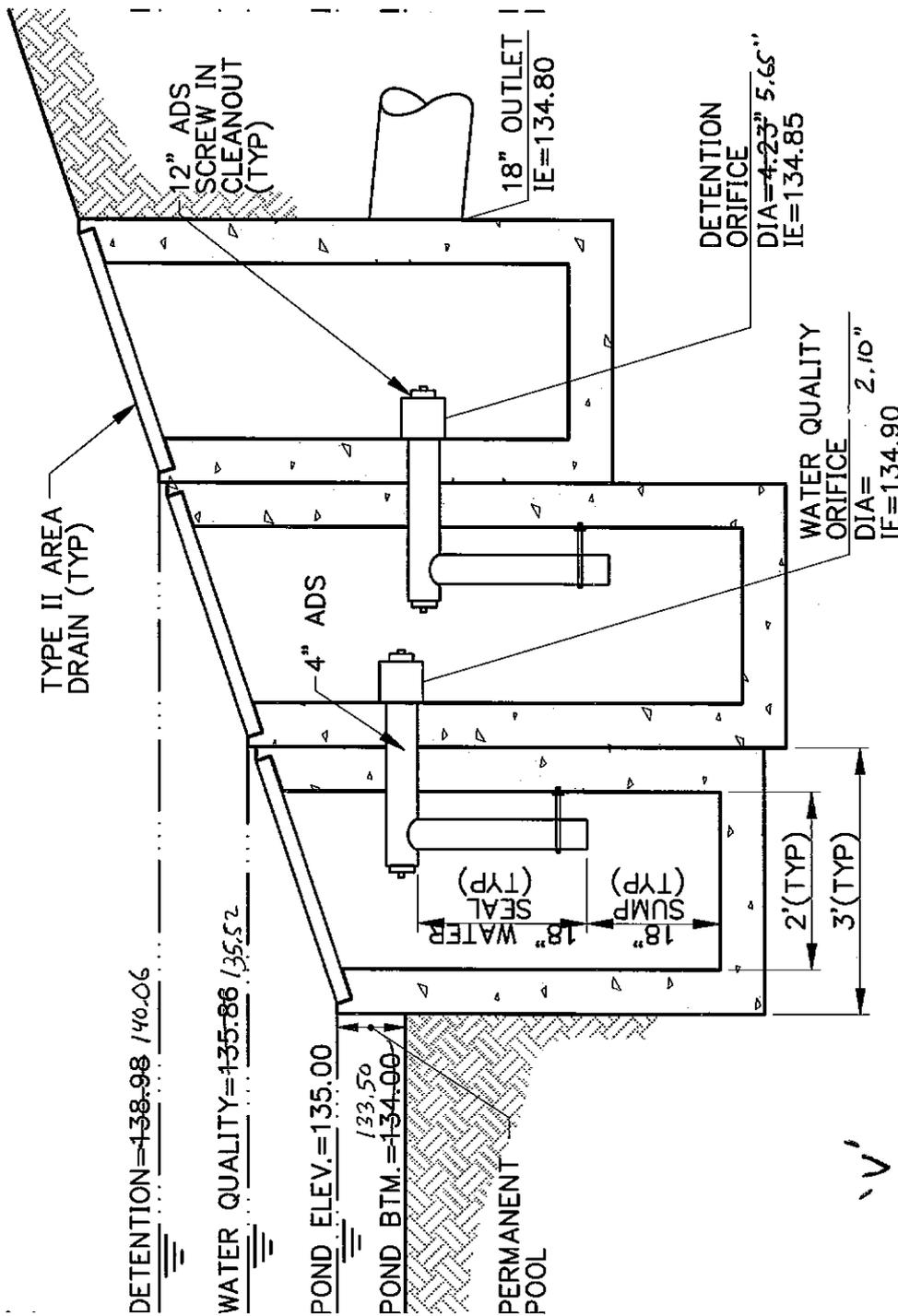
By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

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**3 POND "C" OUTLET DETAIL**

**C8.1**  
N.T.S.  
OUTFLOW DEVICE

SD150  
DETINSET = 1:1



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BASIN SUMMARY

BASIN ID: E10                   NAME: EXISTING 10YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 14.77 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION....: 3.45 inches           AREA..: 14.77 Acres  
 TIME INTERVAL....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE:    3.12 cfs   VOL:    1.97 Ac-ft   TIME:    490 min

BASIN ID: E2                   NAME: EXISTING 2YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 14.77 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION....: 2.50 inches           AREA..: 14.77 Acres  
 TIME INTERVAL....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE:    1.46 cfs   VOL:    1.09 Ac-ft   TIME:    490 min

BASIN ID: E25                  NAME: EXISTING 25YR STORM  
 SBUH METHODOLOGY  
 TOTAL AREA.....: 14.77 Acres           BASEFLOWS: 0.00 cfs  
 RAINFALL TYPE....: TYPE1A           PERVIOUS AREA  
 PRECIPITATION....: 3.90 inches           AREA..: 14.77 Acres  
 TIME INTERVAL....: 10.00 min           CN....: 80.00  
 TIME OF CONC.....: 38.83 min           IMPERVIOUS AREA  
 ABSTRACTION COEFF: 0.20           AREA..: 0.00 Acres  
   CN....: 98.00  
 TcReach - Sheet   L: 300.00 ns:0.2400 p2yr: 2.50 s:0.0400  
 TcReach - Shallow L: 300.00 ks:10.00 s:0.0400  
 TcReach - Channel L:1400.00 kc:17.00 s:0.0400  
 PEAK RATE:    4.00 cfs   VOL:    2.41 Ac-ft   TIME:    490 min

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## =====

## HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
1	1.460	490	47658 cf	14.77
2	3.124	490	85612 cf	14.77
3	3.999	490	105049 cf	14.77
5	6.139	480	110109 cf	14.77
6	8.822	480	158818 cf	14.77
7	10.104	480	182151 cf	14.77
10	1.460	690	110176 cf	14.77
11	1.760	800	158945 cf	14.77
12	1.976	800	182266 cf	14.77

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    134.85  
Elev:    134.85 ft        Orifice Diameter:    5.6484 in.

ROUTING CURVE

STAGE	STORAGE	OUTFLOW	O+2S	STAGE	STORAGE	OUTFLOW	O+2S	STAGE	STORAGE	OUTFLOW	O+2S
(ft)	(cf)	(cfs)	cfs-min	(ft)	(cf)	(cfs)	cfs-min	(ft)	(cf)	(cfs)	cfs-min
134.85	0.0000	0.0000	0.0000	136.90	16574	1.2396	56.487	139.00	52955	1.7638	178.28
134.90	0.0000	0.1936	0.1936	137.00	17862	1.2695	60.810	139.10	53960	1.7849	181.65
135.00	0.0000	0.3353	0.3353	137.10	19459	1.2987	66.161	139.20	54964	1.8058	185.02
135.10	0.0000	0.4329	0.4329	137.20	21055	1.3272	71.511	139.30	55969	1.8264	188.39
135.20	0.0000	0.5122	0.5122	137.30	22652	1.3552	76.861	139.40	56973	1.8468	191.76
135.30	0.0000	0.5808	0.5808	137.40	24248	1.3826	82.211	139.50	57978	1.8670	195.13
135.40	0.0000	0.6421	0.6421	137.50	25845	1.4094	87.559	139.60	58982	1.8870	198.49
135.50	0.0000	0.6980	0.6980	137.60	27442	1.4358	92.908	139.70	59987	1.9067	201.86
135.60	830.50	0.7498	3.5181	137.70	29038	1.4616	98.256	139.80	60991	1.9263	205.23
135.70	1869	0.7982	7.0270	137.80	30635	1.4871	103.60	139.90	61996	1.9456	208.60
135.80	2907	0.8439	10.533	137.90	32231	1.5121	108.95	140.00	63000	1.9648	211.96
135.90	3945	0.8872	14.037	138.00	33828	1.5366	114.30	140.10	64500	1.9838	216.98
136.00	4983	0.9285	17.538	138.10	35741	1.5608	120.70	140.20	66000	2.0026	222.00
136.10	6271	0.9680	21.871	138.20	37653	1.5847	127.10	140.30	67500	2.0212	227.02
136.20	7559	1.0060	26.202	138.30	39566	1.6082	133.50	140.40	69000	2.0397	232.04
136.30	8847	1.0426	30.532	138.40	41479	1.6313	139.89	140.50	70500	2.0580	237.06
136.40	10135	1.0779	34.860	138.50	43392	1.6541	146.29	140.60	72000	2.0761	242.08
136.50	11423	1.1121	39.187	138.60	45304	1.6766	152.69	140.70	73500	2.0941	247.09
136.60	12710	1.1453	43.513	138.70	47217	1.6988	159.09	140.80	75000	2.1119	252.11
136.70	13998	1.1776	47.839	138.80	49130	1.7207	165.49	140.90	76500	2.1296	257.13
136.80	15286	1.2090	52.163	138.90	51042	1.7424	171.88				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 1.46 INFLOW Q (cfs): 6.14  
 PEAK STAGE (ft): 137.70 PEAK OUTFLOW : 1.46  
 PEAK TIME: 690.00 min.  
 INFLOW HYD No. : 5 OUTFLOW HYD No.: 10

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.0000	0.0001	0.0000	0.0001	0.0000	0.0001	134.85	50.00
0.0001	0.0076	0.0000	0.0076	0.0001	0.0076	134.85	60.00
0.0076	0.0433	0.0000	0.0508	0.0076	0.0433	134.85	70.00
0.0433	0.1072	0.0000	0.1504	0.0433	0.1072	134.85	80.00
0.1072	0.1787	0.0000	0.2859	0.1072	0.1787	134.85	90.00
0.1787	0.2482	0.0000	0.4269	0.1787	0.2482	134.85	100.00
0.2482	0.3120	0.0000	0.5602	0.2482	0.3120	134.85	110.00
0.3120	0.3689	0.0000	0.6809	0.3120	0.3689	134.85	120.00
0.3689	0.4400	0.0000	0.8089	0.3689	0.4400	134.85	130.00
0.4400	0.5209	0.0000	0.9609	0.4400	0.5209	134.85	140.00
0.5209	0.5837	0.0000	1.1046	0.5209	0.5837	134.85	150.00
0.5837	0.6317	0.0000	1.2153	0.5837	0.6317	134.85	160.00
0.6317	0.6758	0.0000	1.3075	0.6317	0.6758	134.85	170.00
0.6758	0.7129	0.0000	1.3887	0.6758	0.7129	134.85	180.00
0.7129	0.7415	0.0146	1.4689	0.6983	0.7706	135.50	190.00
0.7415	0.7711	0.0713	1.5839	0.6994	0.8845	135.50	200.00
0.7711	0.7965	0.1830	1.7506	0.7015	1.0492	135.51	210.00
0.7965	0.8151	0.3447	1.9563	0.7045	1.2518	135.51	220.00
0.8151	0.8367	0.5436	2.1954	0.7082	1.4872	135.52	230.00
0.8367	0.8552	0.7747	2.4667	0.7125	1.7542	135.53	240.00
0.8552	0.9028	1.0367	2.7947	0.7174	2.0773	135.54	250.00
0.9028	0.9647	1.3540	3.2215	0.7234	2.4981	135.55	260.00
0.9647	1.0030	1.7670	3.7348	0.7311	3.0037	135.56	270.00
1.0030	1.0328	2.2633	4.2992	0.7404	3.5588	135.58	280.00
1.0328	1.0497	2.8084	4.8909	0.7504	4.1406	135.60	290.00
1.0497	1.0638	3.3822	5.4956	0.7584	4.7372	135.62	300.00
1.0638	1.2177	3.9706	6.2521	0.7666	5.4855	135.63	310.00
1.2177	1.4390	4.7085	7.3653	0.7770	6.5883	135.66	320.00
1.4390	1.5578	5.7961	8.7929	0.7922	8.0007	135.69	330.00
1.5578	1.6247	7.1898	10.372	0.8109	9.5614	135.73	340.00
1.6247	1.6659	8.7301	12.021	0.8312	11.189	135.77	350.00
1.6659	1.6953	10.337	13.699	0.8520	12.847	135.82	360.00
1.6953	1.6835	11.974	15.353	0.8725	14.481	135.87	370.00
1.6835	1.6500	13.588	16.922	0.8924	16.029	135.91	380.00
1.6500	1.6357	15.119	18.404	0.9107	17.494	135.96	390.00
1.6357	1.6349	16.566	19.836	0.9279	18.908	136.00	400.00
1.6349	1.6449	17.967	21.247	0.9410	20.306	136.03	410.00
1.6449	1.6508	19.352	22.648	0.9537	21.694	136.06	420.00
1.6508	2.1604	20.728	24.539	0.9664	23.573	136.10	430.00
2.1604	2.9320	22.590	27.682	0.9829	26.699	136.14	440.00
2.9320	3.3346	25.689	31.956	1.0102	30.946	136.21	450.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
3.3346	4.2741	29.900	37.508	1.0459	36.462	136.31	460.00	
4.2741	5.4928	35.372	45.139	1.0906	44.048	136.44	470.00	
5.4928	6.1390	42.899	54.530	1.1493	53.381	136.61	480.00	
6.1390	5.5016	52.163	63.804	1.2177	62.586	136.83	490.00	
5.5016	4.2117	61.307	71.021	1.2792	69.741	137.03	500.00	
4.2117	3.5791	68.424	76.214	1.3178	74.897	137.17	510.00	
3.5791	3.1862	73.552	80.317	1.3449	78.972	137.26	520.00	
3.1862	2.9163	77.606	83.709	1.3660	82.343	137.34	530.00	
2.9163	2.7867	80.959	86.662	1.3832	85.279	137.40	540.00	
2.7867	2.5141	83.881	89.182	1.3980	87.784	137.46	550.00	
2.5141	2.1695	86.373	91.057	1.4105	89.647	137.50	560.00	
2.1695	2.0007	88.227	92.397	1.4197	90.977	137.54	570.00	
2.0007	1.9238	89.551	93.476	1.4263	92.049	137.56	580.00	
1.9238	1.8824	90.618	94.424	1.4315	92.993	137.58	590.00	
1.8824	1.8634	91.556	95.302	1.4362	93.866	137.60	600.00	
1.8634	1.8147	92.426	96.104	1.4404	94.663	137.62	610.00	
1.8147	1.7511	93.219	96.785	1.4443	95.341	137.63	620.00	
1.7511	1.7209	93.893	97.365	1.4475	95.918	137.65	630.00	
1.7209	1.7020	94.467	97.890	1.4503	96.440	137.66	640.00	
1.7020	1.6989	94.987	98.388	1.4529	96.935	137.67	650.00	
1.6989	1.6985	95.480	98.877	1.4553	97.422	137.68	660.00	
1.6985	1.6120	95.964	99.275	1.4576	97.817	137.68	670.00	
1.6120	1.4825	96.358	99.452	1.4595	97.993	137.69	680.00	
1.4825	1.4191	96.532	99.434	1.4604	97.974	137.70	690.00	
1.4191	1.3936	96.513	99.326	1.4603	97.866	137.69	700.00	
1.3936	1.3764	96.406	99.176	1.4598	97.716	137.69	710.00	
1.3764	1.3686	96.257	99.002	1.4590	97.543	137.69	720.00	
1.3686	1.3705	96.085	98.824	1.4582	97.366	137.69	730.00	
1.3705	1.3669	95.908	98.646	1.4573	97.189	137.68	740.00	
1.3669	1.3658	95.732	98.465	1.4565	97.008	137.68	750.00	
1.3658	1.3710	95.553	98.289	1.4556	96.834	137.68	760.00	
1.3710	1.3690	95.379	98.119	1.4548	96.664	137.67	770.00	
1.3690	1.3686	95.210	97.948	1.4539	96.494	137.67	780.00	
1.3686	1.2857	95.041	97.695	1.4531	96.242	137.67	790.00	
1.2857	1.1567	94.790	97.233	1.4519	95.781	137.66	800.00	
1.1567	1.0932	94.331	96.581	1.4497	95.131	137.65	810.00	
1.0932	1.0620	93.685	95.840	1.4465	94.393	137.64	820.00	
1.0620	1.0469	92.950	95.059	1.4430	93.616	137.63	830.00	
1.0469	1.0398	92.177	94.264	1.4392	92.825	137.61	840.00	
1.0398	1.0783	91.389	93.507	1.4354	92.072	137.60	850.00	
1.0783	1.1447	90.640	92.863	1.4317	91.432	137.58	860.00	
1.1447	1.1780	90.003	92.326	1.4285	90.897	137.57	870.00	
1.1780	1.1896	89.472	91.839	1.4259	90.413	137.56	880.00	
1.1896	1.2010	88.990	91.380	1.4235	89.957	137.55	890.00	
1.2010	1.2070	88.536	90.944	1.4212	89.523	137.54	900.00	
1.2070	1.2052	88.103	90.516	1.4191	89.097	137.54	910.00	
1.2052	1.2099	87.680	90.095	1.4170	88.678	137.53	920.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
1.2099	1.2126	87.263	89.685	1.4149	88.270	137.52	930.00	
1.2126	1.2090	86.857	89.279	1.4129	87.866	137.51	940.00	
1.2090	1.2129	86.455	88.877	1.4109	87.466	137.51	950.00	
1.2129	1.2152	86.057	88.485	1.4090	87.076	137.50	960.00	
1.2152	1.0799	85.669	87.964	1.4070	86.557	137.49	970.00	
1.0799	0.8869	85.153	87.120	1.4044	85.715	137.48	980.00	
0.8869	0.7915	84.315	85.994	1.4002	84.593	137.47	990.00	
0.7915	0.7392	83.199	84.730	1.3945	83.335	137.44	1000.00	
0.7392	0.7186	81.947	83.405	1.3882	82.016	137.42	1010.00	
0.7186	0.7085	80.635	82.062	1.3816	80.680	137.40	1020.00	
0.7085	0.7880	79.306	80.802	1.3747	79.427	137.37	1030.00	
0.7880	0.9171	78.059	79.764	1.3683	78.396	137.35	1040.00	
0.9171	0.9812	77.033	78.931	1.3630	77.568	137.33	1050.00	
0.9812	1.0132	76.209	78.203	1.3588	76.845	137.31	1060.00	
1.0132	1.0293	75.489	77.532	1.3551	76.177	137.30	1070.00	
1.0293	1.0375	74.825	76.892	1.3516	75.540	137.29	1080.00	
1.0375	0.9995	74.192	76.229	1.3483	74.881	137.28	1090.00	
0.9995	0.9333	73.536	75.469	1.3449	74.124	137.26	1100.00	
0.9333	0.9008	72.783	74.617	1.3409	73.276	137.25	1110.00	
0.9008	1.0488	71.940	73.889	1.3365	72.553	137.23	1120.00	
1.0488	0.9582	71.220	73.227	1.3327	71.894	137.22	1130.00	
0.9582	0.7548	70.565	72.278	1.3293	70.949	137.21	1140.00	
0.7548	0.8183	69.625	71.198	1.3242	69.874	137.19	1150.00	
0.8183	0.8446	68.555	70.218	1.3185	68.899	137.17	1160.00	
0.8446	0.8577	67.586	69.288	1.3133	67.975	137.15	1170.00	
0.8577	0.8697	66.667	68.394	1.3084	67.086	137.13	1180.00	
0.8697	0.8705	65.782	67.522	1.3036	66.219	137.12	1190.00	
0.8705	0.8710	64.920	66.661	1.2990	65.362	137.10	1200.00	
0.8710	0.8767	64.068	65.816	1.2943	64.521	137.09	1210.00	
0.8767	0.8744	63.231	64.983	1.2898	63.693	137.07	1220.00	
0.8744	0.8734	62.408	64.155	1.2852	62.870	137.05	1230.00	
0.8734	0.8783	61.589	63.341	1.2808	62.060	137.04	1240.00	
0.8783	0.8756	60.784	62.538	1.2763	61.262	137.02	1250.00	
0.8756	0.8744	59.990	61.740	1.2720	60.468	137.01	1260.00	
0.8744	0.8793	59.200	60.954	1.2672	59.687	136.99	1270.00	
0.8793	0.8765	58.425	60.181	1.2618	58.919	136.97	1280.00	
0.8765	0.8753	57.663	59.415	1.2565	58.158	136.96	1290.00	
0.8753	0.8801	56.907	58.662	1.2512	57.411	136.94	1300.00	
0.8801	0.8773	56.165	57.923	1.2460	56.677	136.92	1310.00	
0.8773	0.8761	55.436	57.189	1.2410	55.948	136.90	1320.00	
0.8761	0.8330	54.712	56.421	1.2358	55.185	136.89	1330.00	
0.8330	0.7692	53.955	55.557	1.2304	54.327	136.87	1340.00	
0.7692	0.7377	53.102	54.609	1.2243	53.385	136.85	1350.00	
0.7377	0.7168	52.167	53.622	1.2177	52.404	136.83	1360.00	
0.7168	0.7119	51.193	52.622	1.2107	51.411	136.81	1370.00	
0.7119	0.7096	50.208	51.629	1.2036	50.426	136.78	1380.00	
0.7096	0.7032	49.229	50.642	1.1964	49.446	136.76	1390.00	

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

Table with 8 columns: I1, I2, 2S1, SUM, O1, O2+2S2, STAGE (ft), TIME (min). The table contains 30 rows of data representing routing calculations for a pond, showing values for inflow, outflow, storage, and time.

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ROUTING REPORT

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STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    134.85  
Elev:    134.85 ft        Orifice Diameter:    5.6484 in.

ROUTING CURVE

STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min
134.85	0.0000	0.0000	0.0000	136.90	16574	1.2396	56.487	139.00	52955	1.7638	178.28
134.90	0.0000	0.1936	0.1936	137.00	17862	1.2695	60.810	139.10	53960	1.7849	181.65
135.00	0.0000	0.3353	0.3353	137.10	19459	1.2987	66.161	139.20	54964	1.8058	185.02
135.10	0.0000	0.4329	0.4329	137.20	21055	1.3272	71.511	139.30	55969	1.8264	188.39
135.20	0.0000	0.5122	0.5122	137.30	22652	1.3552	76.861	139.40	56973	1.8468	191.76
135.30	0.0000	0.5808	0.5808	137.40	24248	1.3826	82.211	139.50	57978	1.8670	195.13
135.40	0.0000	0.6421	0.6421	137.50	25845	1.4094	87.559	139.60	58982	1.8870	198.49
135.50	0.0000	0.6980	0.6980	137.60	27442	1.4358	92.908	139.70	59987	1.9067	201.86
135.60	830.50	0.7498	3.5181	137.70	29038	1.4616	98.256	139.80	60991	1.9263	205.23
135.70	1869	0.7982	7.0270	137.80	30635	1.4871	103.60	139.90	61996	1.9456	208.60
135.80	2907	0.8439	10.533	137.90	32231	1.5121	108.95	140.00	63000	1.9648	211.96
135.90	3945	0.8872	14.037	138.00	33828	1.5366	114.30	140.10	64500	1.9838	216.98
136.00	4983	0.9285	17.538	138.10	35741	1.5608	120.70	140.20	66000	2.0026	222.00
136.10	6271	0.9680	21.871	138.20	37653	1.5847	127.10	140.30	67500	2.0212	227.02
136.20	7559	1.0060	26.202	138.30	39566	1.6082	133.50	140.40	69000	2.0397	232.04
136.30	8847	1.0426	30.532	138.40	41479	1.6313	139.89	140.50	70500	2.0580	237.06
136.40	10135	1.0779	34.860	138.50	43392	1.6541	146.29	140.60	72000	2.0761	242.08
136.50	11423	1.1121	39.187	138.60	45304	1.6766	152.69	140.70	73500	2.0941	247.09
136.60	12710	1.1453	43.513	138.70	47217	1.6988	159.09	140.80	75000	2.1119	252.11
136.70	13998	1.1776	47.839	138.80	49130	1.7207	165.49	140.90	76500	2.1296	257.13
136.80	15286	1.2090	52.163	138.90	51042	1.7424	171.88				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 3.12 INFLOW Q (cfs): 8.82  
 PEAK STAGE (ft): 138.98 PEAK OUTFLOW : 1.76  
 PEAK TIME: 800.00 min.  
 INFLOW HYD No. : 6 OUTFLOW HYD No.: 11

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.0000	0.0023	0.0000	0.0023	0.0000	0.0023	134.85	40.00
0.0023	0.0255	0.0000	0.0278	0.0023	0.0255	134.85	50.00
0.0255	0.0753	0.0000	0.1008	0.0255	0.0753	134.85	60.00
0.0753	0.1703	0.0000	0.2456	0.0753	0.1703	134.85	70.00
0.1703	0.2994	0.0000	0.4697	0.1703	0.2994	135.50	80.00
0.2994	0.4187	0.0000	0.7181	0.2994	0.4187	135.50	90.00
0.4187	0.5234	0.0000	0.9421	0.4187	0.5234	135.50	100.00
0.5234	0.6131	0.0000	1.1365	0.5234	0.6131	135.50	110.00
0.6131	0.6895	0.0000	1.3026	0.6131	0.6895	135.50	120.00
0.6895	0.7895	0.0000	1.4789	0.6895	0.7895	135.50	130.00
0.7895	0.9053	0.0898	1.7845	0.6997	1.0848	135.50	140.00
0.9053	0.9889	0.3797	2.2739	0.7051	1.5688	135.51	150.00
0.9889	1.0481	0.8548	2.8918	0.7140	2.1778	135.53	160.00
1.0481	1.1016	1.4526	3.6024	0.7252	2.8772	135.55	170.00
1.1016	1.1447	2.1391	4.3854	0.7380	3.6474	135.58	180.00
1.1447	1.1754	2.8958	5.2158	0.7516	4.4642	135.60	190.00
1.1754	1.2085	3.7014	6.0852	0.7629	5.3224	135.63	200.00
1.2085	1.2361	4.5477	6.9923	0.7747	6.2176	135.65	210.00
1.2361	1.2542	5.4306	7.9208	0.7871	7.1338	135.68	220.00
1.2542	1.2775	6.3342	8.8659	0.7996	8.0662	135.70	230.00
1.2775	1.2969	7.2545	9.8289	0.8118	9.0171	135.73	240.00
1.2969	1.3600	8.1930	10.850	0.8241	10.026	135.76	250.00
1.3600	1.4449	9.1885	11.993	0.8373	11.156	135.79	260.00
1.4449	1.4942	10.305	13.244	0.8516	12.392	135.82	270.00
1.4942	1.5311	11.525	14.551	0.8669	13.684	135.85	280.00
1.5311	1.5505	12.801	15.882	0.8828	15.000	135.89	290.00
1.5505	1.5680	14.101	17.220	0.8985	16.321	135.93	300.00
1.5680	1.7930	15.407	18.768	0.9141	17.854	135.97	310.00
1.7930	2.1184	16.922	20.834	0.9313	19.903	136.01	320.00
2.1184	2.2939	18.953	23.365	0.9500	22.415	136.05	330.00
2.2939	2.3939	21.442	26.130	0.9728	25.157	136.11	340.00
2.3939	2.4554	24.160	29.009	0.9968	28.013	136.18	350.00
2.4554	2.4969	26.991	31.944	1.0213	30.922	136.24	360.00
2.4969	2.4756	29.877	34.849	1.0458	33.803	136.31	370.00
2.4756	2.4218	32.734	37.631	1.0693	36.562	136.38	380.00
2.4218	2.3962	35.471	40.289	1.0914	39.197	136.44	390.00
2.3962	2.3906	38.085	42.872	1.1122	41.760	136.50	400.00
2.3906	2.4010	40.628	45.419	1.1319	44.288	136.56	410.00
2.4010	2.4058	43.136	47.943	1.1511	46.792	136.62	420.00
2.4058	3.1411	45.622	51.169	1.1698	49.999	136.68	430.00
3.1411	4.2539	48.806	56.201	1.1933	55.008	136.75	440.00

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LEVEL POOL ROUTING TABLE

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LEVEL POOL ROUTING TABLE								
I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
=====								
4.2539	4.8282	53.779	62.861	1.2292	61.631	136.87	450.00	
4.8282	6.1720	60.357	71.358	1.2740	70.084	137.02	460.00	
6.1720	7.9120	68.764	82.848	1.3196	81.528	137.17	470.00	
7.9120	8.8222	80.149	96.884	1.3791	95.504	137.39	480.00	
8.8222	7.8936	94.056	110.77	1.4483	109.32	137.65	490.00	
7.8936	6.0356	107.81	121.74	1.5138	120.23	137.91	500.00	
6.0356	5.1224	118.67	129.82	1.5591	128.27	138.09	510.00	
5.1224	4.5550	126.68	136.35	1.5890	134.76	138.22	520.00	
4.5550	4.1650	133.15	141.87	1.6127	140.26	138.32	530.00	
4.1650	3.9765	138.63	146.77	1.6326	145.14	138.41	540.00	
3.9765	3.5852	143.49	151.05	1.6500	149.40	138.48	550.00	
3.5852	3.0921	147.73	154.41	1.6650	152.74	138.55	560.00	
3.0921	2.8499	151.07	157.01	1.6768	155.33	138.60	570.00	
2.8499	2.7391	153.65	159.24	1.6858	157.55	138.64	580.00	
2.7391	2.6789	155.86	161.27	1.6935	159.58	138.68	590.00	
2.6789	2.6508	157.88	163.21	1.7005	161.51	138.71	600.00	
2.6508	2.5806	159.80	165.03	1.7071	163.33	138.74	610.00	
2.5806	2.4893	161.61	166.68	1.7133	164.97	138.77	620.00	
2.4893	2.4454	163.25	168.19	1.7190	166.47	138.79	630.00	
2.4454	2.4178	164.74	169.61	1.7241	167.88	138.82	640.00	
2.4178	2.4127	166.15	170.98	1.7289	169.25	138.84	650.00	
2.4127	2.4114	167.52	172.35	1.7335	170.61	138.86	660.00	
2.4114	2.2879	168.87	173.57	1.7381	171.83	138.88	670.00	
2.2879	2.1036	170.09	174.48	1.7422	172.74	138.90	680.00	
2.1036	2.0131	171.00	175.11	1.7453	173.37	138.91	690.00	
2.0131	1.9763	171.62	175.61	1.7474	173.86	138.92	700.00	
1.9763	1.9516	172.11	176.04	1.7490	174.29	138.93	710.00	
1.9516	1.9400	172.54	176.43	1.7504	174.68	138.94	720.00	
1.9400	1.9423	172.93	176.81	1.7518	175.06	138.94	730.00	
1.9423	1.9368	173.31	177.19	1.7530	175.44	138.95	740.00	
1.9368	1.9348	173.68	177.55	1.7543	175.80	138.96	750.00	
1.9348	1.9418	174.04	177.92	1.7555	176.16	138.96	760.00	
1.9418	1.9386	174.41	178.29	1.7567	176.53	138.97	770.00	
1.9386	1.9376	174.77	178.65	1.7579	176.89	138.97	780.00	
1.9376	1.8200	175.13	178.89	1.7591	177.13	138.98	790.00	
1.8200	1.6371	175.37	178.83	1.7599	177.07	138.98	800.00	
1.6371	1.5469	175.31	178.49	1.7597	176.73	138.98	810.00	
1.5469	1.5026	174.97	178.02	1.7586	176.26	138.98	820.00	
1.5026	1.4810	174.51	177.49	1.7570	175.73	138.97	830.00	
1.4810	1.4706	173.98	176.93	1.7553	175.17	138.96	840.00	
1.4706	1.5249	173.42	176.42	1.7534	174.66	138.95	850.00	
1.5249	1.6185	172.91	176.06	1.7517	174.30	138.94	860.00	
1.6185	1.6653	172.55	175.84	1.7505	174.09	138.94	870.00	
1.6653	1.6815	172.34	175.68	1.7498	173.93	138.93	880.00	
1.6815	1.6974	172.18	175.56	1.7492	173.81	138.93	890.00	
1.6974	1.7056	172.07	175.47	1.7488	173.72	138.93	900.00	
1.7056	1.7027	171.97	175.38	1.7485	173.63	138.93	910.00	

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## LEVEL POOL ROUTING TABLE

## LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
1.7027	1.7091	171.88	175.29	1.7482	173.55	138.93	920.00	
1.7091	1.7127	171.80	175.22	1.7480	173.47	138.93	930.00	
1.7127	1.7074	171.72	175.14	1.7477	173.40	138.92	940.00	
1.7074	1.7126	171.65	175.07	1.7475	173.32	138.92	950.00	
1.7126	1.7156	171.57	175.00	1.7472	173.26	138.92	960.00	
1.7156	1.5244	171.51	174.75	1.7470	173.00	138.92	970.00	
1.5244	1.2519	171.26	174.03	1.7461	172.29	138.92	980.00	
1.2519	1.1171	170.54	172.91	1.7437	171.17	138.91	990.00	
1.1171	1.0431	169.43	171.59	1.7400	169.85	138.89	1000.00	
1.0431	1.0140	168.11	170.17	1.7355	168.43	138.87	1010.00	
1.0140	0.9997	166.70	168.72	1.7307	166.99	138.85	1020.00	
0.9997	1.1117	165.26	167.37	1.7258	165.65	138.82	1030.00	
1.1117	1.2937	163.92	166.33	1.7213	164.61	138.80	1040.00	
1.2937	1.3840	162.89	165.57	1.7177	163.85	138.79	1050.00	
1.3840	1.4290	162.14	164.95	1.7151	163.23	138.77	1060.00	
1.4290	1.4515	161.52	164.40	1.7130	162.69	138.76	1070.00	
1.4515	1.4629	160.98	163.89	1.7112	162.18	138.76	1080.00	
1.4629	1.4092	160.47	163.34	1.7094	161.63	138.75	1090.00	
1.4092	1.3158	159.93	162.65	1.7075	160.94	138.74	1100.00	
1.3158	1.2697	159.24	161.82	1.7052	160.12	138.73	1110.00	
1.2697	1.4782	158.42	161.16	1.7024	159.46	138.72	1120.00	
1.4782	1.3504	157.76	160.59	1.7001	158.89	138.71	1130.00	
1.3504	1.0637	157.19	159.61	1.6981	157.91	138.70	1140.00	
1.0637	1.1531	156.21	158.43	1.6947	156.74	138.68	1150.00	
1.1531	1.1900	155.04	157.39	1.6907	155.70	138.66	1160.00	
1.1900	1.2084	154.01	156.41	1.6871	154.72	138.65	1170.00	
1.2084	1.2252	153.04	155.47	1.6837	153.79	138.63	1180.00	
1.2252	1.2261	152.11	154.56	1.6804	152.88	138.62	1190.00	
1.2261	1.2268	151.20	153.65	1.6773	151.98	138.60	1200.00	
1.2268	1.2347	150.30	152.76	1.6741	151.09	138.59	1210.00	
1.2347	1.2313	149.42	151.88	1.6710	150.21	138.57	1220.00	
1.2313	1.2298	148.55	151.01	1.6679	149.34	138.56	1230.00	
1.2298	1.2367	147.67	150.14	1.6648	148.48	138.55	1240.00	
1.2367	1.2328	146.81	149.28	1.6618	147.62	138.53	1250.00	
1.2328	1.2310	145.96	148.43	1.6588	146.77	138.52	1260.00	
1.2310	1.2377	145.11	147.58	1.6558	145.93	138.51	1270.00	
1.2377	1.2337	144.27	146.74	1.6528	145.09	138.49	1280.00	
1.2337	1.2319	143.44	145.91	1.6498	144.26	138.48	1290.00	
1.2319	1.2386	142.61	145.08	1.6469	143.43	138.47	1300.00	
1.2386	1.2346	141.79	144.26	1.6439	142.62	138.46	1310.00	
1.2346	1.2327	140.98	143.45	1.6410	141.80	138.44	1320.00	
1.2327	1.1720	140.17	142.57	1.6381	140.93	138.43	1330.00	
1.1720	1.0821	139.30	141.55	1.6350	139.92	138.42	1340.00	
1.0821	1.0377	138.29	140.41	1.6314	138.77	138.40	1350.00	
1.0377	1.0083	137.15	139.19	1.6272	137.57	138.38	1360.00	
1.0083	1.0014	135.94	137.95	1.6229	136.33	138.36	1370.00	
1.0014	0.9980	134.71	136.71	1.6184	135.09	138.34	1380.00	

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LEVEL POOL ROUTING TABLE
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LEVEL POOL ROUTING TABLE

Table with 8 columns: I1, I2, 2S1, SUM, O1, O2+2S2, STAGE, TIME. Each column has units specified below the header: cfs, min, ft, min. The table contains 40 rows of numerical data.

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.0000	0.0000	22.411	22.411	0.9813	21.430	136.14	1860.00
0.0000	0.0000	20.466	20.466	0.9640	19.502	136.09	1870.00
0.0000	0.0000	18.555	18.555	0.9464	17.609	136.05	1880.00
0.0000	0.0000	16.680	16.680	0.9291	15.751	136.00	1890.00
0.0000	0.0000	14.843	14.843	0.9074	13.936	135.95	1900.00
0.0000	0.0000	13.050	13.050	0.8859	12.164	135.90	1910.00
0.0000	0.0000	11.300	11.300	0.8640	10.436	135.85	1920.00
0.0000	0.0000	9.5935	9.5935	0.8426	8.7509	135.80	1930.00
0.0000	0.0000	7.9302	7.9302	0.8207	7.1095	135.75	1940.00
0.0000	0.0000	6.3102	6.3102	0.7993	5.5109	135.70	1950.00
0.0000	0.0000	4.7336	4.7336	0.7773	3.9563	135.66	1960.00
0.0000	0.0000	3.2004	3.2004	0.7559	2.4446	135.61	1970.00
0.0000	0.0000	1.7145	1.7145	0.7301	0.9844	135.56	1980.00
0.0000	0.0000	0.2811	0.2811	0.7033	-0.4222	135.51	1990.00

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ROUTING REPORT

STORAGE LIST            ID No.    A  
Description:

MULTIPLE ORIFICE        ID No.    A  
Description:  
Outlet Elev:    134.85  
Elev:    134.85 ft        Orifice Diameter:    5.6484 in.

ROUTING CURVE

STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min	STAGE (ft)	STORAGE (cf)	OUTFLOW (cfs)	O+2S cfs-min
134.85	0.0000	0.0000	0.0000	136.90	16574	1.2396	56.487	139.00	52955	1.7638	178.28
134.90	0.0000	0.1936	0.1936	137.00	17862	1.2695	60.810	139.10	53960	1.7849	181.65
135.00	0.0000	0.3353	0.3353	137.10	19459	1.2987	66.161	139.20	54964	1.8058	185.02
135.10	0.0000	0.4329	0.4329	137.20	21055	1.3272	71.511	139.30	55969	1.8264	188.39
135.20	0.0000	0.5122	0.5122	137.30	22652	1.3552	76.861	139.40	56973	1.8468	191.76
135.30	0.0000	0.5808	0.5808	137.40	24248	1.3826	82.211	139.50	57978	1.8670	195.13
135.40	0.0000	0.6421	0.6421	137.50	25845	1.4094	87.559	139.60	58982	1.8870	198.49
135.50	0.0000	0.6980	0.6980	137.60	27442	1.4358	92.908	139.70	59987	1.9067	201.86
135.60	830.50	0.7498	3.5181	137.70	29038	1.4616	98.256	139.80	60991	1.9263	205.23
135.70	1869	0.7982	7.0270	137.80	30635	1.4871	103.60	139.90	61996	1.9456	208.60
135.80	2907	0.8439	10.533	137.90	32231	1.5121	108.95	140.00	63000	1.9648	211.96
135.90	3945	0.8872	14.037	138.00	33828	1.5366	114.30	140.10	64500	1.9838	216.98
136.00	4983	0.9285	17.538	138.10	35741	1.5608	120.70	140.20	66000	2.0026	222.00
136.10	6271	0.9680	21.871	138.20	37653	1.5847	127.10	140.30	67500	2.0212	227.02
136.20	7559	1.0060	26.202	138.30	39566	1.6082	133.50	140.40	69000	2.0397	232.04
136.30	8847	1.0426	30.532	138.40	41479	1.6313	139.89	140.50	70500	2.0580	237.06
136.40	10135	1.0779	34.860	138.50	43392	1.6541	146.29	140.60	72000	2.0761	242.08
136.50	11423	1.1121	39.187	138.60	45304	1.6766	152.69	140.70	73500	2.0941	247.09
136.60	12710	1.1453	43.513	138.70	47217	1.6988	159.09	140.80	75000	2.1119	252.11
136.70	13998	1.1776	47.839	138.80	49130	1.7207	165.49	140.90	76500	2.1296	257.13
136.80	15286	1.2090	52.163	138.90	51042	1.7424	171.88				

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LEVEL POOL ROUTING TABLE

MATCH Q (cfs) : 4.00    INFLOW Q (cfs): 10.10  
 PEAK STAGE (ft): 140.06    PEAK OUTFLOW : 1.98  
 PEAK TIME: 800.00 min.  
 INFLOW HYD No. : 7    OUTFLOW HYD No.: 12

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.0000	0.0108	0.0000	0.0108	0.0000	0.0108	134.85	40.00
0.0108	0.0546	0.0000	0.0654	0.0108	0.0546	135.50	50.00
0.0546	0.1252	0.0000	0.1798	0.0546	0.1252	135.50	60.00
0.1252	0.2471	0.0000	0.3723	0.1252	0.2471	135.50	70.00
0.2471	0.4071	0.0000	0.6542	0.2471	0.4071	135.50	80.00
0.4071	0.5481	0.0000	0.9552	0.4071	0.5481	135.50	90.00
0.5481	0.6678	0.0000	1.2158	0.5481	0.6678	135.50	100.00
0.6678	0.7681	0.0000	1.4358	0.6678	0.7681	135.50	110.00
0.7681	0.8518	0.0687	1.6886	0.6993	0.9893	135.50	120.00
0.8518	0.9641	0.2859	2.1019	0.7034	1.3985	135.51	130.00
0.9641	1.0953	0.6876	2.7470	0.7109	2.0362	135.52	140.00
1.0953	1.1875	1.3136	3.5963	0.7226	2.8737	135.55	150.00
1.1875	1.2507	2.1358	4.5739	0.7380	3.8359	135.58	160.00
1.2507	1.3074	3.0818	5.6399	0.7542	4.8857	135.61	170.00
1.3074	1.3523	4.1170	6.7767	0.7687	6.0081	135.64	180.00
1.3523	1.3831	5.2239	7.9594	0.7842	7.1752	135.67	190.00
1.3831	1.4173	6.3750	9.1755	0.8002	8.3753	135.70	200.00
1.4173	1.4453	7.5595	10.422	0.8158	9.6063	135.74	210.00
1.4453	1.4626	8.7745	11.682	0.8318	10.851	135.77	220.00
1.4626	1.4863	10.003	12.952	0.8478	12.104	135.81	230.00
1.4863	1.5058	11.241	14.233	0.8633	13.370	135.84	240.00
1.5058	1.5760	12.491	15.572	0.8789	14.693	135.88	250.00
1.5760	1.6719	13.799	17.046	0.8949	16.152	135.92	260.00
1.6719	1.7289	15.239	18.640	0.9121	17.728	135.96	270.00
1.7289	1.7740	16.798	20.301	0.9302	19.371	136.00	280.00
1.7740	1.7986	18.425	21.998	0.9452	21.053	136.04	290.00
1.7986	1.8195	20.092	23.710	0.9605	22.750	136.08	300.00
1.8195	2.0796	21.774	25.673	0.9757	24.698	136.12	310.00
2.0796	2.4549	23.705	28.239	0.9928	27.246	136.17	320.00
2.4549	2.6557	26.232	31.342	1.0148	30.327	136.22	330.00
2.6557	2.7687	29.286	34.711	1.0408	33.670	136.30	340.00
2.7687	2.8373	32.602	38.208	1.0682	37.140	136.37	350.00
2.8373	2.8828	36.044	41.764	1.0959	40.668	136.45	360.00
2.8828	2.8561	39.544	45.283	1.1235	44.160	136.53	370.00
2.8561	2.7921	43.009	48.658	1.1502	47.507	136.61	380.00
2.7921	2.7608	46.332	51.885	1.1751	50.710	136.69	390.00
2.7608	2.7527	49.512	55.025	1.1985	53.827	136.77	400.00
2.7527	2.7632	52.606	58.122	1.2208	56.901	136.84	410.00
2.7632	2.7674	55.658	61.189	1.2425	59.947	136.91	420.00
2.7674	3.6107	58.683	65.061	1.2636	63.798	136.98	430.00
3.6107	4.8868	62.512	71.009	1.2858	69.723	137.06	440.00

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 =====  
 LEVEL POOL ROUTING TABLE
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## LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME	
<----- cfs			min	----->			(ft)	(min)
4.8868	5.5430	68.406	78.835	1.3177	77.518	137.17	450.00	
5.5430	7.0799	76.159	88.782	1.3586	87.424	137.31	460.00	
7.0799	9.0687	86.015	102.16	1.4087	100.75	137.50	470.00	
9.0687	10.104	99.281	118.45	1.4735	116.98	137.75	480.00	
10.104	9.0361	115.43	134.57	1.5468	133.03	138.04	490.00	
9.0361	6.9063	131.42	147.36	1.6064	145.76	138.29	500.00	
6.9063	5.8589	144.10	156.87	1.6522	155.22	138.49	510.00	
5.8589	5.2080	153.53	164.60	1.6854	162.91	138.64	520.00	
5.2080	4.7606	161.20	171.17	1.7119	169.46	138.76	530.00	
4.7606	4.5438	167.72	177.03	1.7342	175.29	138.86	540.00	
4.5438	4.0957	173.54	182.18	1.7538	180.43	138.95	550.00	
4.0957	3.5317	178.65	186.28	1.7772	184.50	139.06	560.00	
3.5317	3.2545	182.70	189.48	1.8026	187.68	139.18	570.00	
3.2545	3.1274	185.86	192.24	1.8221	190.42	139.28	580.00	
3.1274	3.0582	188.58	194.77	1.8387	192.93	139.36	590.00	
3.0582	3.0257	191.07	197.16	1.8538	195.30	139.43	600.00	
3.0257	2.9452	193.43	199.41	1.8681	197.54	139.51	610.00	
2.9452	2.8406	195.66	201.44	1.8813	199.56	139.57	620.00	
2.8406	2.7903	197.67	203.30	1.8932	201.41	139.63	630.00	
2.7903	2.7584	199.50	205.05	1.9041	203.15	139.69	640.00	
2.7584	2.7522	201.23	206.74	1.9142	204.83	139.74	650.00	
2.7522	2.7505	202.90	208.41	1.9240	206.48	139.79	660.00	
2.7505	2.6094	204.55	209.91	1.9335	207.98	139.84	670.00	
2.6094	2.3990	206.03	211.04	1.9421	209.10	139.88	680.00	
2.3990	2.2956	207.15	211.85	1.9485	209.90	139.91	690.00	
2.2956	2.2535	207.94	212.49	1.9530	210.54	139.94	700.00	
2.2535	2.2251	208.58	213.06	1.9567	211.11	139.96	710.00	
2.2251	2.2117	209.15	213.58	1.9599	211.62	139.97	720.00	
2.2117	2.2142	209.66	214.09	1.9629	212.12	139.99	730.00	
2.2142	2.2077	210.16	214.58	1.9654	212.61	140.00	740.00	
2.2077	2.2052	210.65	215.06	1.9673	213.09	140.01	750.00	
2.2052	2.2130	211.12	215.54	1.9691	213.57	140.02	760.00	
2.2130	2.2092	211.60	216.02	1.9709	214.05	140.03	770.00	
2.2092	2.2080	212.08	216.50	1.9727	214.52	140.04	780.00	
2.2080	2.0738	212.55	216.83	1.9745	214.86	140.05	790.00	
2.0738	1.8653	212.88	216.82	1.9758	214.84	140.06	800.00	
1.8653	1.7624	212.87	216.50	1.9757	214.52	140.06	810.00	
1.7624	1.7118	212.55	216.02	1.9745	214.05	140.05	820.00	
1.7118	1.6871	212.07	215.47	1.9727	213.50	140.04	830.00	
1.6871	1.6753	211.53	214.89	1.9706	212.92	140.03	840.00	
1.6753	1.7370	210.95	214.36	1.9684	212.40	140.02	850.00	
1.7370	1.8436	210.43	214.01	1.9664	212.04	140.01	860.00	
1.8436	1.8968	210.08	213.82	1.9651	211.85	140.00	870.00	
1.8968	1.9151	209.89	213.70	1.9642	211.74	140.00	880.00	
1.9151	1.9331	209.77	213.62	1.9635	211.66	139.99	890.00	
1.9331	1.9424	209.70	213.57	1.9631	211.61	139.99	900.00	
1.9424	1.9390	209.65	213.53	1.9628	211.56	139.99	910.00	

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LEVEL POOL ROUTING TABLE
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LEVEL POOL ROUTING TABLE

Table with 8 columns: I1, I2, 2S1, SUM, O1, O2+2S2, STAGE (ft), TIME (min). The table contains 40 rows of data representing routing calculations for a level pool, showing values for inflow (I1, I2), storage (2S1), summation (SUM), outflow (O1), and stage/overflow (O2+2S2) over time.

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LEVEL POOL ROUTING TABLE

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LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
1.1347	1.1243	171.59	173.85	1.7473	172.10	138.92	1390.00
1.1243	1.1278	170.36	172.61	1.7431	170.87	138.90	1400.00
1.1278	1.1296	169.13	171.39	1.7390	169.65	138.88	1410.00
1.1296	1.1221	167.91	170.16	1.7348	168.43	138.87	1420.00
1.1221	1.1270	166.70	168.95	1.7307	167.22	138.85	1430.00
1.1270	1.1295	165.49	167.75	1.7266	166.02	138.83	1440.00
1.1295	0.8407	164.30	166.27	1.7226	164.54	138.81	1450.00
0.8407	0.4162	162.83	164.08	1.7175	162.37	138.79	1460.00
0.4162	0.2060	160.66	161.28	1.7101	159.57	138.75	1470.00
0.2060	0.1020	157.87	158.18	1.7005	156.48	138.71	1480.00
0.1020	0.0505	154.79	154.94	1.6898	153.25	138.66	1490.00
0.0505	0.0250	151.57	151.65	1.6786	149.97	138.61	1500.00
0.0250	0.0124	148.30	148.34	1.6670	146.67	138.56	1510.00
0.0124	0.0061	145.01	145.03	1.6554	143.38	138.51	1520.00
0.0061	0.0030	141.73	141.74	1.6437	140.10	138.45	1530.00
0.0030	0.0015	138.47	138.47	1.6320	136.84	138.40	1540.00
0.0015	0.0007	135.22	135.22	1.6203	133.60	138.35	1550.00
0.0007	0.0004	131.99	131.99	1.6085	130.39	138.30	1560.00
0.0004	0.0002	128.79	128.79	1.5967	127.19	138.25	1570.00
0.0002	0.0001	125.61	125.61	1.5850	124.02	138.20	1580.00
0.0001	0.0000	122.45	122.45	1.5732	120.88	138.15	1590.00
0.0000	0.0000	119.32	119.32	1.5615	117.75	138.10	1600.00
0.0000	0.0000	116.20	116.20	1.5497	114.65	138.05	1610.00
0.0000	0.0000	113.12	113.12	1.5380	111.58	138.01	1620.00
0.0000	0.0000	110.05	110.05	1.5241	108.53	137.95	1630.00
0.0000	0.0000	107.02	107.02	1.5101	105.51	137.89	1640.00
0.0000	0.0000	104.01	104.01	1.4960	102.52	137.84	1650.00
0.0000	0.0000	101.04	101.04	1.4819	99.554	137.78	1660.00
0.0000	0.0000	98.086	98.086	1.4678	96.619	137.72	1670.00
0.0000	0.0000	95.165	95.165	1.4537	93.711	137.67	1680.00
0.0000	0.0000	92.271	92.271	1.4397	90.832	137.62	1690.00
0.0000	0.0000	89.406	89.406	1.4255	87.981	137.56	1700.00
0.0000	0.0000	86.569	86.569	1.4115	85.158	137.51	1710.00
0.0000	0.0000	83.760	83.760	1.3974	82.363	137.46	1720.00
0.0000	0.0000	80.980	80.980	1.3833	79.596	137.40	1730.00
0.0000	0.0000	78.227	78.227	1.3692	76.858	137.35	1740.00
0.0000	0.0000	75.503	75.503	1.3552	74.148	137.30	1750.00
0.0000	0.0000	72.807	72.807	1.3410	71.466	137.25	1760.00
0.0000	0.0000	70.138	70.138	1.3270	68.811	137.20	1770.00
0.0000	0.0000	67.499	67.499	1.3128	66.186	137.15	1780.00
0.0000	0.0000	64.887	64.887	1.2988	63.588	137.10	1790.00
0.0000	0.0000	62.303	62.303	1.2847	61.019	137.05	1800.00
0.0000	0.0000	59.748	59.748	1.2707	58.477	137.00	1810.00
0.0000	0.0000	57.224	57.224	1.2534	55.971	136.95	1820.00
0.0000	0.0000	54.735	54.735	1.2360	53.499	136.89	1830.00
0.0000	0.0000	52.280	52.280	1.2185	51.062	136.83	1840.00
0.0000	0.0000	49.861	49.861	1.2010	48.660	136.77	1850.00

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LEVEL POOL ROUTING TABLE

LEVEL POOL ROUTING TABLE

I1	I2	2S1	SUM	O1	O2+2S2	STAGE	TIME
<----- cfs min ----->						(ft)	(min)
0.0000	0.0000	47.476	47.476	1.1836	46.293	136.72	1860.00
0.0000	0.0000	45.126	45.126	1.1661	43.960	136.66	1870.00
0.0000	0.0000	42.812	42.812	1.1487	41.663	136.61	1880.00
0.0000	0.0000	40.532	40.532	1.1311	39.401	136.56	1890.00
0.0000	0.0000	38.287	38.287	1.1138	37.173	136.50	1900.00
0.0000	0.0000	36.077	36.077	1.0962	34.981	136.45	1910.00
0.0000	0.0000	33.902	33.902	1.0789	32.823	136.40	1920.00
0.0000	0.0000	31.762	31.762	1.0613	30.700	136.35	1930.00
0.0000	0.0000	29.656	29.656	1.0439	28.613	136.30	1940.00
0.0000	0.0000	27.586	27.586	1.0263	26.560	136.26	1950.00
0.0000	0.0000	25.551	25.551	1.0090	24.542	136.21	1960.00
0.0000	0.0000	23.550	23.550	0.9914	22.559	136.16	1970.00
0.0000	0.0000	21.585	21.585	0.9740	20.611	136.12	1980.00
0.0000	0.0000	19.654	19.654	0.9565	18.698	136.07	1990.00
0.0000	0.0000	17.759	17.759	0.9390	16.820	136.03	2000.00
0.0000	0.0000	15.900	15.900	0.9200	14.980	135.98	2010.00
0.0000	0.0000	14.082	14.082	0.8983	13.183	135.93	2020.00
0.0000	0.0000	12.307	12.307	0.8766	11.430	135.88	2030.00
0.0000	0.0000	10.575	10.575	0.8550	9.7201	135.83	2040.00
0.0000	0.0000	8.8868	8.8868	0.8333	8.0535	135.78	2050.00
0.0000	0.0000	7.2419	7.2419	0.8116	6.4303	135.73	2060.00
0.0000	0.0000	5.6403	5.6403	0.7900	4.8503	135.68	2070.00
0.0000	0.0000	4.0821	4.0821	0.7682	3.3139	135.64	2080.00
0.0000	0.0000	2.5678	2.5678	0.7461	1.8218	135.59	2090.00
0.0000	0.0000	1.1031	1.1031	0.7187	0.3845	135.54	2100.00
0.0000	0.0000	0.0000	0.0000	0.3845	-0.3845	135.50	2110.00

PIPES HAVE BEEN DESIGNED TO CONVEY  
THE 25 YR STORM FOR EXISTING AND FUTURE  
EXPANSION. FLOWS WERE GENERATED USING THE  
SCS BASED SOFTWARE PROGRAM "WATERWORKS"

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GROUP

**MACKENZIE**

0690 SW Bancroft St / PO Box 69039 Portland, OR 97201-0039  
Tel: 503.224.9560 Net: info@grpmack.com Fax: 503.228.1285

By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

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# AREAS FOR PIPE SIZING - 'X'

ID	AREA (AC)	ID	AREA (AC)	ID	AREA (AC)
CB					
#1	0.26	#21	0.26	#42	0.21
#2	0.07	#22	0.10	#43	0.36
#3	0.05	#23	0.25	#44	0.07
#4	0.05	#24	0.25	#45	0.20
#5	0.24	#25	0.15	#46	0.25
#6	0.09	#26	0.19	#47	0.29
#7	0.08	#27	0.14	#48	0.26
#8	0.08	#28	0.10	#49	0.13
#9	0.10	#29	0.16	#50	0.18
#10	0.12	#30	0.17	#51	0.11
#11	0.11	#31	0.13	#52	0.18
#12	0.11	#32	0.03	#53	0.21
#13	0.11	#33	0.03	#54	0.12
#14	0.20	#34	0.06	#55	0.15
#15	0.21	#35	0.21	#56	0.03
#16	0.21	#36	0.12	#57	0.04
#17	0.11	#37	0.17	DITCH INLET	
#18	0.11	#38	0.19	#1	0.46
#19	0.06	#38A	0.12	#2	1.0
#20	0.06	#39	0.15	#3	0.28
#21		#40	0.36		
		#41	0.15		

# AREAS FOR PIPE SIZING

ID	AREA (AC)	ID	AREA (AC)
RD			
#1	0.06	#22	0.15
#2	0.06	#23	0.15
#3	0.06	#24	0.15
#4	0.06	#25	0.15
#5	0.06	#26	0.15
#6	0.06	#27	0.15
#7	0.06		
#8	0.06	FUTURE	
#9	0.06	#1	3.40
#10	0.23	#2	3.50
#11	0.22	#3	0.35
#12	0.08		
#13	0.08		
#14	0.08		
#15	0.20		
#16	0.20		
#17	0.15		
#18	0.15		
#19	0.28		
#20	0.28		
#21	0.28		

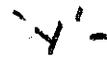
By \_\_\_\_\_

Date \_\_\_\_\_

Job # \_\_\_\_\_

Sht. \_\_\_\_\_ of \_\_\_\_\_

GROUP  
**MACKENZIE**



PIPE SIZING

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BASIN RESULT SUMMARY

BASIN ID	-----VOLUME-----		-RATE-	----TIME-----		Hydrograph Methodology	Area Acres
	---cf--	Ac-ft	--cfs-	-min-	hours		
CB1	3459	0.08	0.21	480	8.00	SBUH Method	0.26
CB10	1597	0.04	0.10	480	8.00	SBUH Method	0.12
CB11	1464	0.03	0.09	480	8.00	SBUH Method	0.11
CB12	1464	0.03	0.09	480	8.00	SBUH Method	0.11
CB13	1464	0.03	0.09	480	8.00	SBUH Method	0.11
CB14	2661	0.06	0.16	480	8.00	SBUH Method	0.20
CB15	2794	0.06	0.17	480	8.00	SBUH Method	0.21
CB16	2794	0.06	0.17	480	8.00	SBUH Method	0.21
CB17	1464	0.03	0.09	480	8.00	SBUH Method	0.11
CB18	1464	0.03	0.09	480	8.00	SBUH Method	0.11
CB19	798	0.02	0.05	480	8.00	SBUH Method	0.06
CB2	931	0.02	0.06	480	8.00	SBUH Method	0.07
CB20	798	0.02	0.05	480	8.00	SBUH Method	0.06
CB21	3459	0.08	0.21	480	8.00	SBUH Method	0.26
CB22	1331	0.03	0.08	480	8.00	SBUH Method	0.10
CB23	3326	0.08	0.20	480	8.00	SBUH Method	0.25
CB24	3326	0.08	0.20	480	8.00	SBUH Method	0.25
CB25	1996	0.05	0.12	480	8.00	SBUH Method	0.15
CB26	2528	0.06	0.15	480	8.00	SBUH Method	0.19
CB27	1863	0.04	0.11	480	8.00	SBUH Method	0.14
CB28	1331	0.03	0.08	480	8.00	SBUH Method	0.10
CB29	2129	0.05	0.13	480	8.00	SBUH Method	0.16
CB3	665	0.02	0.04	480	8.00	SBUH Method	0.05
CB30	2262	0.05	0.14	480	8.00	SBUH Method	0.17
CB31	1730	0.04	0.11	480	8.00	SBUH Method	0.13
CB32	399	0.01	0.02	480	8.00	SBUH Method	0.03
CB33	399	0.01	0.02	480	8.00	SBUH Method	0.03
CB34	798	0.02	0.05	480	8.00	SBUH Method	0.06
CB35	2794	0.06	0.17	480	8.00	SBUH Method	0.21
CB36	1597	0.04	0.10	480	8.00	SBUH Method	0.12
CB37	2262	0.05	0.14	480	8.00	SBUH Method	0.17
CB38	2528	0.06	0.15	480	8.00	SBUH Method	0.19
CB38A	1597	0.04	0.10	480	8.00	SBUH Method	0.12
CB39	1996	0.05	0.12	480	8.00	SBUH Method	0.15
CB4	665	0.02	0.04	480	8.00	SBUH Method	0.05
CB40	4790	0.11	0.29	480	8.00	SBUH Method	0.36
CB41	1996	0.05	0.12	480	8.00	SBUH Method	0.15
CB42	2794	0.06	0.17	480	8.00	SBUH Method	0.21
CB43	4790	0.11	0.29	480	8.00	SBUH Method	0.36
CB44	931	0.02	0.06	480	8.00	SBUH Method	0.07
CB45	2661	0.06	0.16	480	8.00	SBUH Method	0.20
CB46	3326	0.08	0.20	480	8.00	SBUH Method	0.25
CB47	3859	0.09	0.24	480	8.00	SBUH Method	0.29
CB48	3459	0.08	0.21	480	8.00	SBUH Method	0.26
CB49	1730	0.04	0.11	480	8.00	SBUH Method	0.13
CB5	3193	0.07	0.20	480	8.00	SBUH Method	0.24
CB50	2395	0.05	0.15	480	8.00	SBUH Method	0.18

## PIPE SIZING

=====
  
BASIN RESULT SUMMARY
  
=====

BASIN ID	-----VOLUME-----		-RATE-	----TIME-----		Hydrograph Methodology	Area Acres
	---cf--	Ac-ft	--cfs-	-min-	hours		
CB51	1464	0.03	0.09	480	8.00	SBUH Method	0.11
CB52	2395	0.05	0.15	480	8.00	SBUH Method	0.18
CB53	2794	0.06	0.17	480	8.00	SBUH Method	0.21
CB54	1597	0.04	0.10	480	8.00	SBUH Method	0.12
CB55	1996	0.05	0.12	480	8.00	SBUH Method	0.15
CB56	399	0.01	0.02	480	8.00	SBUH Method	0.03
CB57	532	0.01	0.03	480	8.00	SBUH Method	0.04
CB6	1197	0.03	0.07	480	8.00	SBUH Method	0.09
CB7	1064	0.02	0.07	480	8.00	SBUH Method	0.08
CB8	1064	0.02	0.07	480	8.00	SBUH Method	0.08
CB9	1331	0.03	0.08	480	8.00	SBUH Method	0.10
DI1	6120	0.14	0.37	480	8.00	SBUH Method	0.46
DI3	3725	0.09	0.23	480	8.00	SBUH Method	0.28
FUT1	45238	1.04	2.77	480	8.00	SBUH Method	3.40
FUT2	46568	1.07	2.85	480	8.00	SBUH Method	3.50
FUT3	4657	0.11	0.29	480	8.00	SBUH Method	0.35
RD1	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD10	3060	0.07	0.19	480	8.00	SBUH Method	0.23
RD11	2927	0.07	0.18	480	8.00	SBUH Method	0.22
RD12	1064	0.02	0.07	480	8.00	SBUH Method	0.08
RD13	1064	0.02	0.07	480	8.00	SBUH Method	0.08
RD14	1064	0.02	0.07	480	8.00	SBUH Method	0.08
RD15	2661	0.06	0.16	480	8.00	SBUH Method	0.20
RD16	2661	0.06	0.16	480	8.00	SBUH Method	0.20
RD17	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD18	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD19	3725	0.09	0.23	480	8.00	SBUH Method	0.28
RD2	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD20	3725	0.09	0.23	480	8.00	SBUH Method	0.28
RD21	3725	0.09	0.23	480	8.00	SBUH Method	0.28
RD22	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD23	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD24	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD25	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD26	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD27	1996	0.05	0.12	480	8.00	SBUH Method	0.15
RD3	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD4	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD5	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD6	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD7	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD8	798	0.02	0.05	480	8.00	SBUH Method	0.06
RD9	798	0.02	0.05	480	8.00	SBUH Method	0.06





STORM SEWERS

SEWER LOCATION	TIME (Min)		INCR. TIME	TOTAL TIME (To Upper End)	INL. Hr.	AREA (Acres)				RUNOFF (CFS)	SEWER DESIGN				PROFILE		
	M.F. #	TO M.F. #				INCR. AREA	COEF. OF RUNOFF (C)	INCR. EQUIV. (0.43)	TOTAL EQUIV. AREA (INCR. M.F. #) (C)		SLOPE (%)	DIAMETER (IN.)	CAPACITY (CFS)	VELOCITY (FPS), n=0.012	LENGTH (ft.)	GROUND ELEV.	INVERT ELEV.
By: _____ Date: _____ Ck'd _____ Date: _____																	
STREET																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CS #16, 17, 18 (29)									0.35	5.85	7.05	18"	30				
CS #19, 20 (30)									0.10	0.10	1.0	6"	0.12				
CS #21 (31)									0.21	0.21	2.0	6"	0.86				
CS #22 (32)									0.08	0.29	3.16	8"	2.44				
CS #23 (33)									0.20	0.49	3.16	8"	2.44				
CS #24 (34)									6.70	0.69	4.63	16"	5.10				
CS #25 (35)									6.12	0.81	4.63	16"	5.10				
CS #26 (36)									6.10	0.91	2.5	12"	6.10				
CS #27 (37)									0.11	1.02	2.5	12"	6.10				
CS #28, 29 (38)									6.22	1.24	2.5	12"	6.10				
CS #30 (39)									0.11	0.14	6.13%	6"	1.51				
CS #31 (40)									0.11	0.25	11.6%	8"	4.46				
CS #32, 33 (41)									0.04	0.29	11.6%	8"	4.46				
CS #34 (42)									0.05	0.34	11.6%	8"	4.46				

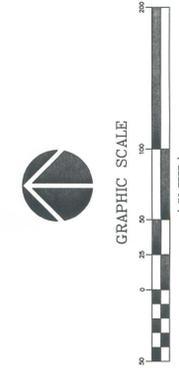


STORM SEWERS

SEWER LOCATION		TIME (Min)		In./Hr.	AREA (Acres)			SEWER DESIGN				PROFILE							
By: _____	Date: _____	CK'd _____	Date: _____	INCR. TIME	TOTAL TIME (To Upper End)	INTENSITY (I)	INCR. AREA	COEFF OF RUNOFF (c)	INCR. EQUIV. (c-f)	TOTAL EQUIV. AREA (ACRES. AREA) (cf)	RUNOFF (CFS)	SLOPE (%)	DIAMETER (IN.)	CAPACITY (CFS)	VELOCITY (FPS)	LENGTH (ft)	GROUND ELEV.	INVERT ELEV.	LOWER
STREET	M.F.#	TO M.F.#																	
				4	5	9	7	8	9	10	11	12	13	14	15	16	17	18	
RO #12 (53)										0.07	0.07	2.0	6"	0.86					
RO #13 (61)										0.07	0.07	0.5	12"	2.73					
RO #14 (55)										0.07	0.21	0.5	12"	2.73					
RO # 15, 16 (56)										0.32	0.53	0.5	12"	2.73					
(52) + (56) = (97)											4.36	2.65	18"	18.53					
CS #12 (58)										0.17	4.53	2.65	18"	18.53					
CS #15 Foot #3 (59)										0.59	0.58	0.75	10"	2.06					
CS # 41, RO # 17 (60)										0.18	0.76	0.75	10"	2.06					
CS # 15, RO #18 (61)										0.28	1.04	0.49	12"	2.70					
(58) + (61) = (62)											5.57	2.65	12"	6.28					
CS #16 (63)										0.20	5.77	2.65	12"	6.28					
CS # 47 (64)										0.24	0.24	2%	6"	0.86					

# STORM SEWERS

SEWER LOCATION		TIME (Min.)		IN. Hc.	AREA (Acres)				RUNOFF (CFS)	SEWER DESIGN				PROFILE								
					INCR. AREA	COEF. OF RUNOFF (C)	INCR. EQUIV. (C-F)	TOTAL EQUIV. AREA (C-F)		SLOPE (%)	DIAMETER (IN.)	CAPACITY (CFS)	VELOCITY (FPS)			LENGTH (FT)	GROUND ELEV.	INVERT ELEV.				
By:	Date:	CK'D	Date:	STREET	M.F. #	TO M.F. #	INCR. TIME	TOTAL TIME (To Upper End)	INTENSITY (I)	7	8	9	10	11	12	13	14	15	16	17	18	
					1																	
					CS #48	RD #19																
						RD #20																
					CS #49																	
						RD #21																
					CS #50																	
					(63) + (64) + (65)																	
					CS #51																	
					CS #52																	
					CS #53																	
					CS #54																	
					CS #55																	
					CS #56, 57																	



**UTILITY NOTES**

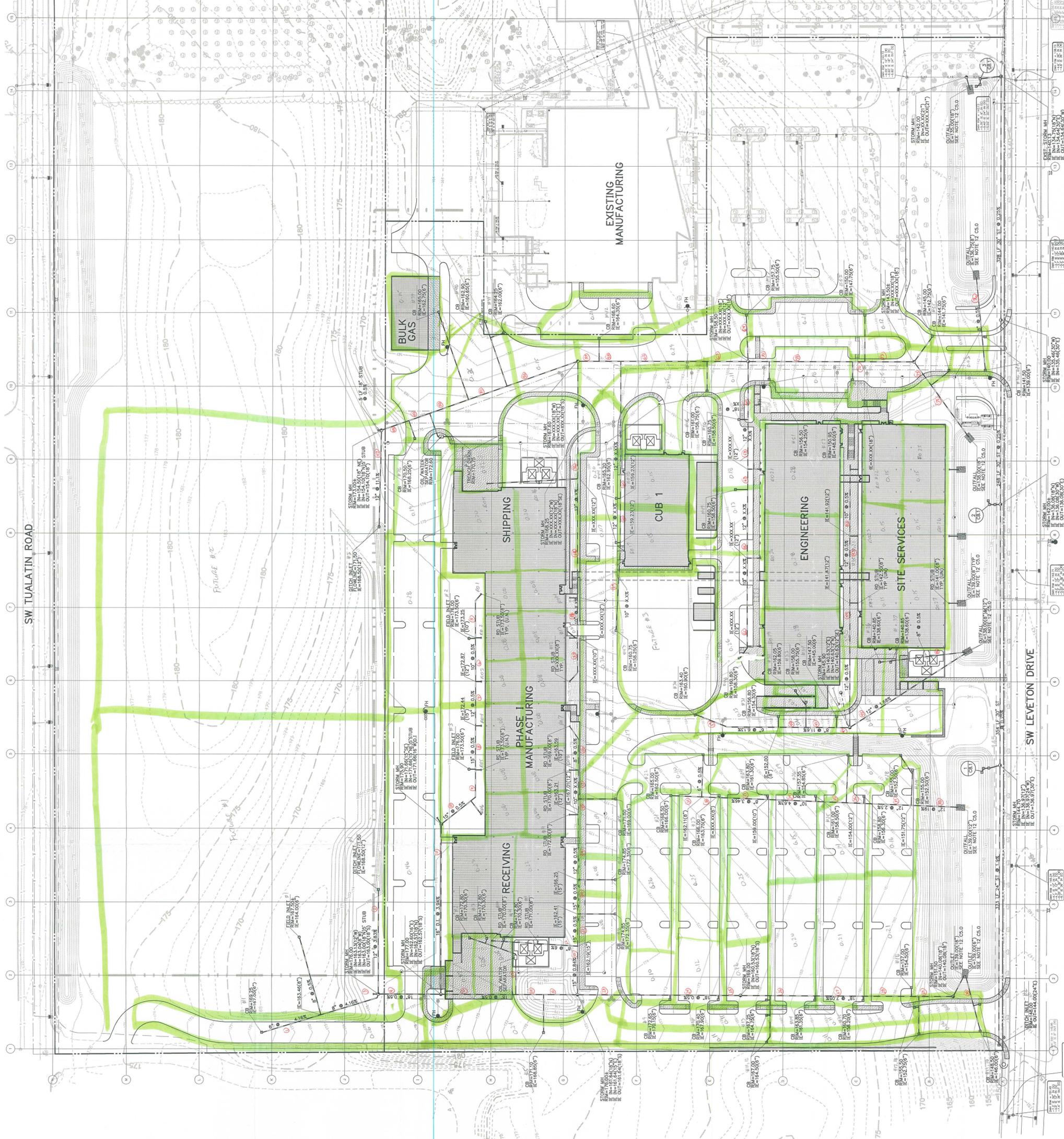
- ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CITY OF TUALATIN, THE UNITED SEWAGE AGENCY, AND THE CURRENT EDITION OF THE UNIFORM CODE BOOK. ALL WORK WITHIN THE PUBLIC R.O.W. REQUIRES A PUBLIC WORKS PERMIT.
- THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL LOCATIONS FOR WORK SHALL BE CHECKED AND COORDINATED WITH ALL UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXISTING UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR EXCAVATION SHALL BE VERIFIED AS TO CONDITION, SIZE AND LOCATION BY UNCOVERING, AND SHALL BE RESPONSIBLE FOR NOTIFYING THE CITY OF TUALATIN AND THE ENGINEER IF THERE ARE ANY DISCREPANCIES.
- PROVIDE CLEANOUTS AS REQUIRED IN THE CURRENT UNIFORM PLUMBING CODE CHAPTER 7, SECTIONS 707 AND 719, AND CHAPTER 11, SECTION 1103.4. CLEANOUTS SHALL BE PROVIDED USING CONCRETE PIPE TO PIPE AND WYE FITTINGS.
- ALL STORM PIPING IS SIZED FOR A MANNING'S "N" VALUE = 0.013. ALL STORM PIPING IS DESIGNED USING CONCRETE PIPE TO PIPE AND WYE FITTINGS.
- SEE MECHANICAL DRAWINGS FOR UTILITIES LOCATED WITHIN THE BUILDING AND TO 5' OUTSIDE THE BUILDING.
- ALL ROOF DRAIN LEADERS TO BE 8" AT 2.0% MIN. UNLESS NOTED OTHERWISE.
- VERIFY LOCATION, SIZE AND DEPTH OF EXISTING UTILITIES BY PORTHOLE PRIOR TO CONSTRUCTION. NOTIFY ENGINEER OF DISCREPANCIES.
- PROVIDE 4" THIS DRAIN LINE FROM PASTORIC WATER METERS VAULT AND BACKFLOW PREVENTER VAULT TO THE DOUBLE DETECTOR CHECK VALVE (FIRE) VAULT. PROVIDE 1/2" HP SUMP PUMP AT BASE OF FIRE VAULT AND INSTALL 2" PVC DRAIN FURNISH 3/4" RICH DIAMETER CONDUIT FROM BUILDING ELECTRICAL ROOM TO FIRE VAULT FOR SUMP PUMP ELECTRICAL SERVICE.
- INSTALLATION AND CONDUIT REQUIREMENTS.
- THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS BASED ON A SURVEY PREPARED BY HICKMAN AND ASSOCIATES.
- CONTRACTOR TO PROVIDE POWER TO IRRIGATION CONTROLLER. SEE SPECIFICATIONS AND LANDSCAPE PLANS.
- SEE BUILDING PLUMBING DRAWINGS FOR PIPING WITHIN THE BUILDING AND UP TO 5' OUTSIDE THE BUILDING, INCLUDING ANY FOUNDATION DRAINAGE PIPING.
- PROVIDE MINIMUM 12" x 12" THICK TYPE II RIP-RAP AT 12" AND LARGER STORM OUTFALLS. PROVIDE MINIMUM 8" x 12" THICK TYPE II RIP-RAP AT 10" AND SMALLER OUTFALLS.

**PROPOSED UTILITY LEGEND**

- STORM SEWER LINE
- SANITARY SEWER LINE
- FIRE WATER LINE
- WATER METER
- MANHOLE
- CATCH BASIN/OTCH INLET
- FIELD INLET
- FIRE HYDRANT ASSEMBLY
- UNLESS NOTED
- U.N.

**EXISTING UTILITY LEGEND**

- SITE BOUNDARY
- ADJOINING OR INTERIOR PROPERTY LINE
- RIGHT-OF-WAY CENTERLINE
- WATER LINE
- GAS LINE
- SANITARY SEWER LINE
- UNDERGROUND TELEPHONE LINE (ITE)
- STORM DRAINAGE LINE
- UNDERGROUND POWER LINE
- OVERHEAD POWER LINE
- FIRE HYDRANT
- WATER VALVE
- GAS VALVE
- CATCH BASIN
- CURB LINE
- EDGE OF PAVEMENT
- STREET SIGN
- SANITARY SEWER MANHOLE
- EVERGREEN TREE WITH DIAMETER
- DECIDUOUS TREE WITH DIAMETER
- CHAIN LINK FENCE LINE
- LIGHT POLE
- 6" BOLLARD
- ROOF DRAIN (SHOOT ON ROOF)
- GAS METER
- POWER TRANSFORMER
- CAMERA TOWER
- POWER POLE
- GUY ANCHOR
- SIDE INLET CATCH BASIN
- MAIL BOX
- STORM SEWER MANHOLE





February 2, 2016

Clare Fuchs  
City of Tualatin  
18880 SW Martinazzi Road  
Tualatin, OR 97062

**Re: AR-15-0029**  
**Tax Lot I.D: 2S1 22CC 00 500**

Dear Clare,

Thank you for the opportunity to review the proposed site plan surrounding the above named development project. Tualatin Valley Fire & Rescue endorses this proposal predicated on the following criteria and conditions of approval:

### **FIRE APPARATUS ACCESS:**

1. **FIRE APPARATUS ACCESS ROAD DISTANCE FROM BUILDINGS AND FACILITIES:** Access roads shall be within 150 feet of all portions of the exterior wall of the first story of the building as measured by an approved route around the exterior of the building or facility. An approved turnaround is required if the remaining distance to an approved intersecting roadway, as measured along the fire apparatus access road, is greater than 150 feet. (OFC 503.1.1))
2. **DEAD END ROADS AND TURNAROUNDS:** Dead end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround. Diagrams of approved turnarounds are shown below: (OFC 503.2.5 & D103.1)
3. **FIRE APPARATUS ACCESS ROAD EXCEPTION FOR AUTOMATIC SPRINKLER PROTECTION:** When buildings are completely protected with an approved automatic fire sprinkler system, the requirements for fire apparatus access may be modified as approved by the fire code official. (OFC 503.1.1) ***Note: If residential fire sprinklers are elected as an alternate means of protection and the system will be supported by a municipal water supply, please contact the local water purveyor for information surrounding water meter sizing.***
4. **ADDITIONAL ACCESS ROADS – COMMERCIAL/INDUSTRIAL HEIGHT:** Buildings exceeding 30 feet in height or three stories in height shall have at least two separate means of fire apparatus access. (D104.1)
5. **ADDITIONAL ACCESS ROADS – COMMERCIAL/INDUSTRIAL SQUARE FOOTAGE:** Buildings or facilities having a gross building area of more than 62,000 square feet shall have at least two approved separate means of fire apparatus access. Exception: Projects having a gross building area of up to 124,000 square feet that have a single approved fire apparatus access road when all buildings are equipped throughout with approved automatic sprinkler systems. (OFC D104.2)

6. **AERIAL FIRE APPARATUS ROADS:** Buildings with a vertical distance between the grade plane and the highest roof surface that exceeds 30 feet in height shall be provided with a fire apparatus access road constructed for use by aerial apparatus with an unobstructed driving surface width of not less than 26 feet. For the purposes of this section, the highest roof surface shall be determined by measurement to the eave of a pitched roof, the intersection of the roof to the exterior wall, or the top of the parapet walls, whichever is greater. Any portion of the building may be used for this measurement, provided that it is accessible to firefighters and is capable of supporting ground ladder placement. (OFC D105.1, D105.2)
7. **AERIAL APPARATUS OPERATIONS:** At least one of the required aerial access routes shall be located within a minimum of 15 feet and a maximum of 30 feet from the building, and shall be positioned parallel to one entire side of the building. The side of the building on which the aerial access road is positioned shall be approved by the fire code official. Overhead utility and power lines shall not be located over the aerial access road or between the aerial access road and the building. (D105.3, D105.4)
8. **FIRE APPARATUS ACCESS ROAD WIDTH AND VERTICAL CLEARANCE:** Fire apparatus access roads shall have an unobstructed driving surface width of not less than 20 feet (26 feet adjacent to fire hydrants (OFC D103.1)) and an unobstructed vertical clearance of not less than 13 feet 6 inches. The fire district will approve access roads of 12 feet for up to three dwelling units and accessory buildings. (OFC 503.2.1 & D103.1)
9. **NO PARKING SIGNS:** Where fire apparatus roadways are not of sufficient width to accommodate parked vehicles and 20 feet of unobstructed driving surface, "No Parking" signs shall be installed on one or both sides of the roadway and in turnarounds as needed. Signs shall read "NO PARKING - FIRE LANE" and shall be installed with a clear space above grade level of 7 feet. Signs shall be 12 inches wide by 18 inches high and shall have red letters on a white reflective background. (OFC D103.6)
10. **NO PARKING:** Parking on emergency access roads shall be as follows (OFC D103.6.1-2):
  1. 20-26 feet road width – no parking on either side of roadway
  2. 26-32 feet road width – parking is allowed on one side
  3. Greater than 32 feet road width – parking is not restricted
11. **PAINTED CURBS:** Where required, fire apparatus access roadway curbs shall be painted red (or as approved) and marked "NO PARKING FIRE LANE" at 25 foot intervals. Lettering shall have a stroke of not less than one inch wide by six inches high. Lettering shall be white on red background (or as approved). (OFC 503.3)
12. **FIRE APPARATUS ACCESS ROADS WITH FIRE HYDRANTS:** Where a fire hydrant is located on a fire apparatus access road, the minimum road width shall be 26 feet and shall extend 20 feet before and after the point of the hydrant. (OFC D103.1)
13. **SURFACE AND LOAD CAPACITIES:** Fire apparatus access roads shall be of an all-weather surface that is easily distinguishable from the surrounding area and is capable of supporting not less than 12,500 pounds point load (wheel load) and 75,000 pounds live load (gross vehicle weight). Documentation from a registered engineer that the final construction is in accordance with approved plans or the requirements of the Fire Code may be requested. (OFC 503.2.3)
14. **TURNING RADIUS:** The inside turning radius and outside turning radius shall not be less than 28 feet and 48 feet respectively, measured from the same center point. (OFC 503.2.4 & D103.3)
15. **ACCESS ROAD GRADE:** Fire apparatus access roadway grades shall not exceed 12%. When fire sprinklers\* are installed, a maximum grade of 15% will be allowed.

0-12%	Allowed
13-15%	Special consideration with submission of written Alternate Methods and Materials request. Ex: Automatic fire sprinkler (13-D) system* in lieu of grade.
≥16%	Special consideration on a case by case basis with submission of written

	Alternate Methods and Materials request Ex: Automatic fire sprinkler (13-D) system* plus additional engineering controls in lieu of grade.**
--	--

\*The approval of fire sprinklers as an alternate shall be accomplished in accordance with the provisions of ORS 455.610(5) and OAR 918-480-0100 and installed per section 903.3.1.1, 903.3.1.2, or 903.3.1.3 of the Oregon Fire Code (OFC 503.2.7 & D103.2)

\*\* See Forest Dwelling Access section for exceptions.

- 16. **ANGLE OF APPROACH/GRADE FOR TURNAROUNDS:** Turnarounds shall be as flat as possible and have a maximum of 5% grade with the exception of crowning for water run-off. (OFC 503.2.7 & D103.2)
- 17. **ANGLE OF APPROACH/GRADE FOR INTERSECTIONS:** Intersections shall be level (maximum 5%) with the exception of crowning for water run-off. (OFC 503.2.7 & D103.2)
- 18. **AERIAL APPARATUS OPERATING GRADES:** Portions of aerial apparatus roads that will be used for aerial operations shall be as flat as possible. Front to rear and side to side maximum slope shall not exceed 10%.
- 19. **GATES:** Gates securing fire apparatus roads shall comply with all of the following (OFC D103.5, and 503.6):
  - 1. Minimum unobstructed width shall be not less than 20 feet (or the required roadway surface width).
  - 2. Gates serving three or less single-family dwellings shall be a minimum of 12 feet in width.
  - 3. Gates shall be set back at minimum of 30 feet from the intersecting roadway or as approved.
  - 4. Electric gates shall be equipped with a means for operation by fire department personnel
  - 5. Electric automatic gates shall comply with ASTM F 2200 and UL 325.
- 20. **ACCESS DURING CONSTRUCTION:** Approved fire apparatus access roadways shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. Temporary address signage shall also be provided during construction. (OFC 3309 and 3310.1)
- 21. **TRAFFIC CALMING DEVICES:** Shall be prohibited on fire access routes unless approved by the Fire Code Official. (OFC 503.4.1).

**FIREFIGHTING WATER SUPPLIES:**

- 22. **MUNICIPAL FIREFIGHTING WATER SUPPLY EXCEPTIONS:** The requirements for firefighting water supplies may be modified as approved by the fire code official where any of the following apply: (OFC 507.5.1 Exceptions)
  - 1. Buildings are equipped throughout with an approved automatic fire sprinkler system (the approval of this alternate method of construction shall be accomplished in accordance with the provisions of ORS 455.610(5)).
  - 2. There are not more than three Group R-3 or Group U occupancies.
- 23. **COMMERCIAL BUILDINGS – REQUIRED FIRE FLOW:** The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be determined in accordance with residual pressure (OFC Table B105.2). The required fire flow for a building shall not exceed the available GPM in the water delivery system at 20 psi.
 

**Note:** OFC B106, Limiting Fire-Flow is also enforced, except for the following:

  - In areas where the water system is already developed, the maximum needed fire flow shall be either 3,000 GPM or the available flow in the system at 20 psi, whichever is greater.
  - In new developed areas, the maximum needed fire flow shall be 3,000 GPM at 20 psi.
  - Tualatin Valley Fire & Rescue does not adopt Occupancy Hazards Modifiers in section B105.4-B105.4.1
- 24. **FIRE FLOW WATER AVAILABILITY:** Applicants shall provide documentation of a fire hydrant flow test or flow test modeling of water availability from the local water purveyor if the project includes a new structure or increase in the floor area of an existing structure. Tests shall be conducted from a fire hydrant within 400 feet for commercial projects, or 600 feet for residential development. Flow tests will be accepted if they were performed within 5 years as long as no adverse modifications have been made to the supply system. Water availability information may not be required to be submitted for every project. (OFC Appendix B)
- 25. **WATER SUPPLY DURING CONSTRUCTION:** Approved firefighting water supplies shall be installed and operational prior to any combustible construction or storage of combustible materials on the site. (OFC 3312.1)

## **FIRE HYDRANTS:**

26. **FIRE HYDRANTS – COMMERCIAL BUILDINGS:** Where a portion of the building is more than 400 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the building, on-site fire hydrants and mains shall be provided. (OFC 507.5.1)
- This distance may be increased to 600 feet for buildings equipped throughout with an approved automatic sprinkler system.
  - The number and distribution of fire hydrants required for commercial structure(s) is based on Table C105.1, following any fire-flow reductions allowed by section B105.3.1. Additional fire hydrants may be required due to spacing and/or section 507.5 of the Oregon Fire Code.
27. **FIRE HYDRANTS – ONE- AND TWO-FAMILY DWELLINGS & ACCESSORY STRUCTURES:** Where a portion of a structure is more than 600 feet from a hydrant on a fire apparatus access road, as measured in an approved route around the exterior of the structure(s), on-site fire hydrants and mains shall be provided. (OFC 507.5.1)
28. **FIRE HYDRANT NUMBER AND DISTRIBUTION:** The minimum number and distribution of fire hydrants available to a building shall not be less than that listed in Table C 105.1. (OFC Appendix C)
29. **FIRE HYDRANT(S) PLACEMENT:** (OFC C104)
- Existing hydrants in the area may be used to meet the required number of hydrants as approved. Hydrants that are up to 600 feet away from the nearest point of a subject building that is protected with fire sprinklers may contribute to the required number of hydrants. (OFC 507.5.1)
  - Hydrants that are separated from the subject building by railroad tracks shall not contribute to the required number of hydrants unless approved by the fire code official.
  - Hydrants that are separated from the subject building by divided highways or freeways shall not contribute to the required number of hydrants. Heavily traveled collector streets may be considered when approved by the fire code official.
  - Hydrants that are accessible only by a bridge shall be acceptable to contribute to the required number of hydrants only if approved by the fire code official.
30. **PRIVATE FIRE HYDRANT IDENTIFICATION:** Private fire hydrants shall be painted red in color. Exception: Private fire hydrants within the City of Tualatin shall be yellow in color. (OFC 507)
31. **FIRE HYDRANT DISTANCE FROM AN ACCESS ROAD:** Fire hydrants shall be located not more than 15 feet from an approved fire apparatus access roadway unless approved by the fire code official. (OFC C102.1)
32. **REFLECTIVE HYDRANT MARKERS:** Fire hydrant locations shall be identified by the installation of blue reflective markers. They shall be located adjacent and to the side of the center line of the access roadway that the fire hydrant is located on. In the case that there is no center line, then assume a center line and place the reflectors accordingly. (OFC 507)
33. **PHYSICAL PROTECTION:** Where fire hydrants are subject to impact by a motor vehicle, guard posts, bollards or other approved means of protection shall be provided. (OFC 507.5.6 & OFC 312)
34. **CLEAR SPACE AROUND FIRE HYDRANTS:** A 3 foot clear space shall be provided around the circumference of fire hydrants. (OFC 507.5.5)
35. **FIRE DEPARTMENT CONNECTION (FDC) LOCATIONS:** FDCs shall be located within 100 feet of a fire hydrant (or as approved). Hydrants and FDC's shall be located on the same side of the fire apparatus access roadway or drive aisle, fully visible, and recognizable from the street or nearest point of the fire department vehicle access or as otherwise approved. (OFC 912.2.1 & NFPA 13)
- Fire department connections (FDCs) shall normally be located remotely and outside of the fall-line of the building when required. FDCs may be mounted on the building they serve, when approved.

- FDCs shall be plumbed on the system side of the check valve when sprinklers are served by underground lines also serving private fire hydrants.

## **BUILDING ACCESS AND FIRE SERVICE FEATURES**

36. **EMERGENCY RESPONDER RADIO COVERAGE:** In new buildings where the design reduces the level of radio coverage for public safety communications systems below minimum performance levels, a distributed antenna system, signal booster, or other method approved by TVF&R and Washington County Consolidated Communications Agency shall be provided. (OSSC 915.1; OFC 510.1)
- a. Emergency responder radio system testing and/or system installation is required for this building. Please contact me (using my contact info below) for further information including an alternate means of compliance that is available. If the alternate method is preferred, it must be requested from TVF&R prior to issuance of building permit.
37. **KNOX BOX:** A Knox Box for building access may be required for structures and gates. See Appendix C for further information and detail on required installations. Order via [www.tvfr.com](http://www.tvfr.com) or contact TVF&R for assistance and instructions regarding installation and placement. (OFC 506.1)
38. **UTILITY IDENTIFICATION:** Rooms containing controls to fire suppression and detection equipment shall be identified as "Fire Control Room." Signage shall have letters with a minimum of 4 inches high with a minimum stroke width of 1/2 inch, and be plainly legible, and contrast with its background. (OFC 509.1)

If you have questions or need further clarification, please feel free to contact me at (503) 649-8577.

Sincerely,



Ty Darby  
Deputy Fire Marshal II

Cc: file

CITY OF TUALATIN  
RECEIVED  
FEB 10 2016  
ENGINEERING &  
BUILDING DEPARTMENT

**MEMORANDUM**

**Date:** February 5, 2016  
**To:** Clare Fuchs, Senior Planner, City of Tualatin  
**From:** Jackie Sue Humphreys, Clean Water Services (the District)  
**Subject:** LAM Building D Expansion, AR-15-29, 2S122AB00100

Please include the following comments when writing your conditions of approval:

**PRIOR TO ANY WORK ON THE SITE**

A Clean Water Services (the District) Storm Water Connection Permit Authorization must be obtained. Application for the District's Permit Authorization must be in accordance with the requirements of the Design and Construction Standards, Resolution and Order No. 07-20, (or current R&O in effect at time of Engineering plan submittal), and is to include:

- a. Detailed plans prepared in accordance with Chapter 2, Section 2.04.2.b-1.
- b. Detailed grading and erosion control plan. An Erosion Control Permit will be required. Area of Disturbance must be clearly identified on submitted construction plans. If site area and any offsite improvements required for this development exceed one-acre of disturbance, project will require a 1200-CN Erosion Control Permit.
- c. Detailed plans showing the development having direct access by gravity to public storm and sanitary sewer.
- d. Provisions for water quality in accordance with the requirements of the above named design standards. Water Quality is required for all new development and redevelopment areas per R&O 07-20, Section 4.05.5, Table 4-1. Access shall be provided for maintenance of facility per R&O 07-20, Section 4.02.4.
- e. If use of an existing, offsite or regional Water Quality Facility is proposed, it must be clearly identified on plans, showing its location, condition, capacity to treat this site and, any additional improvements and/or upgrades that may be needed to utilize that facility.

- f. If private lot LIDA systems proposed, must comply with the current CWS Design and Construction Standards. A private maintenance agreement, for the proposed private lot LIDA systems, needs to be provided to the City for review and acceptance.
- g. Show all existing and proposed easements on plans. Any required storm sewer, sanitary sewer, and water quality related easements must be granted to the City.
- h. Application may require additional permitting and plan review from the District's Source Control Program. For any questions or additional information, please contact Source Control at (503) 681-5175.
- i. Any proposed offsite construction activities will require an update or amendment to the current Service Provider Letter for this project.

## CONCLUSION

This Land Use Review does not constitute the District's approval of storm or sanitary sewer compliance to the NPDES permit held by the District. The District, prior to issuance of any connection permits, must approve final construction plans and drainage calculations.



# City of Tualatin

[www.tualatinoregon.gov](http://www.tualatinoregon.gov)

E-mailed January 21, 2016  
Sent by First Class Mail January 21, 2016

Suzannah Stanley  
Mackenzie  
1515 SE Water Ave  
Suite 100  
Portland, OR 97214

Re: Notice of Complete Application for Case file No. AR-15-0029, 1st Submittal intake dated stamped December 21, 2015

Dear Ms. Stanley:

Staff reviewed the Architectural Review application for 11155-11361 SW Leveton Drive. Staff has determined that this application is complete as of **January 20, 2016**. Please address approvability issues discussed below.

### ***Approvability Items***

*The following items are approvability items, not completeness items. They are listed here for your information and should be resolved at the beginning of the review process so that staff has sufficient time to analyze your proposal and formulate a recommendation with regard to approvability. **Please respond sufficiently to these items by 5pm on February 5, 2016 in order to not have the completeness date forward dated.***

### Public Facilities Decision Items:

There are a number of sections of code that we can obtain from your team during the Architectural Review process towards a stronger decision that responds to needed sections of code. In order for the decision to be supported in case of an appeal please provide responses to the code sections below. I can work with you as we construct the decision to incorporate your responses.

1. **TDC SECTION 73.400 ACCESS (12)** Comment on the reduction in parking spaces and therefore the existing accesses that were approved for more are sufficient.
2. **TDC SECTION 74.210 MINIMUM STREET RIGHT-OF-WAY WIDTHS**
3. **TDC SECTION 74.420 STREET IMPROVEMENTS**
4. **TDC SECTION 74.425 STREET DESIGN STANDARDS**
5. **TDC SECTION 74.430 STREETS, MODIFICATIONS OF REQUIREMENTS IN CASES OF UNUSUAL CONDITIONS**

For the above sections refer to our current street cross-sections, compare to existing conditions, and utilize your traffic engineer as needed to respond to widths, queuing, and safety in regards to the additional trips. With this advice include a comparison to the 2001 master plan traffic study, the total trips proposed at that time vs. the current total.

6. **TDC SECTION 74.610 WATER SERVICE**
7. **TDC SECTION 74.620 SANITARY SEWER SERVICE**
8. **TDC SECTION 74.630 STORM DRAINAGE SYSTEM**

The above sections should have comments regarding the lack of need to extend public lines if adjacent properties are served.

9. **TDC SECTION 74.640 GRADING**
10. **TDC SECTION 74.650 WATER QUALITY, STORM WATER DETENTION AND EROSION CONTROL**

These above sections should address other aspects: to not affect aspects such as: properties, gravity service, and discuss existing facilities.

11. **TDC SECTION 74.660 UNDERGROUND**

Above ground lines exist. Make findings of whether they will be undergrounded, or make a request to enter into an agreement to underground with a larger future project.

12. **TDC SECTION 75.120 EXISTING STREETS (15)**

Discuss the existing driveways compared to what is allowed.

Planning has no approvability comments on this application. However, this does not exclude the possibility of conditions of approval in the final decision.

Revisions to application must include date of resubmission on all new and revised materials. Provide a response letter addressing each item and on what page the information can be found. Please submit 5 copies of an entire new packet, not just the revised and new materials, in paper and electronic format. Please organize the new and revised materials and put them in the appropriate places in the application.

During every review staff will retain at least one paper copy of the submission for the record. Additional copies may be slip sheeted for resubmission at the staff member's discretion, but must be slip sheeted by the applicant in the appropriate places in the application at the counter. Resubmittal reviews are done generally in 10 business days.

Please do not hesitate to contact Clare Fuchs with any questions at either 503-691-3027 or [cfuchs@ci.tualatin.or.us](mailto:cfuchs@ci.tualatin.or.us) for Planning issues or Tony Doran at 503-691-3035 or [tdoran@ci.tualatin.or.us](mailto:tdoran@ci.tualatin.or.us) for Engineering issues.

Thank you,



Clare L. Fuchs, AICP  
Senior Planner

c: Aquilla Hurd-Ravich, Planning Manager  
Tony Doran, Engineering Associate  
Jeff Fuchs, City Engineer  
Lee Leighton, Mackenzie

file: AR-15-0029

# MACKENZIE.

DESIGN DRIVEN | CLIENT FOCUSED

March 1, 2016 (*Revised March 8, 2016*)

City of Tualatin  
Attention: Tony Doran  
18880 SW Martinazzi Avenue  
Tualatin, OR 97062

Re: **Lam Research R&D Building D Addition**  
*Additional Traffic Information*  
Project Number 2150163.05

Dear Mr. Doran:

Mackenzie has prepared this letter to provide additional traffic impact information related to the proposed expansion of Building D on the Lam Research campus, located at 11357 SW Leveton Drive in Tualatin, Oregon. As noted in our letter dated January 21, 2016, the 26,000-square-foot addition will house production equipment whose support involves 30 employees, and the staffing need will be met with existing employees who already work at the site. Therefore, no net increase in employment over present staffing is associated with the expansion.

As requested, this analysis addresses the needs of Architectural Review and determination of the Transportation Development Tax (TDT).

## ARCHITECTURAL REVIEW

While the building addition is not adding employees or trips to the campus, we understand the overall transportation system operation needs to be addressed. The existing campus development was approved in 2001 and included a transportation impact analysis, prepared by Mackenzie. It specifically addressed Phase 1 of the campus development with a total of 448,000 square feet of manufacturing and research and development uses. At that time, a total of 415 PM peak hour trips were estimated for the campus, with 101 entering and 314 exiting. The analysis concluded that no intersections would be significantly impacted as a result of the master plan project trips, with the exception of the SW Herman Road/SW 108th Avenue intersection, which was anticipated to operate at LOS F with the project. The intersection has since been signalized as was recommended in the TIA. In addition, the intersection of Herman Road at Teton Avenue has been signalized since the 2001 TIA was prepared.

In order to compare the original traffic analysis assumptions with the current campus impacts, we arranged for Quality Counts to conduct peak hour driveway counts at all three Lam Research driveways on Leveton Drive. Campus driveways to Tualatin Road and SW 108th Avenue are gated, and therefore were not counted. A total of 374 trips (85 entering, 289 exiting) were noted during the highest hour of the campus from 4:35-5:35 PM. This is less than the 415 PM peak hour trips originally assumed. Based on these numbers, the existing Lam facility is generating approximately 90% of the anticipated trips presented in the 2001 study.



P 503.224.9560 ■ F 503.228.1285 ■ W [MCKNZE.COM](http://MCKNZE.COM) ■ RiverEast Center, 1515 SE Water Avenue, #100, Portland, OR 97214  
ARCHITECTURE ■ INTERIORS ■ STRUCTURAL ENGINEERING ■ CIVIL ENGINEERING ■ LAND USE PLANNING ■ TRANSPORTATION PLANNING ■ LANDSCAPE ARCHITECTURE  
Portland, Oregon ■ Vancouver, Washington ■ Seattle, Washington

Even if the additional 19 PM peak hour trips were assumed to represent the 26,000-square foot expansion based on ITE rates as presented in our prior letter, the total campus trips would generate 393 trips. This is 22 trips less than the estimated trip generation from the original analysis.

At the time of the original campus development beginning in 2001, a total of 415 PM peak hour trips were assumed. The impacts of the original traffic study resulted in deficient operation of the Herman Road intersection with SW 108th Avenue, but it has since been improved with a traffic signal. Given the current campus, trip generation is less than anticipated; the impacts do not exceed that for which it was approved.

## TRANSPORTATION DEVELOPMENT TAX

The TDT is typically paid at the time of building permit and is assessed based on traffic impacts. Because the building addition does not add employees or generate additional trips at the campus, there is no traffic impact for which a TDT would need to be assessed. We understand a TDT could be assessed in the future, should the building use change.

We trust this letter provides the information necessary to complete the Architectural review and determine the TDT assessment for the Lam Research building addition.

If you have any questions regarding this letter, please do not hesitate to contact me.

Sincerely,



Brent Ahrend, PE  
Senior Associate | Traffic Engineer

Enclosure(s): Traffic Count Summary Sheets

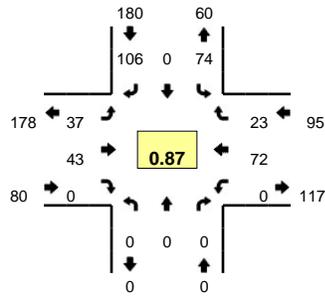
c: Melinda Anderson, Jeff Fuchs – City of Tualatin  
David Luedtke, Cindy Pomella, John Munson –Lam Research  
Janet Jones, Peter Alto, Lee Leighton – Mackenzie



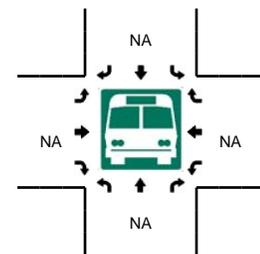
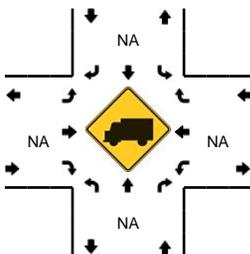
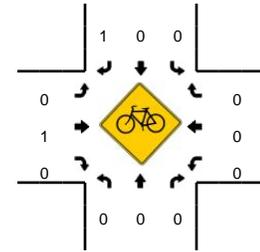
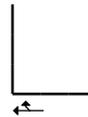
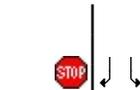
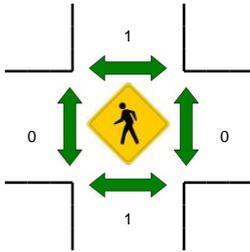
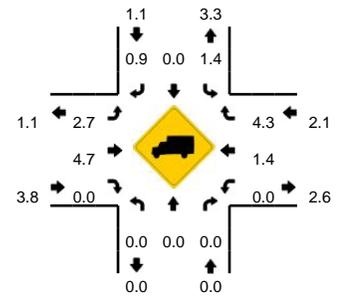
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4:00 PM	4	0	0	1	6	2	2	0	3	5	2	0			
4:05 PM	4	0	0	0	3	1	1	0	1	4	2	0			
4:10 PM	4	3	0	0	1	3	2	0	5	3	2	0			
4:15 PM	0	0	0	0	1	1	1	0	4	3	1	0			
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5:05 PM	2	3	0	0	8	2	0	0	0	13	3	2	231	79	310
5:10 PM	1	0	0	0	2	2	0	1	3	10	0	1	230	77	307
5:15 PM	2	2	0	0	5	0	0	2	9	12	0	2	251	79	330
5:20 PM	4	2	0	0	4	2	1	2	11	13	1	0	279	80	359
5:25 PM	1	2	0	0	8	0	2	0	9	9	2	0	291	82	373
5:30 PM	2	1	0	1	2	2	1	2	8	7	1	1	289	85	374
5:35 PM	1	1	0	0	2	2	0	0	6	8	3	0	283	77	360
5:40 PM	2	2	0	0	3	2	2	2	2	11	3	0	287	73	360
5:45 PM	1	1	0	0	4	4	1	2	9	10	2	0	300	70	370
5:50 PM	2	0	0	0	1	0	0	2	4	5	2	1	297	68	365
5:55 PM	4	5	0	1	6	1	1	2	2	4	1	1	296	59	355
6:00 PM	4	3	0	1	2	3	0	2	9	6	0	0	295	54	349
6:05 PM	2	3	0	0	2	3	1	1	6	9	0	0	292	51	343
6:10 PM	6	3	0	0	2	2	0	1	0	9	0	0	296	50	346
6:15 PM	3	1	0	0	3	2	0	0	3	4	1	0	282	47	329
6:20 PM	2	2	1	0	4	3	0	1	5	9	0	0	271	45	316
6:25 PM	2	0	0	0	1	2	1	0	1	7	0	0	255	42	297
6:30 PM	1	1	0	0	3	3	0	1	7	4	1	0	252	38	290
6:35 PM	1	1	0	0	0	2	2	0	4	8	2	0	248	39	287
6:40 PM	2	0	0	1	3	1	1	0	2	7	0	0	241	34	275
6:45 PM	1	0	0	0	1	1	1	0	2	10	0	1	227	31	258
6:50 PM	0	0	0	1	4	0	1	0	3	2	0	0	224	28	252
6:55 PM	2	2	0	0	6	1	1	0	1	3	0	0	217	23	240

**LOCATION:** West Driveway -- SW Leveton Dr  
**CITY/STATE:** Tualatin, OR

**QC JOB #:** 13721801  
**DATE:** Wed, Feb 17 2016



**Peak-Hour: 4:35 PM -- 5:35 PM**  
**Peak 15-Min: 5:15 PM -- 5:30 PM**

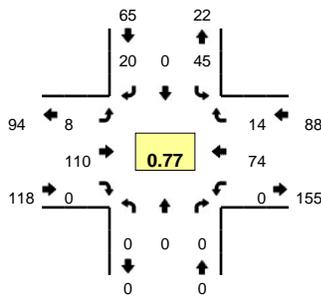


5-Min Count Period Beginning At	West Driveway (Northbound)				West Driveway (Southbound)				SW Leveton Dr (Eastbound)				SW Leveton Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	0	0	0	0	1	0	4	0	2	6	0	0	0	5	0	0	18	
4:10 PM	0	0	0	0	5	0	3	0	2	5	0	0	0	7	0	0	22	
4:15 PM	0	0	0	0	4	0	3	0	1	2	0	0	0	4	0	0	14	
4:20 PM	0	0	0	0	1	0	1	0	1	6	0	0	0	5	1	0	15	
4:25 PM	0	0	0	0	5	0	3	0	1	3	0	0	0	4	0	0	16	
4:30 PM	0	0	0	0	5	0	12	0	2	4	0	0	0	7	0	0	30	
4:35 PM	0	0	0	0	6	0	11	0	5	8	0	0	0	8	3	0	41	
4:40 PM	0	0	0	0	9	0	4	0	5	4	0	0	0	2	3	0	27	
4:45 PM	0	0	0	0	2	0	5	0	4	3	0	0	0	1	4	0	19	
4:50 PM	0	0	0	0	4	0	6	0	5	2	0	0	0	3	0	0	20	
4:55 PM	0	0	0	0	8	0	5	0	7	2	0	0	0	7	5	0	34	282
5:00 PM	0	0	0	0	5	0	11	0	4	3	0	0	0	10	2	0	35	291
5:05 PM	0	0	0	0	0	0	13	0	3	2	0	0	0	6	2	0	26	299
5:10 PM	0	0	0	0	3	0	10	0	0	3	0	0	0	9	1	0	26	303
5:15 PM	0	0	0	0	9	0	12	0	0	5	0	0	0	9	2	0	37	326
5:20 PM	0	0	0	0	11	0	13	0	1	6	0	0	0	4	0	0	35	346
5:25 PM	0	0	0	0	9	0	9	0	2	2	0	0	0	8	0	0	30	360
5:30 PM	0	0	0	0	8	0	7	0	1	3	0	0	0	5	1	0	25	355
5:35 PM	0	0	0	0	6	0	8	0	3	2	0	0	0	3	0	0	22	336
5:40 PM	0	0	0	0	2	0	11	0	3	2	0	0	0	5	0	0	23	332
5:45 PM	0	0	0	0	9	0	10	0	2	4	0	0	0	6	0	0	31	344
5:50 PM	0	0	0	0	4	0	5	0	2	2	0	0	0	4	1	0	18	342
5:55 PM	0	0	0	0	2	0	4	0	1	2	0	0	0	5	1	0	15	323
6:00 PM	0	0	0	0	9	0	6	0	0	2	0	0	0	9	0	0	26	314
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	116	0	136	0	12	52	0	0	0	84	8	0	408	
Heavy Trucks	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	
Pedestrians	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	
Bicycles	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
Railroad																		
Stopped Buses																		

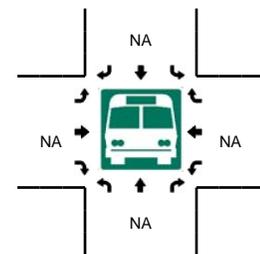
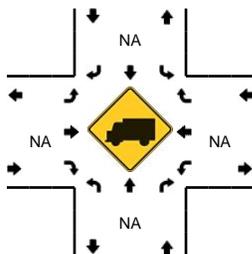
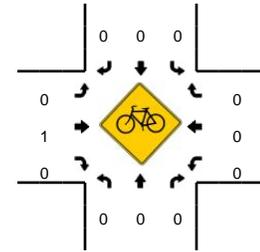
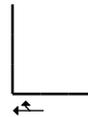
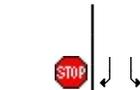
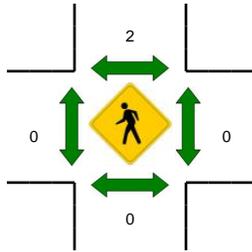
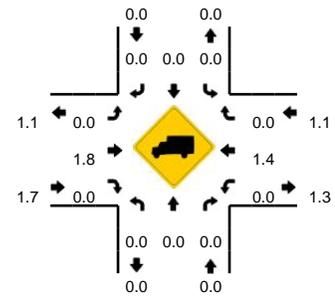
Comments:

**LOCATION:** Center Driveway -- SW Leveton Dr  
**CITY/STATE:** Tualatin, OR

**QC JOB #:** 13721802  
**DATE:** Wed, Feb 17 2016



**Peak-Hour: 4:35 PM -- 5:35 PM**  
**Peak 15-Min: 5:15 PM -- 5:30 PM**

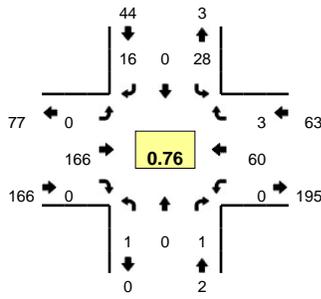


5-Min Count Period Beginning At	Center Driveway (Northbound)				Center Driveway (Southbound)				SW Leveton Dr (Eastbound)				SW Leveton Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	0	0	0	0	3	0	1	0	1	5	0	0	0	3	0	0	13	
4:10 PM	0	0	0	0	1	0	3	0	2	9	0	0	0	5	0	0	20	
4:15 PM	0	0	0	0	1	0	1	0	1	5	0	0	0	2	0	0	10	
4:20 PM	0	0	0	0	2	0	0	0	0	7	0	0	0	6	0	0	15	
4:25 PM	0	0	0	0	4	0	1	0	0	8	0	0	0	3	1	0	17	
4:30 PM	0	0	0	0	1	0	2	0	0	9	0	0	0	4	1	0	17	
4:35 PM	0	0	0	0	4	0	3	0	1	11	0	0	0	9	0	0	28	
4:40 PM	0	0	0	0	2	0	0	0	2	11	0	0	0	4	1	0	20	
4:45 PM	0	0	0	0	6	0	1	0	0	5	0	0	0	5	0	0	17	
4:50 PM	0	0	0	0	2	0	1	0	0	7	0	0	0	2	2	0	14	
4:55 PM	0	0	0	0	2	0	3	0	0	9	0	0	0	8	3	0	25	220
5:00 PM	0	0	0	0	0	0	4	0	1	8	0	0	0	9	1	0	23	219
5:05 PM	0	0	0	0	8	0	2	0	0	3	0	0	0	5	0	0	18	224
5:10 PM	0	0	0	0	2	0	2	0	0	5	0	0	0	7	1	0	17	221
5:15 PM	0	0	0	0	5	0	0	0	0	16	0	0	0	11	2	0	34	245
5:20 PM	0	0	0	0	4	0	2	0	1	16	0	0	0	4	2	0	29	259
5:25 PM	0	0	0	0	8	0	0	0	2	9	0	0	0	6	0	0	25	267
5:30 PM	0	0	0	0	2	0	2	0	1	10	0	0	0	4	2	0	21	271
5:35 PM	0	0	0	0	2	0	2	0	0	8	0	0	0	1	0	0	13	256
5:40 PM	0	0	0	0	3	0	2	0	2	1	0	0	0	4	2	0	14	250
5:45 PM	0	0	0	0	4	0	4	0	1	11	0	0	0	2	2	0	24	257
5:50 PM	0	0	0	0	1	0	0	0	0	8	0	0	0	5	2	0	16	259
5:55 PM	0	0	0	0	6	0	1	0	1	3	0	0	0	5	2	0	18	252
6:00 PM	0	0	0	0	2	0	3	0	0	11	0	0	0	5	2	0	23	252
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	68	0	8	0	12	164	0	0	0	84	16	0	352	
Heavy Trucks	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	
Pedestrians	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

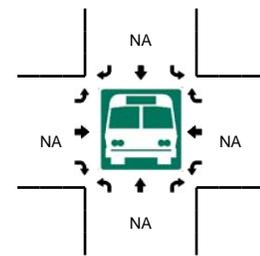
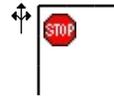
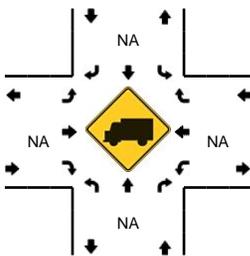
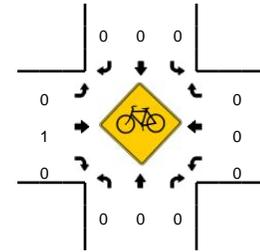
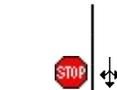
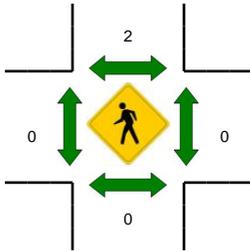
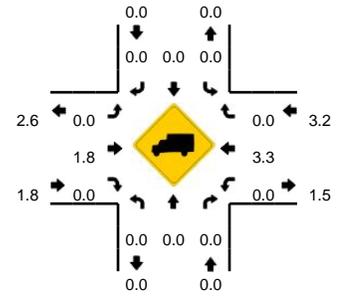
Comments:

**LOCATION:** East Driveway -- SW Leveton Dr  
**CITY/STATE:** Tualatin, OR

**QC JOB #:** 13721803  
**DATE:** Wed, Feb 17 2016



**Peak-Hour: 4:35 PM -- 5:35 PM**  
**Peak 15-Min: 5:15 PM -- 5:30 PM**



5-Min Count Period Beginning At	East Driveway (Northbound)				East Driveway (Southbound)				SW Leveton Dr (Eastbound)				SW Leveton Dr (Westbound)				Total	Hourly Totals	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
4:05 PM	0	0	0	0	4	0	0	0	0	9	0	0	0	0	1	0	0	14	
4:10 PM	0	0	0	0	4	0	3	0	0	10	0	0	0	0	1	0	0	18	
4:15 PM	0	0	0	0	0	0	0	0	0	8	0	0	0	0	1	0	0	9	
4:20 PM	1	0	0	0	2	0	2	0	0	9	0	0	0	0	3	1	0	18	
4:25 PM	1	0	0	0	3	0	1	0	0	12	0	0	0	0	2	0	0	19	
4:30 PM	0	0	0	0	2	0	2	0	0	9	0	0	0	0	2	0	0	15	
4:35 PM	1	0	0	0	0	0	2	0	0	17	0	0	0	0	6	2	0	28	
4:40 PM	0	0	1	0	2	0	1	0	0	13	0	0	0	0	4	0	0	21	
4:45 PM	0	0	0	0	2	0	0	0	0	11	0	0	0	0	5	0	0	18	
4:50 PM	0	0	0	0	1	0	1	0	0	10	0	0	0	0	3	0	0	15	
4:55 PM	0	0	0	0	3	0	2	0	0	12	0	0	0	0	7	0	0	24	225
5:00 PM	0	0	0	0	8	0	0	0	0	8	0	0	0	0	8	0	0	24	223
5:05 PM	0	0	0	0	2	0	3	0	0	13	0	0	0	0	3	0	0	21	230
5:10 PM	0	0	0	0	1	0	0	0	0	7	0	0	0	0	5	0	0	13	225
5:15 PM	0	0	0	0	2	0	2	0	0	21	0	0	0	0	8	0	0	33	249
5:20 PM	0	0	0	0	4	0	2	0	0	20	0	0	0	0	4	0	0	30	261
5:25 PM	0	0	0	0	1	0	2	0	0	22	0	0	0	0	3	0	0	28	270
5:30 PM	0	0	0	0	2	0	1	0	0	12	0	0	0	0	4	1	0	20	275
5:35 PM	0	0	0	0	1	0	1	0	0	11	0	0	0	0	0	0	0	13	260
5:40 PM	0	0	0	0	2	0	2	0	0	5	0	0	0	0	3	0	0	12	251
5:45 PM	0	0	0	0	1	0	1	0	0	15	0	0	0	0	3	0	0	20	253
5:50 PM	0	0	0	0	2	0	0	0	0	9	0	0	0	0	4	0	0	15	253
5:55 PM	0	0	0	0	4	0	5	0	0	9	0	0	0	0	2	1	0	21	250
6:00 PM	0	0	0	0	4	0	3	0	0	15	0	0	0	0	3	1	0	26	252
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total		
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U			
All Vehicles	0	0	0	0	28	0	24	0	0	252	0	0	0	0	60	0	0	364	
Heavy Trucks	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	
Pedestrians	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																			
Stopped Buses																			

Comments: