City of West Linn

Planning & Development · 22500 Salamo Rd #1000 · West Linn, Oregon 97068
Telephone 503.656.4211 · Fax 503.656.4106 · westlinnoregon.gov

DEVELOPMENT REVIEW APPLICATION

For Office Use Only		
STAFF CONTACT Darren Wyss	PROJECT NO(S). CUP-18-01 / DR-18-04 / VAR-18-02 / VAR-18-03	
NON-REFUNDABLE FEE(S) 2900, 1450, 500	REFUNDABLE DEPOSIT(S) 16,500	TOTAL 21,350 -

Type of Review (Please check all that apply):

- [ ] Annexation (ANX)
- [ ] Appeal and Review (AP) *
- [x] Conditional Use (CUP) 4500 + 200
- [x] Design Review (DR) 12000 + 300
- [ ] Easement Vacation
- [ ] Extraterritorial Ext. of Utilities
- [ ] Final Plat or Plan (FP)
- [ ] Flood Management Area
- [ ] Hillside Protection & Erosion Control
- [ ] Historic Review
- [ ] Legislative Plan or Change
- [ ] Lot Line Adjustment (LLA) */**
- [ ] Minor Partition (MIP) (Preliminary Plat or Plan)
- [ ] Non-Conforming Lots, Uses & Structures
- [ ] Planned Unit Development (PUD)
- [ ] Pre-Application Conference (PA) */**
- [ ] Street Vacation
- [ ] Subdivision (SUB)
- [ ] Temporary Uses *
- [ ] Time Extension *
- [x] Variance (VAR) 2900 + 1450
- [ ] Water Resource Area Protection/Single Lot (WAP)
- [ ] Water Resource Area Protection/Wetland (WAP)
- [ ] Willamette & Tualatin River Greenway (WRG)
- [ ] Zone Change

Home Occupation, Pre-Application, Sidewalk Use, Sign Review Permit, and Temporary Sign Permit applications require different or additional application forms, available on the City website or at City Hall.

Site Location/Address:
19915 Old River Drive
West Linn, OR 97068

Assessor's Map No.: 21E23AA
Tax Lot(s): 400, 500
Total Land Area: 0.99 acres

Brief Description of Proposal: The owner/applicant is proposing to redevelop the site and change the use from a church to a school as part of the proposed phased development plan. The proposed school will ultimately have a two-story building built on the vacant northern portion of the site, a new/re-designed parking lot including vehicle and school bus access ways, outdoor recreation facilities, open space areas, pedestrian pathways, and new landscaped areas.

Applicant Name: (please print) Sheila Walker
Address: 1232 Linn Avenue
City State Zip: Oregon City, OR 97045
Phone: 503-650-0978
Email: info@themarylhurstschool.org

RECEIVED
SEP 10 2018
Full application 9-11-18 SS
PLANNING & BUILDING
CITY OF WEST LINN
TIME

Owner Name (required): (please print) The Marylhurst School
Address: 1232 Linn Avenue
City State Zip: Oregon City, OR 97045
Phone: 503-650-0978
Email: info@themarylhurstschool.org

Consultant Name: (please print) Cardno (Attn: Kevin Brady)
Address: 6720 SW Macadam Avenue, Suite 200
City State Zip: Portland, OR 97219
Phone: 503-419-2500
Email: kevin.brady@cardno.com

1. All application fees are non-refundable (excluding deposit). **Any overruns to deposit will result in additional billing.**
2. The owner/applicant or their representative should be present at all public hearings.
3. A denial or approval may be reversed on appeal. No permit will be in effect until the appeal period has expired.
4. **Three (3) complete hard-copy sets (single sided) of application materials must be submitted with this application. One (1) complete set of digital application materials must also be submitted on CD in PDF format. If large sets of plans are required in application please submit only two sets.**

* No CD required / ** Only one hard-copy set needed

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Community Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

Sheila Walker — 8/14/18 — [signature] — 8-14-18

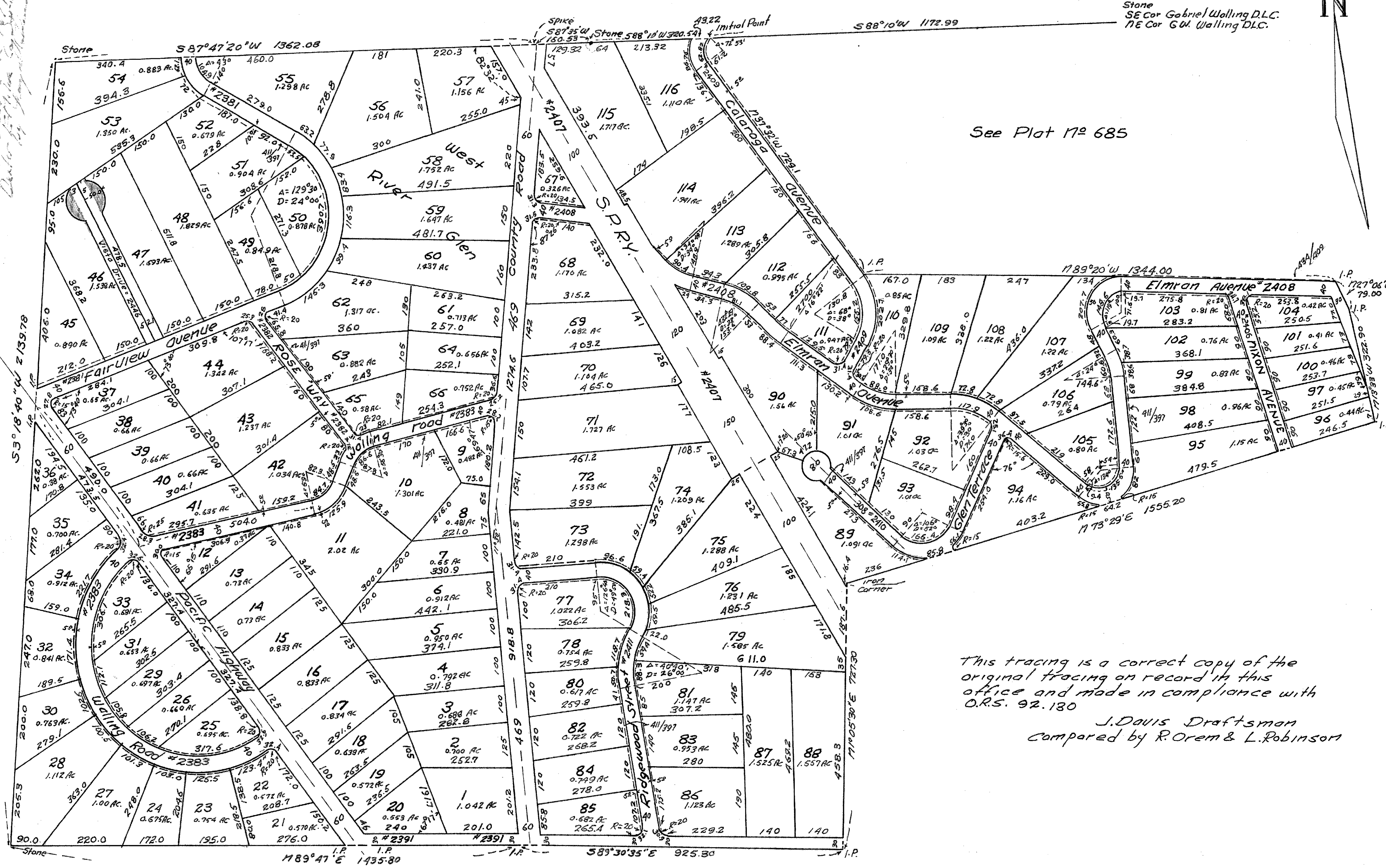
Applicant's signature — Date — Owner's signature *(required)* — Date

MAP OF CEDAROAK PARK

Situated in G.W. WALLING D.L.C.
T2S. R1E. W.M.
CLACKAMAS COUNTY, OREGON
Surveyed September, 1922. U. Ernest Nelson, Eng.
Scale: 1 inch = 200 ft.

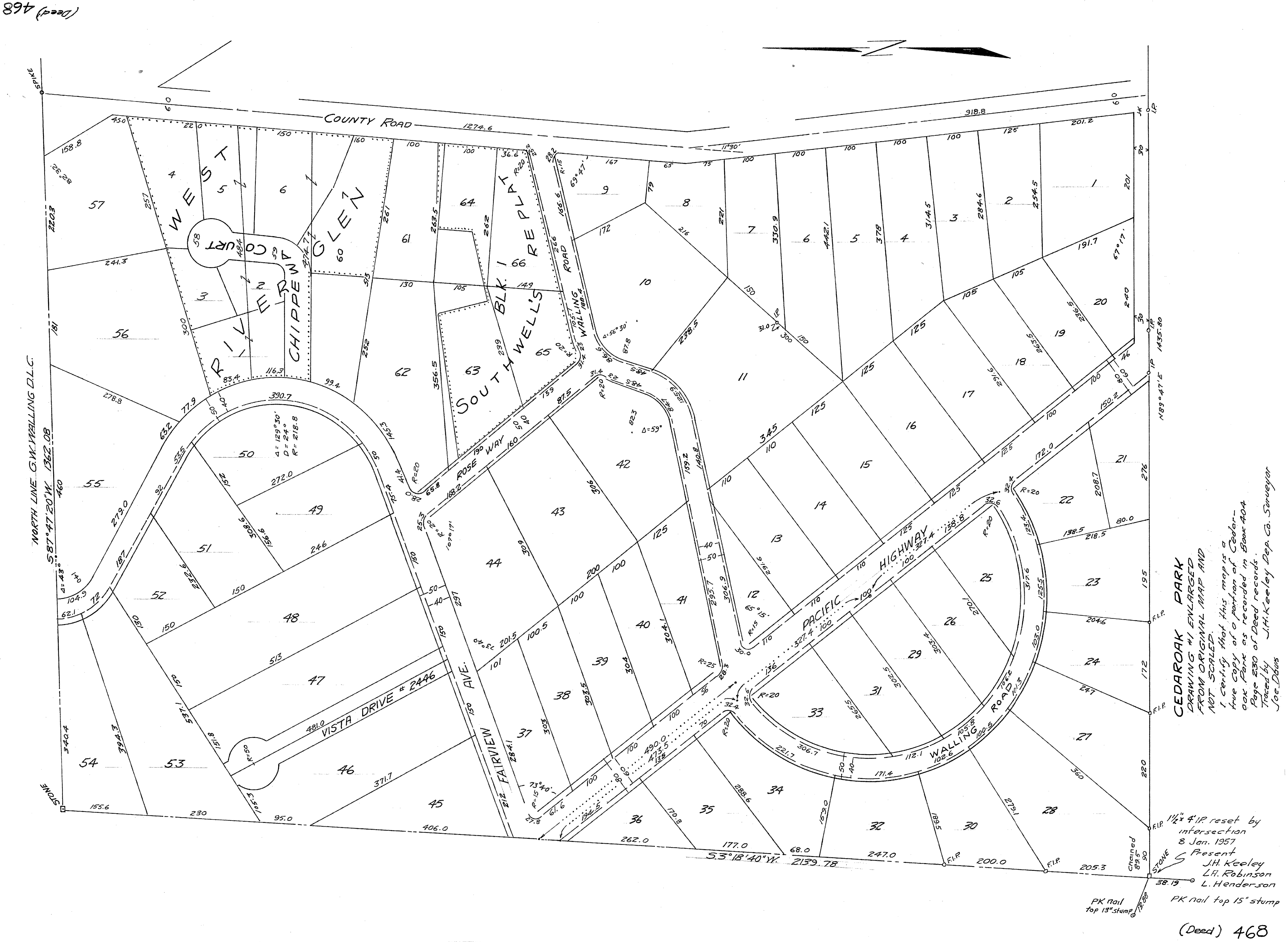
Note:
See Corrected plat (Henderson's) Cedaroak Park
Deed Records Book 404 - Page 230

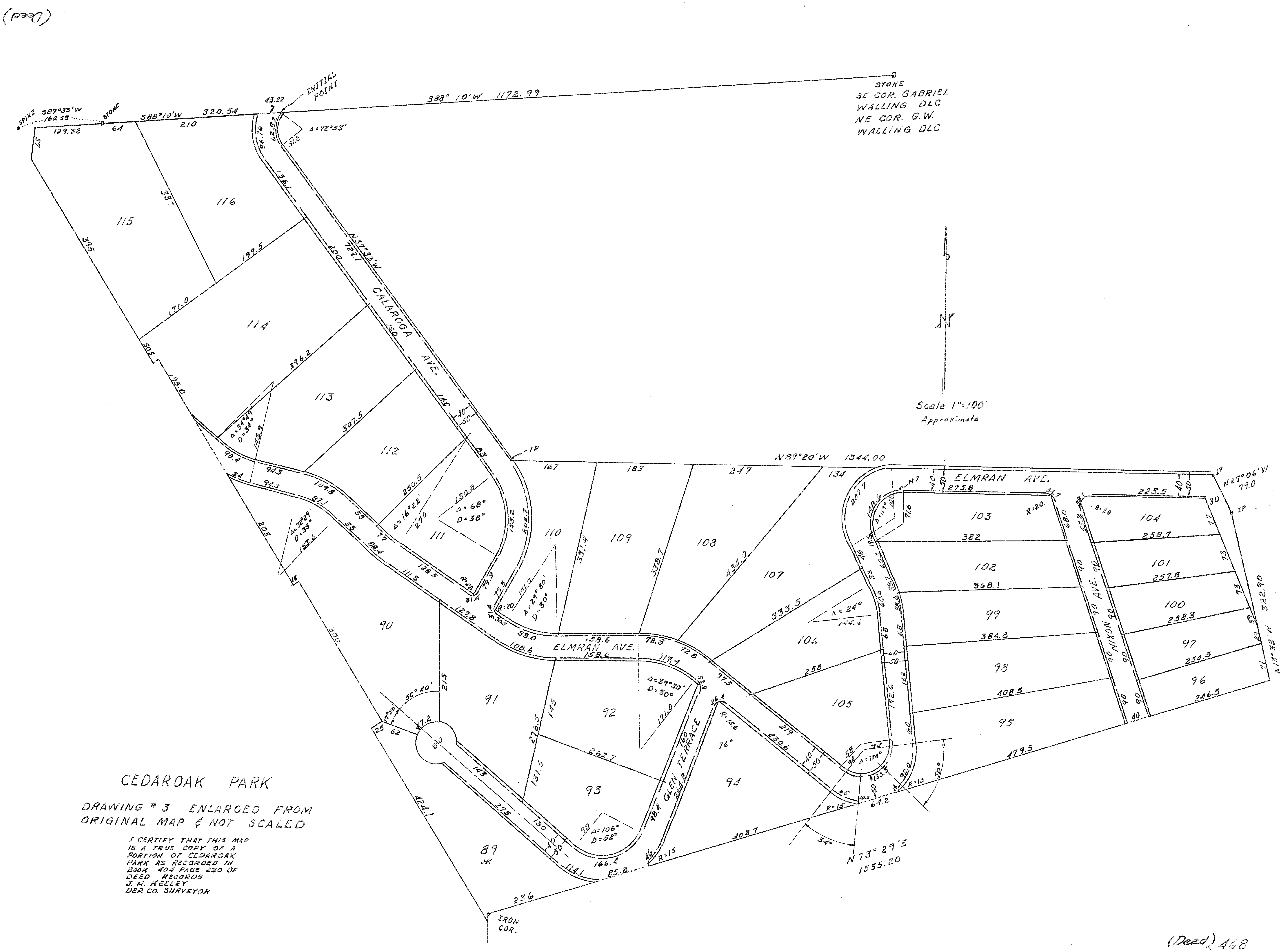
Note: Although this tracing is certified as traced from the original tracing, it is apparent the original tracing had been modified (about 1957) from data of original plat. See Co. Clerk plat book 16, page 8 for original detail. Changes, in general, are supplementary information ie; Altered road widths shown by dashed lines, County Road numbers, deed book and page references, the location of Vista Drive within tracts 46 and 47, the title "West River Glen" in tracts 58, 59 and 60, and the "Corrected plat" note at upper left.
Dexter E. Miller C.S.
8/12/75



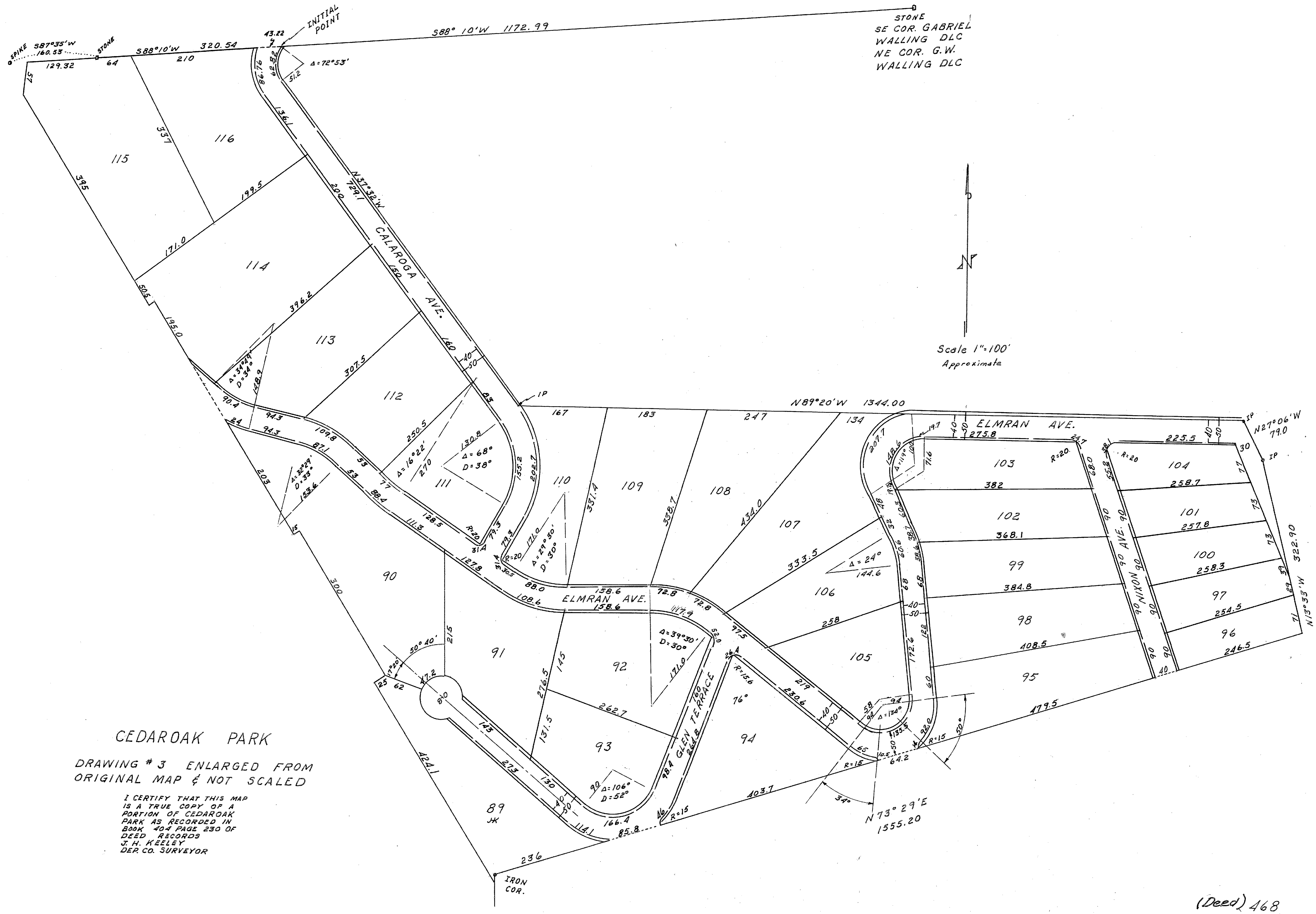
This tracing is a correct copy of the original tracing on record in this office and made in compliance with O.R.S. 92.130
J. Davis Draftsman
Compared by R. Orem & L. Robinson

468


(Deed) 468
N
COUNTY ROAD
WEST RIVER COURT
CHIPPEWA GLEN
SOUTHWELL'S REPLAT BLK. I
WALLING ROAD
ROSE WAY
FAIRVIEW AVE.
VISTA DRIVE #2446
PACIFIC HIGHWAY
NORTH LINE G.W. WALLING D.L.C.
S.87°47'20"W. 1362.08
S.3°18'40"W. 2139.78
N.89°47'E. 1435.80
SPIKE
STONE
CEDAROAK PARK
DRAWING #1 ENLARGED FROM ORIGINAL MAP AND NOT SCALED.
I certify that this map is a true copy of a portion of Cedaroak Park as recorded in Book 404 Page 230 of Deed records.
Traced by Joe Davis
J.H. Keeley Dep. Co. Surveyor
1½" x 4' I.P. reset by intersection 8 Jan. 1957
Present J.H. Keeley L.H. Robinson L. Henderson
PK nail top 13" stump
PK nail top 15" stump
(Deed) 468


(Deed) 468
INITIAL POINT
S88° 10'W 1172.99
STONE
SE COR. GABRIEL WALLING DLC
NE COR. G.W. WALLING DLC
SPIKE S87°35'W 160.55
S88°10'W 320.54
CALAROGA AVE.
N37°32'W 729.1
N
Scale 1" = 100'
Approximate
N89°20'W 1344.00
ELMRAN AVE.
NIXON AVE.
GLEN TERRACE
N27°06'W 79.0
N13°33'W 322.90
N73° 29'E 1555.20
IRON COR.
CEDAROAK PARK
DRAWING # 3 ENLARGED FROM ORIGINAL MAP & NOT SCALED
I CERTIFY THAT THIS MAP IS A TRUE COPY OF A PORTION OF CEDAROAK PARK AS RECORDED IN BOOK 404 PAGE 230 OF DEED RECORDS
J. H. KEELEY
DEP. CO. SURVEYOR
(Deed) 468

(Deed) 468



CEDAROAK PARK

DRAWING # 3 ENLARGED FROM ORIGINAL MAP & NOT SCALED

I CERTIFY THAT THIS MAP IS A TRUE COPY OF A PORTION OF CEDAROAK PARK AS RECORDED IN BOOK 404 PAGE 230 OF DEED RECORDS
J. H. KEELEY
DEP. CO. SURVEYOR

(Deed) 468

468

CEDAROAK
PARK

KNOW ALL MEN BY THESE PRESENTS that Province Of The Holy Name, a corporation organized and existing under the laws of the state of California and authorized to transact business in the state of Oregon does hereby declare the annexed map to be a true and correct map of the land owned and laid out by them as Said land being more particularly described in the engineer's certificate hereunto annexed and the said Province Of The Holy Name does hereby dedicate to the use of the public forever all streets and highways shown on said map.

IN WITNESS WHEREOF the Province Of The Holy Name, by the authority of its board of directors, has caused these presents to be executed by the provincial and secretary of the said corporation and has caused the corporate seal to be hereunto affixed.

Province Of The Holy Name.
By A. L. McMahon Provincial.
By W. T. Lewis Secretary.

Witness: J. D. O'Brien
V. H. Palmer

Province of the Holy Name
Seal

STATE OF CALIFORNIA
COUNTY OF SAN FRANCISCO } SS.

This certifies that on this 14th day of September 1922 before me a notary public in and for said county and state, personally appeared Arthur L. McMahan and W.T. Lewis to me personally known. Who first being duly sworn did say; that he the said Arthur L. McMahan is the provincial, and that he the said W.T. Lewis is the secretary, of the Province of the Holy Name, the corporation above named and, that the seal affixed to the above instrument is the corporate seal of the said corporation, and that the said instrument was signed and sealed in behalf of said corporation by authority of its board of directors, and they acknowledge said instrument to be the act and deed of said corporation.

Witness my hand and official seal.

Chester Williamson
Notary public for California
My commission expires December 21, 1925.

Notary seal

I, U. Ernest Nelson, being first duly sworn on oath depose and say that I am a civil engineer by profession, that I have correctly surveyed the lands represented on the annexed map, that the initial point of said survey is a galvanized iron pipe 2 inches in diameter and 36 inches long driven 6 inches below the surface of the ground which point is S88°10'W 1172.99 feet from the N.E. Corner of the G.W. Walling D.L.C. in Twp. 2 S., R.1 E. W.M. thence from above described point S88°10'W 320.54 feet to a stone, thence S.87°33'W. 160.53 feet to an iron spike in the ℄ of the county road, thence S87°47'20" W. 1362.08 feet to a stone at the northerly N.W. Corner of the G.W. Walling D.L.C., thence S. 3°18'40" W. 2139.78 feet to a stone, thence N89°47'E. 1435.8 feet to an I.P., thence S.89°30'35"E 929.1 feet to an I.P., thence N1°05'30"E 727.30 feet to an iron bar, thence N. 73°29'E 1555.2 feet to an I.P., thence N13°33'W 322.9 feet to an I.P. thence N.27°06'W 79.0 feet to an I.P., thence N89°20'W.1344.0 feet to an I.P., thence N.37°32' W 729.1 feet to an I.P., thence following curve to right with 72°53' angle and 51.2 feet radius, 62.82 feet to place of beginning.

U Ernest Nelson

Subscribed and sworn to before me this 22nd day of Sept. 1922

B. Lee Paget.
Notary Public for Oregon
My comission expires October 3rd 1924.

Notary seal

Engineers Seal

Approved Oct 6 1922.
[illegible] County Judge
[illegible]
W. A. Swiss
County Commissioners.

All taxes inclusive are paid from 1911 to First ½ 1921
W. J. Wilson Sheriff.
J. D. Taylor Deputy.

Attest Fred Whelan County Clerk.
By [illegible] Deputy.

Approved Oct 3 1922.
W. B. Cook. Assessor.

468

Approved 1922.
City Planning Commission of Portland, Oregon.
By [illegible] President.

Approved Oct 3d 1922.
D. T. Meldrum County Surveyor.

468

150 Beavercreek Rd
Oregon City, OR 97045
503-655-8671

Property Account Summary

1/9/2018

Account Number	00360601	Property Address	19915 OLD RIVER DR , WEST LINN, OR 97068

General Information

Alternate Property #	21E23AA00500
Property Description	468 CEDAROAK PK PT LT 2&3 SEE RELATED PROPERTY 00500E1
Last Sale Price	$0.00
Last Sale Date	01/10/2006
Last Sale Excise Number	133843
Property Category	Land &/or Buildings
Status	Active, Locally Assessed
Tax Code Area	003-002
Remarks	

Property Characteristics

Neighborhood	15841: Calaroga/Cedar Oaks 100, 101
Land Class Category	101: Residential land improved
Acreage	0.00
Change property ratio	9XX
Not in CPR Calc	Multiple Chg's

Property Details

Living Area Sq Ft	Manf Struct Size	Year Built	Improvement Grade	Stories	Bedrooms	Full Baths	Half Baths

Parties

Role	Percent	Name	Address
Taxpayer	100	NEW LIFE CHURCH ROBINWOOD	PO BOX 5, WEST LINN, OR 97068
Owner	100	NEW LIFE CHURCH ROBINWOOD	PO BOX 5, WEST LINN, OR 97068

Property Values

Value Type	Tax Year 2017	Tax Year 2016	Tax Year 2015	Tax Year 2014	Tax Year 2013
AVR Total	$524,669	$421,620	$409,340	$397,417	$385,842
Exempt	$524,669	$421,620	$409,340	$397,417	$385,842
TVR Total					
Real Mkt Land	$312,041	$204,055	$160,998	$147,893	$136,660
Real Mkt Bldg	$422,790	$419,340	$396,550	$364,640	$319,060
Real Mkt Total	$734,831	$623,395	$557,548	$512,533	$455,720
M5 Mkt Land	$312,041	$204,055	$160,998	$147,893	$136,660
M5 Mkt Bldg	$422,790	$419,340	$396,550	$364,640	$319,060
M5 SAV					
SAVL (MAV Use Portion)					
MAV (Market Portion)	$524,669	$421,620	$409,340	$397,417	$385,842
Mkt Exception					
AV Exception					

Tax Rate

Description	Rate
Total Rate	

Tax Balance

No Available Tax Charges Information for this Property at the Moment.

Installments Payable/Paid for Tax Year(Enter 4-digit Year, then Click-Here): 2017

Parents

Parcel No.	Seg/Merge No.	Status	From Date	To Date	Continued	Document Number
No Parents Found						

Children

Parcel No.	Seg/Merge No.	Status	From Date	To Date	Document Number
05031867	SM170494	Completed	01/02/2016	Active	21E23AA00500

Related Properties

No Related Properties Found

Active Exemptions

Religious

Events

Effective Date	Entry Date-Time	Type	Remarks
07/19/2017	07/19/2017 08:23:00	Seg/Merge Completed	Parent in Seg/Merge SM170494, Effective: 01/02/2016 by DROME
07/19/2017	07/19/2017 08:21:00	Seg/Merge Initiated	SEG/MERGE BEGUN ON SM170494 EXC TL 00500E1 FROM TL 00500 BY LTR 7-11-2017, EFF 2017-18 BY DROME

01/11/2006	01/11/2006 10:59:00	Tax Bill Recalculation	Error or Omission for 2005 performed by JUDYHAM TRC 2005-0653
12/15/2005	01/10/2006 14:47:00	Recording Processed	Property Transfer Filing No.: 133843, Letter 12/15/2005 by LAURIEB
12/15/2005	01/10/2006 14:47:00	Taxpayer Changed	Property Transfer Filing No.: 133843 12/15/2005 by LAURIEB
08/20/2004	08/24/2004 14:38:00	Taxpayer Changed	Property Transfer Filing No.: 103035 08/20/2004 by LINDADUN
08/20/2004	08/24/2004 14:38:00	Recording Processed	Property Transfer Filing No.: 103035, Warranty Deed, Recording No.: 2004-077253 08/20/2004 by LINDADUN
04/05/2004	04/05/2004 10:04:00	Annexation Completed For Property	Annex to TVFR, Ord 03-13 for 2004-Revise TCA Membership by JENMAYO
12/12/2002	12/12/2002 12:19:00	The situs address has changed	by LINDAPET
07/01/1999	07/01/1999 12:00:00	Ownership at Conversion	Warranty Deed: 94-24436, 3/1/94, $ 440000

Receipts

Date	Receipt No.	Amount Applied	Amount Due	Tendered	Change
No Receipts Found					

Sales History

Transfer Date	Receipt Date	Recording Number	Sale Amount	Excise Number	Deed Type	Transfer Type	Grantor (Seller)	Grantee (Buyer)	Other Parcels
12/15/2005	01/10/2006		$0.00	133843		X	WEST LINN BAPTIST CHURCH	NEW LIFE CHURCH ROBINWOOD	No
08/19/2004	08/24/2004	2004-077253	$525,000.00	103035		M	WEST LINN CHRISTIAN FELLOWSHIP	WEST LINN BAPTIST CHURCH	No
03/01/1994		1994-024436	$440,000.00	94-24436					No
06/01/1989		1989-030157	$24,548.00	89-30157					No

Printable Version

150 Beavercreek Rd
Oregon City, OR 97045
503-655-8671

Home Help Login Logoff

Property Search > Search Results > Property Summary

Property Account Summary

1/9/2018

Account Number	05031867	Property Address	19915 OLD RIVER DR , WEST LINN, OR 97068

General Information

Alternate Property #	21E23AA00500E1
Property Description	468 CEDAROAK PARK PT LTS 2&3 SEE RELATED PROPERTY 00500
Last Sale Price	
Last Sale Date	
Last Sale Excise Number	
Property Category	Land &/or Buildings
Status	Active, Locally Assessed
Tax Code Area	003-002
Remarks	

Property Characteristics

Neighborhood	15841: Calaroga/Cedar Oaks 100, 101
Land Class Category	101: Residential land improved
Change property ratio	9XX
Not in CPR Calc	Multiple Chg's

Property Details

Living Area Sq Ft	Manf Struct Size	Year Built	Improvement Grade	Stories	Bedrooms	Full Baths	Half Baths

Parties

Role	Percent	Name	Address
Taxpayer	100	NEW LIFE CHURCH ROBINWOOD	PO BOX 5, WEST LINN, OR 97068
Owner	100	NEW LIFE CHURCH ROBINWOOD	PO BOX 5, WEST LINN, OR 97068
Exempt Tenant	100		

		WEST LINN COMMUNITY PRESCHOOL	PO BOX 213, WEST LINN, OR 97068

Property Values

Value Type	Tax Year 2017	Tax Year 2016	Tax Year 2015	Tax Year 2014	Tax Year 2013
AVR Total	$46,765				
Exempt	$46,765				
TVR Total					
Real Mkt Land	$27,907				
Real Mkt Bldg	$37,590				
Real Mkt Total	$65,497				
M5 Mkt Land	$27,907				
M5 Mkt Bldg	$37,590				
M5 SAV					
SAVL (MAV Use Portion)					
MAV (Market Portion)	$46,765				
Mkt Exception					
AV Exception					

Tax Rate

Description	Rate
Total Rate	

Tax Balance

No Available Tax Charges Information for this Property at the Moment.

Installments Payable/Paid for Tax Year(Enter 4-digit Year, then Click-Here): 2017

Parents

Parcel No.	Seg/Merge No.	Status	From Date	To Date	Continued	Document Number
00360601	SM170494	Completed	01/01/1980	Active	Y	21E23AA00500

Children

Parcel No.	Seg/Merge No.	Status	From Date	To Date	Document Number
No Children Found					

Related Properties

No Related Properties Found

Active Exemptions

Day Care

Events

Effective Date	Entry Date-Time	Type	Remarks
07/19/2017	07/19/2017 08:23:00	Created by Seg/Merge	Created by Seg/Merge SM170494, Effective: 01/02/2016 by DROME

Receipts

Date	Receipt No.	Amount Applied	Amount Due	Tendered	Change
No Receipts Found					

Sales History

Transfer Date	Receipt Date	Recording Number	Sale Amount	Excise Number	Deed Type	Transfer Type	Grantor (Seller)	Grantee (Buyer)	Other Parcels
No Sales History Found									

Printable Version

150 Beavercreek Rd
Oregon City, OR 97045
503-655-8671

Home Help Login Logoff

Property Search > Search Results > Property Summary

Property Account Summary

1/9/2018

Account Number	00360594	Property Address	19803 OLD RIVER DR , WEST LINN, OR 97068

General Information

Alternate Property #	21E23AA00400
Property Description	468 CEDAROAK PK PT LT 4
Property Category	Land &/or Buildings
Status	Active, Locally Assessed
Tax Code Area	003-002
Remarks	

Property Characteristics

Neighborhood	15841: Calaroga/Cedar Oaks 100, 101
Land Class Category	100: Residential land, vacant
Change property ratio	9XX

Property Details

Living Area Sq Ft	Manf Struct Size	Year Built	Improvement Grade	Stories	Bedrooms	Full Baths	Half Baths

Property Values

Value Type	Tax Year 2017	Tax Year 2016	Tax Year 2015	Tax Year 2014	Tax Year 2013
AVR Total	$120,105	$116,607	$113,211	$109,914	$106,713
Exempt	$120,105	$116,607	$113,211	$109,914	$106,713
TVR Total					
Real Mkt Land	$227,371	$206,529	$162,949	$149,686	$138,317
Real Mkt Bldg					
Real Mkt Total	$227,371	$206,529	$162,949	$149,686	$138,317
M5 Mkt Land	$227,371	$206,529	$162,949	$149,686	$138,317
M5 Mkt Bldg					

M5 SAV					
SAVL (MAV Use Portion)					
MAV (Market Portion)	$120,105	$116,607	$113,211	$109,914	$106,713
Mkt Exception					
AV Exception					

Tax Rate

Description	Rate
Total Rate	

Tax Balance

No Available Tax Charges Information for this Property at the Moment.

Installments Payable/Paid for Tax Year(Enter 4-digit Year, then Click-Here): 2017

Related Properties

No Related Properties Found

Active Exemptions

Religious

Events

Effective Date	Entry Date-Time	Type	Remarks
12/24/2014	12/24/2014 15:13:00	The situs address has changed	by ALEESHAJOE
01/11/2006	01/11/2006 10:56:00	Tax Bill Recalculation	Error or Omission for 2005 performed by JUDYHAM TRC 2005-0652
12/15/2005	01/10/2006 14:47:00	Taxpayer Changed	Property Transfer Filing No.: 133843 12/15/2005 by LAURIEB
12/15/2005	01/10/2006 14:47:00	Recording Processed	Property Transfer Filing No.: 133843, Letter 12/15/2005 by LAURIEB
08/20/2004	08/24/2004 14:38:00	Recording Processed	Property Transfer Filing No.: 103035, Warranty Deed, Recording No.: 2004-077253 08/20/2004 by LINDADUN
08/20/2004	08/24/2004 14:38:00	Taxpayer Changed	Property Transfer Filing No.: 103035 08/20/2004 by LINDADUN
04/05/2004	04/05/2004 10:04:00	Annexation Completed For Property	Annex to TVFR, Ord 03-13 for 2004-Revise TCA Membership by JENMAYO
07/01/1999	07/01/1999 12:00:00	Ownership at Conversion	Warranty Deed: 94-24436, 3/1/94, $ 440000

Receipts

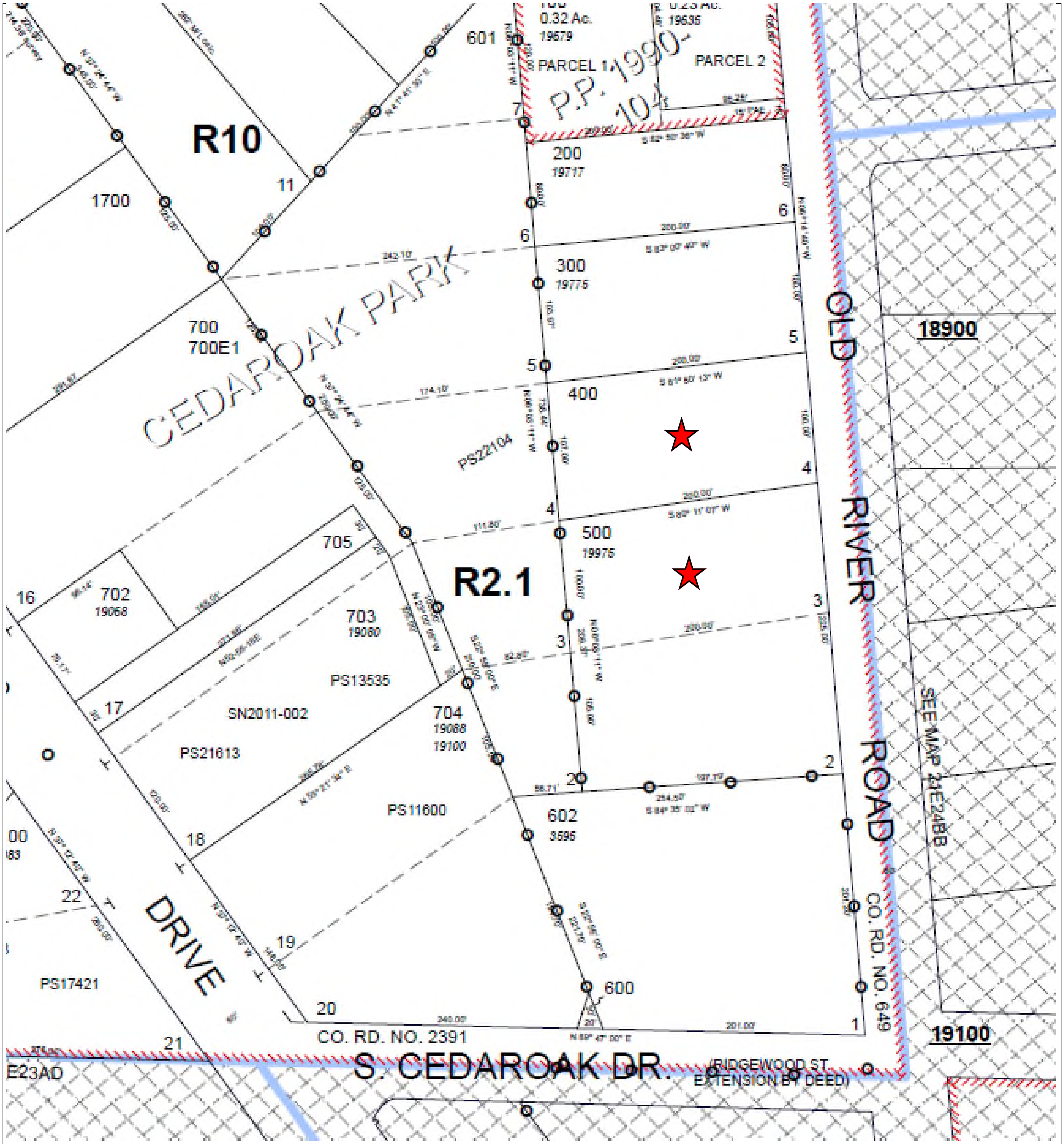
Date	Receipt No.	Amount Applied	Amount Due	Tendered	Change
No Receipts Found					

Sales History

Transfer Date	Receipt Date	Recording Number	Sale Amount	Excise Number	Deed Type	Transfer Type	Other Parcels

12/15/2005	01/10/2006		$0.00	133843		M	No
08/19/2004	08/24/2004	2004-077253	$525,000.00	103035		X	No
03/01/1994		1994-024436	$440,000.00	94-24436			No
06/01/1989		1989-030157	$24,548.00	89-30157			No

Printable Version



Order Number: 5512003441

OLD REPUBLIC TITLE COMPANY OF OREGON
A MEMBER OF THE OLD REPUBLIC TITLE INSURANCE GROUP

RESERVATIONS AND RESTRICTIONS IN CEDAROAK PARK
and CEDAROAK PARK Plat 2.

KNOW ALL MEN BY THESE PRESENTS, That L.A. Henderson and Edna C. Henderson, his wife; and Willard G. Deardorff and Betty Jane Deardorff, his wife, do hereby certify and declare that the following reservations, conditions, covenants and agreements shall become and hereby are made a part of all conveyances of property owned by the parties herein, within the plats of CEDAROAK PARK and CEDAROAK PARK Plat 2, as the same appear in Plats recorded in book 16 at page 8, and book 25 at page 1, record of Town Plats of Clackamas County, Oregon, of which conveyances the following reservations, conditions, covenants and agreements shall become a part by reference hereto and to which they shall thereupon apply as fully and with the same effect as if set forth at large therein, during the period of twenty-five years from date thereof.

These covenants are to run with the land and shall be binding on all parties and all persons claiming under them until the end of said term, at which time said covenants shall be automatically extended for successive periods of ten years unless by vote of a majority of the then owners of the lots it is agreed to change said covenants in whole or in part.

1. All parcels of land therein shall be used exclusively for residential purposes, except, those parcels fronting on the Pacific Highway; and on the West side of the Oswego County road from the South line of the plat to Walling Road, which said parcels fronting the Pacific Highway aforesaid and that part of the County road aforesaid may be used for business purposes.

2. No residential buildings including dwelling houses and or apartment houses shall exceed two and one-half stories in height; they may have family garages attached or detached.

3. Minimum set back lines as follows:

Fronting Pacific Highway 60 feet from center line, all other roads 45 feet from center lines; 20 feet from side lines of the old Southern Pacific Right of way; and 10 feet from side lot lines.

4. All out buildings shall be in the rear of the main buildings and no detached garage shall be in front of any building. No out buildings or other structures shall be obnoxious or offensive in character and exterior thereof shall be so constructed and decorated to conform with the general plan of the other buildings, except that said out buildings need not be of concrete or masonry construction. Play houses or family green houses shall be permitted along the same general plan in the rear of the main buildings.

5. No obnoxious or offensive trade or pursuit shall be carried on upon any tract therein, nor shall anything be done thereon which may be an annoyance or a nuisance to the neighborhood.

6. No trailer, basement, tent, shack, garage, barn or other out buildings shall be at any time used for residential purposes, either temporarily or otherwise.

7. Business structures shall not be of wood walls or foundations but shall be of concrete, masonry, or other fire proof material, only as regards walls and foundations.

8. No buildings of any kind shall be placed upon an area of less than 75 feet front by 100 feet in depth, as the same applies to dwellings and business structures.

9. No dwellings costing less than $7500.00 shall be erected on any part of the land West of the West side of the Oswego County Road. And no dwellings costing less than $10,000.00 shall be erected on any part of the land east of the East line of the Oswego County Road. (The said Oswego County Road being designated as that certain 60 foot County Road running North and South through the center part of said plat); and no business structure shall be erected at a cost of less than $5000.00

10. No fence or wall shall be erected to a greater height than four feet, except that suitable fences may be erected on the rear portion of Tracts for confining pets or poultry. All hedges shall be kept pruned back to reasonable heights not exceeding four feet.

11. No persons of other than the Caucasian race shall use or occupy any buildings therein, except that persons of other races may be employed by the owner or tenant as domestic servants.

12. No cows, horses, goats, pigs, rabbits or any other animals except household pets shall be kept on any parcel thereof, except that poultry may be kept in the back of each of said premises in reasonable numbers for family use. And except that not to exceed three riding horses per family may be kept for family use in suitable quarters on any tract therein lying East of said Oswego County Road.

13. Until such time as a sanitary sewer system has been installed all sewage disposal shall be by means of septic tanks of a type and in structure, constructions and outlets in accordance with recommendations of the Oregon State Board of Health; and if and when a sanitary sewer has been installed, that means of sewage disposal shall be used exclusively. In no event shall any overflow or drainage from such be permitted to appear above ground or drain onto any street or road or any adjoining property.

14. Any restrictions covering that part of Cedaroak Park lying West of the said Oswego County Road, may be changed or modified by the signed petition or agreement of 75% of the owners therein, and any restrictions covering that part of Cedaroak Park lying east of said Oswego County Road may be changed or modified by the signed petition or agreement of 75% of the owners therein, duly placed of record in the deed records of Clackamas County, Oregon.

15. Invalidation of any one of these covenants by judgment or court order shall in no wise affect any of the other provision which shall remain in full force and effect.

16. Any breach of any covenant herein shall not work a forfeiture of the land conveyed in fee simple, but such breach shall give the grantor any owner of land in said plat the right to compel performance of these covenants, and to abate or remove any structure erected in violation thereof, or any other violation through any court having jurisdiction thereof.

DATED at Oregon City, Oregon, this ~~23~~ 7th day of ~~February~~ July, 1948.

WITNESS our hands and seals the date above mentioned.

[illegible] [illegible]

Betty Jane [illegible] Edna E. Henderson

BOOK 411 PAGE 394

State of Oregon
: ss
County of Clackamas

BE IT REMEMBERED, That on this ~~26~~ 7th day of ~~February~~ July, 1948, before me the undersigned, A Notary Public in and for said County and State, personally appeared the within named L.A. Henderson and Edna [illegible] Henderson, his wife; and Millard G. Deardorff and Betty Jane Deardorff, his wife, who are known to me to be the identical individuals described in and who executed the within instrument, and acknowledged to me that they executed the same freely and voluntarily.

[illegible signature]
NOTARY PUBLIC FOR OREGON
My Commission Expires: [illegible]

STATE OF OREGON, }
County of Clackamas, } ss.

I, Guy H. Pace, County Clerk, Ex-Officio Recorder of Conveyances and Ex-Officio Clerk of the Circuit Court of the State of Oregon, for the County of Clackamas, do hereby certify that the within instrument of writing was received for record and recorded in the records of

DEED

of said County at

1948 SEP 20 AM 10 35

In book 411 On page 392

Witness my hand and seal of said county affixed.

GUY H. PACE,
County Clerk.

[illegible signature]
Deputy

Recording Certificate

AMENDED RESERVATIONS AND RESTRICTIONS
CedarOak Park

WHEREAS, certain Reservations and Restrictions affecting CedarOak Park were recorded in Book 411 of Deeds at pg. 398 and in said instrument the cost of dwelling houses lying west of the Oswego county road, known as Old River Road, was restricted to not less than $7500.00 and

WHEREAS, it is the desire of the owners of that part of CedarOak Park lying west of said Old River Road to amend said Reservations and Restrictions insofar as it affects Tracts numbered 1, 2, 3, 4, 5, 14, 15, 16, 17, 18, 19 and 20 of CedarOak Park, according to the duly recorded plat thereof.

NOW THEREFORE IT IS AGREED by the owners of said tracts, immediately enumerated above, that said Reservations and Restrictions be amended to read as follows: "that no dwelling house shall be erected at a cost of [illegible] and with the first floor area of not less than [illegible] square feet."

AND that said Reservations and Restrictions as in said Book 411 of Deeds at pg. [illegible], shall remain in full force and effect except as to that part thereof amended as above.

Dated Oregon City, Oregon this 24th day of July, 1957.

L.A. Henderson
[illegible]
By L.A. Henderson
Her attorney in fact

Willard G. Deardorff
Betty Jane Deardorff
By Willard G. Deardorff
Her attorney in fact

State of Oregon)
) ss.
County of Clackamas)

On this 24th day of July, 1957, before me, the undersigned, a Notary Public in and for said county and state personally appeared the within named L.A. Henderson, personally and as attorney in fact for his wife, Edna C. Henderson; Willard G. Deardorff, personally and as attorney in fact for his wife, Betty Jane Deardorff, who acknowledged to me that they executed the within instrument for the purposes therein mentioned.

Frances Wagner
Notary Public for Oregon
Residing at
My Commission Expires Sept. 10, 1960
Commission expires:

SEAL DOCUMENT 11359 RECORDED JUL 31 1957 8:56 A.M. GUY H. PACE COUNTY CLERK

FORM No. 633—WARRANTY DEED.
KA

KNOW ALL MEN BY THESE PRESENTS, That E. F. Graybill and Gayle E. Graybill, husband and wife and Charles Boelens and Leona M. Boelens, husband and wife, grantor s in consideration of Ten and No/100 - - - - - - - - - - - - - - - - - - Dollars, to them paid by The Calvary Baptist Church of Cedar Oak Park, an Oregon corporation, grantee, do hereby grant, bargain, sell and convey unto the said grantee, its successors and assigns, all the following real property, with the tenements, hereditaments and appurtenances, situated in the County of Clackamas and State of Oregon, bounded and described as follows, to-wit:

Part of Lots 2, 3 and 4, CEDAR OAK PARK, in the County of Clackamas and State of Oregon, described as follows:
Beginning at the northeast corner of said Lot 4, thence Westerly on the northerly line of said Lot 4, a distance of 200 feet; thence Southerly parallel with the easterly boundary of said Lots 2, 3 and 4 to a point on the southerly boundary of said Lot 2; thence Easterly along the southerly boundary of said Lot 2 to the southeast corner thereof; thence Northerly along the easterly boundary of Lots 2, 3 and 4, a distance of 325 feet to the point of beginning, Reserving however, an easement for sewer line over the north 5 (five) feet of said Lot 4 together with the right of access to construct and maintain the same.

To Have and to Hold the above described and granted premises unto the said grantee, its successors and assigns forever.

And the grantor do covenant that they are lawfully seized in fee simple of the above granted premises free from all encumbrances, conditions and restrictions contained in Declaration and amendments;

and that they will and their heirs, executors and administrators, shall warrant and forever defend the above granted premises, and every part and parcel thereof, against the lawful claims and demands of all persons whomsoever.

Witness their hands and seals this 15 day of July, 1960.

E. F. Graybill (SEAL)
Gayle E. Graybill (SEAL)
Leona M. Boelens (SEAL)
Charles Boelens (SEAL)

STATE OF OREGON,
County of Clackamas, ss.

On this 15 day of July, 1960, before me, the undersigned, a Notary Public in and for said County and State, personally appeared the within named E. F. Graybill and Gayle E. Graybill, husband and wife and Charles Boelens and Leona M. Boelens, husband and wife who are known to me to be the identical individuals described in and who executed the within instrument, and acknowledged to me that they executed the same freely and voluntarily.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal the day and year last above written.

[signature]
Notary Public for Oregon.
My commission expires My Commission Expires Oct. 20, 196_

WARRANTY DEED

TO

AFTER RECORDING RETURN TO
Grantee
Calvary Bap. Church
Cedar Oak Park

12990 DOCKET No.

BOOK 574 PAGE 328

STATE OF OREGON, County of Clackamas, ss.

I, Robert Schumacher, County Clerk, Ex-Officio Recorder of Conveyances and Ex-Officio Clerk of the Circuit Court of the State of Oregon, for the County of Clackamas, do hereby certify that the within instrument of writing was received for record and recorded in the records of DEED of said County at 1960 JUL 21 PM 2 36

In Book 574 Page 328

Witness my hand and seal of said Court affixed. ROBERT SCHUMACHER, County Clerk.

By Deputy.

Recording Certificate

6'

10

E A S E M E N T

The undersigned, CALVARY BAPTIST CHURCH ,

Grantors, for the consideration of One and no/100 Dollars to Grantors paid, the receipt of which is hereby acknowledged, do hereby grant unto the CITY OF WEST LINN, a municipal corporation, its successors and assigns, referred to herein as CITY, a permanent right-of-way and easement to construct, reconstruct, operate and maintain utilities and all necessary related facilities under and along the following described premises:

(See Reverse for Description)

The permanent right-of-way or easement shall include the right, privilege and authority of CITY to excavate for, and to construct, install, lay, operate, maintain and remove underground pipelines and/or cables with all appurtenances incident thereto or necessary thereafter, for the purpose of supplying public utility service under and across the said premises, together with the right of CITY to place, install, maintain, inspect, add to the number of and relocate pipelines and/or cables and necessary appurtenances and make excavations therefor from time to time, in, under and through the above described premises within said right-of-way, and to cut and remove from said right-of-way any trees and other obstructions which may endanger the safety or interfere with the use of said pipelines and/or cables or appurtenances attached to or connected therewith; and the right of ingress and egress to and over said above described premises at any and all times for the purpose of patroling the pipelines and/or cables, or repairing, renewing or adding to the number of pipelines and/or cables and appurtenances and for doing anything necessary, useful or convenient for the enjoyment of the easement hereby granted.

CITY, upon the initial installation and upon each and every occasion that the same be repaired or removed shall restore the premises of the Grantor_ by removing all debris and leaving the ground surface in a neat and presentable condition; buildings and improvements to be restored as near as possible to as good a condition as the same were prior to any such installation. The only other persons, firms, or corporations known by Grantors to have any interest in the granted property are: ________.

Dated this 27th day of October, 1977.

CALVARY BAPTIST CHURCH

BY: Les Olmsted

Les Olmsted, Chairman
Board of Directors

STATE OF OREGON)
) ss
County of Clackamas)

October 27, 1977.

Personally appeared the above named Les Olmsted, Chairman, Board of Directors, Calvary Baptist Church and acknowledged the foregoing instrument to be his voluntary act and deed.

Before me:

[signature]

Notary Public for Oregon
My Commission Expires: April 23, 1980

77 45480

A fifteen (15)-foot strip of land for sanitary sewer purposes.

A tract of land located in the Northeast one-quarter of the Northeast one-quarter of Section 23, Township 2 South, Range 1 East, Willamette Meridian, City of West Linn, Clackamas County, Oregon, more particularly described as follows:

All of that portion of fifteen (15)-foot strip of land lying within that tract conveyed to the Calvary Baptist Church recorded in Book 574, Page 328, Clackamas County Deed Records. The centerline of said fifteen (15)-foot strip of land begins at a point located on the easterly line of Lot 1, CEDAR OAK PARK and six (6) feet southerly of the northeast corner of said Lot 1, said easterly line is also the westerly line of Old River Road, sixty (60) feet wide; thence northwesterly along said centerline to a point on the westerly line of Lot 2, CEDAR OAK PARK, said point is located forty (40) feet southerly, measured along the lot line, of the northwesterly corner of said Lot 2.

Calvary Baptist Church also grants a construction easement of ten (10) feet wide on each side of the above described fifteen (15)-foot strip of land, said construction easement shall expire six (6) months after acceptance of the sanitary sewer by the City of West Linn.

After recording, please return to
CITY OF WEST LINN
CITY HALL
WEST LINN, OREGON 97068

STATE OF OREGON)
County of Clackamas) ss.

I, George D. Poppen, County Clerk, Ex-Officio Recorder of Conveyances and Ex-Officio Clerk of the Circuit Court of the State of Oregon, for the County of Clackamas, do hereby certify that the within instrument of writing was received for and recorded in the records of said county at

77 NOV 4 P 3:19

Witness my hand and seal affixed.

George D. Poppen

GEORGE D. POPPEN
County Clerk

Recording Certificate

CCP-R4 '77 45480

RECORDER OF CONVEYANCES * CLACKAMAS CO. OREGON

2

13 10 11 38

After recording return to:
West Linn Baptist Church
PO Box 5
West Linn, OR 97068

Until a change is requested all tax statements shall be sent to the following address:
West Linn Baptist Church
PO Box 5
West Linn, OR 97068

File No.: 7071-421147 (se)
Date: August 19, 2004

THIS SPACE RESERVED FOR RECORDER'S USE

Clackamas County Official Records
Sherry Hall, County Clerk
2004-077253
$36.00
00724477200400772530030032
08/20/2004 03:29:43 PM
D-D Cnt=1 Stn=4 MELISSA
$15.00 $11.00 $10.00

FATCO NO. 421147 OC

STATUTORY WARRANTY DEED

West Linn Christian Fellowship, an Oregon Non-Profit Corporation, Grantor, conveys and warrants to **West Linn Baptist Church, an Oregon Non-Profit Corporation**, Grantee, the following described real property free of liens and encumbrances, except as specifically set forth herein:

See Legal Description attached hereto as Exhibit A and by this reference incorporated herein.

This property is free from liens and encumbrances, EXCEPT:

1. The **2004-2005** Taxes, a lien not yet payable.
2. Covenants, conditions, restrictions and/or easements, if any, affecting title, which may appear in the public record, including those shown on any recorded plat or survey.

THIS INSTRUMENT WILL NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY APPROVED USES AND TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES AS DEFINED IN ORS 30.930.

The true consideration for this conveyance is **$525,000.00.** (Here comply with requirements of ORS 93.030)

Dated this 19th day of August, 2004.

West Linn Christian Fellowship, an Oregon Non-Profit Corporation

By: Mark Russell, President

x Steve Rans

By: Steve Rans, Secretary

STATE OF Oregon)
)ss.
County of Clackamas)

This instrument was acknowledged before me on this 19th day of August, 2004 by Mark Russell as President of West Linn Christian Fellowship, on behalf of the Non-Profit Corporation, and Steve Rans as Secretary of West Linn Christian Fellowship.

OFFICIAL SEAL
SHEILA M. ENGEL
NOTARY PUBLIC-OREGON
COMMISSION NO. 347580
MY COMMISSION EXPIRES AUG. 1, 2005

Notary Public for Oregon
My commission expires: 8/01/05

EXHIBIT A

LEGAL DESCRIPTION:

Parcel I:
Part of Lots 2, 3 and 4, CEDAR OAK PARK, in the City of West Linn, County of Clackamas and State of Oregon, described as follows:

Beginning at the Northeast corner of said Lot 4; thence Westerly on the Northerly line of said lot 4, a distance of 200 feet; thence Southerly parallel with the Easterly boundary of said Lots 2, 3 and 4, to a point on the Southerly boundary of said Lot 2; thence Easterly along the Southerly boundary of said Lot 2 to the Southeast corner thereof; thence Northerly along the Easterly boundary of Lots 2, 3 and 4, a distance of 325 feet to the point of beginning.

Oregon
Kate Brown, Governor

Department of Transportation
Region 1 Headquarters
123 NW Flanders Street
Portland, Oregon 97209
(503) 731.8200
FAX (503) 731.8259

January 18, 2018 ODOT #8147

ODOT Pre-Application Response

Project Name: The Marylhurst School - 19915 Old River Drive	**Applicant:** The Marylhurst School
Jurisdiction: City of West Linn	**Jurisdiction Case #:** PA-18-04
Site Address: 19915 Old River Drive, West Linn, OR	**Legal Description:** **Tax Lot(s):**
State Highway: OR 43	**Mileposts:** 8.8

The site of this proposed land use action is *(*in the vicinity of Willamette Drive (OR 43). ODOT has permitting authority for this facility and an interest in ensuring that this proposed land use is compatible with its safe and efficient operation.

COMMENTS/FINDINGS

ODOT recommends that the applicant submit a traffic impact analysis to assess the impacts of the proposed use on the State highway system. The analysis must be conducted by a Professional Engineer registered in Oregon. **Contact the ODOT Traffic representative identified below and the local jurisdiction to scope the study.**

Please send a copy of the Land Use Notice to:

ODOT Region 1 Planning
Development Review
123 NW Flanders St
Portland, OR 97209

Region1_DEVREV_Applications@odot.state.or.us

Development Review Planner: Joshua Brooking	503.731.3049, joshua.c.brooking@odot.state.or.us
Traffic Contact: Katherine 'Katie' Bell	503.731.8435

City of West Linn	Pre-app Comments **Project Number: PA-18-04** **The Marylhurst School** **19915 Old River Drive**	**Engineering Contact:** Amy Pepper, PE apepper@westlinnoregon.gov Telephone: (503) 722-5517

Project Description: Conversion of church into pre-k through 8 education facility. Applicant to provide additional information about number of staff and students proposed at facility. Proposed lot consolidation.

Pre-application meeting date: January 18, 2018

The comments provided below are based upon material provided as part of the pre-application packet and are intended to identify potential design challenges associated with the development. Comments are not intended to be exhaustive and do not preclude the Engineering Department from making additional comments as part of the formal land use application process.

TRANSPORTATION
Minimum Required Improvement:

- Old River Drive street improvement:
  - Existing right-of-way is unimproved and approximately 60 feet wide.
  - Old River Drive is designated in the Transportation System Plan as a Neighborhood Route. The TSP identifies 2 medium priority capital improvement projects along Old River Drive, a sidewalk extension and bike facility.
  - The existing pavement width is approximately 23 feet. Half-street improvements, including street widening, sidewalk and drainage facilities will be required.
- Street trees: coordinate with the Park Department to install appropriate number and type of tree, as applicable:
  - Parks Contact: Mike Perkins
    mperkins@westlinnoregon.gov
    503-723-2554
- Driveway approach and spacing: driveway approaches shall be 36’ wide max including wing. Driveway sapcing shall meet the Community Development Code.
- New franchise utilities: All new distribution and communication franchise utilities and their services must be placed underground.
- Street lighting: Coordinate with PGE to install appropriate number and type of street lights.
- Development shall pay all applicable Transportation System Development Charges (SDC) fees (Street and Bike/Ped).
- A Traffic Impact Analysis (TIA) is likely required. Review CDC Chapter 85 and Section 5 of the *City of West Linn Public Works Standards*. Applicant should set up a meeting with West Linn Engineering and ODOT to determine the required elements of the TIA and the level of analyses expected.

City of West Linn	**Pre-app Comments** **Project Number: PA-18-04** **The Marylhurst School** **19915 Old River Drive**	**Engineering Contact:** Amy Pepper, PE apepper@westlinnoregon.gov Telephone: (503) 722-5517

SANITARY SEWER
Minimum Required Improvement:

- There is an 8" sanitary sewer main in Old River Drive.
- The new structure shall connect to the sewer main via a separate, private lateral.
- Development shall pay all applicable Sanitary Sewer SDC fees.

DOMESTIC WATER
Minimum Required Improvement:

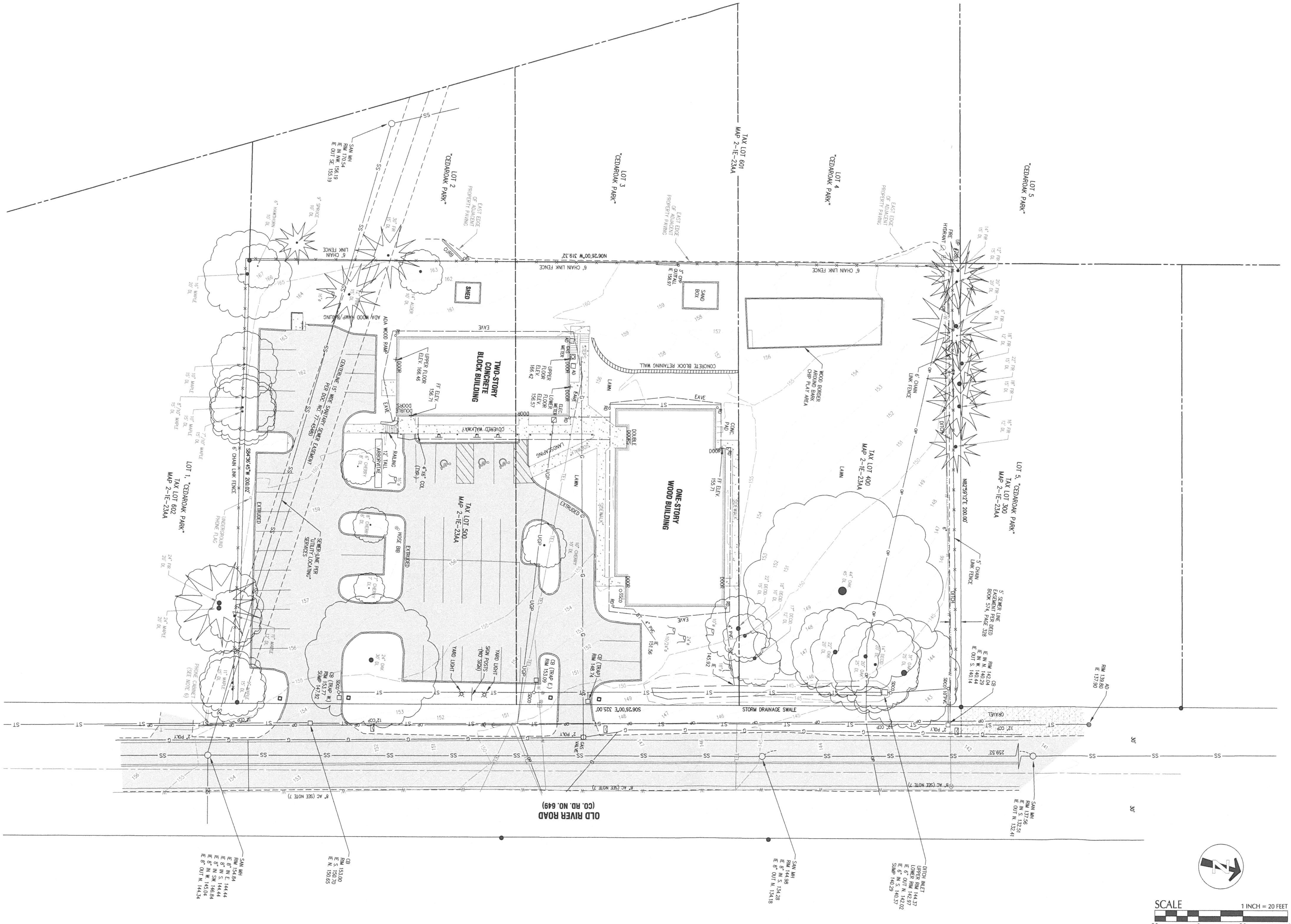
- There is an existing 8" AC water main in Old River Drive that has adequate capacity to serve the proposed development.
- The new water service shall supply water to the new structure.
- There is an existing 6" water line on the north side of 19803 Old River Drive. Verify that this line is located within an easement. If not provide easement for continued use of this line.
- Fire flow test requests can be made through the Engineering Department. More information and a request form can be found at: http://westlinnoregon.gov/publicworks/fire-flow-test-request .
- Development shall pay all applicable Water SDC fees.

SURFACE WATER (STORM SEWER)
Minimum Required Improvement:

- Onsite run-off generated from new impervious areas of greater than 5,000 square feet must be captured, treated, detained and conveyed to the nearest public stormwater system in accordance with the *Portland Stormwater Management Manual,* the Uniform Plumbing Code, and *City of West Linn Public Works Standards*.
- Stormwater facilities installed to capture, treat, detain and convey stormwater from the private improvements shall be privately owned and maintained.
- Development shall pay all applicable Surface Water SDC fees.

OTHER

- If the proposed development will disturb less than 1 acre, a West Linn Erosion Control Permit Application, as outlined in Section 2.0065 of the *City of West Linn Public Works Standards,* will be required prior to the commencement of construction.
- For partitions and subdivisions, all existing overhead utilities shall be buried underground if the developments frontage is greater than 200 feet and the site is greater than 1 acre.



kpff

111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

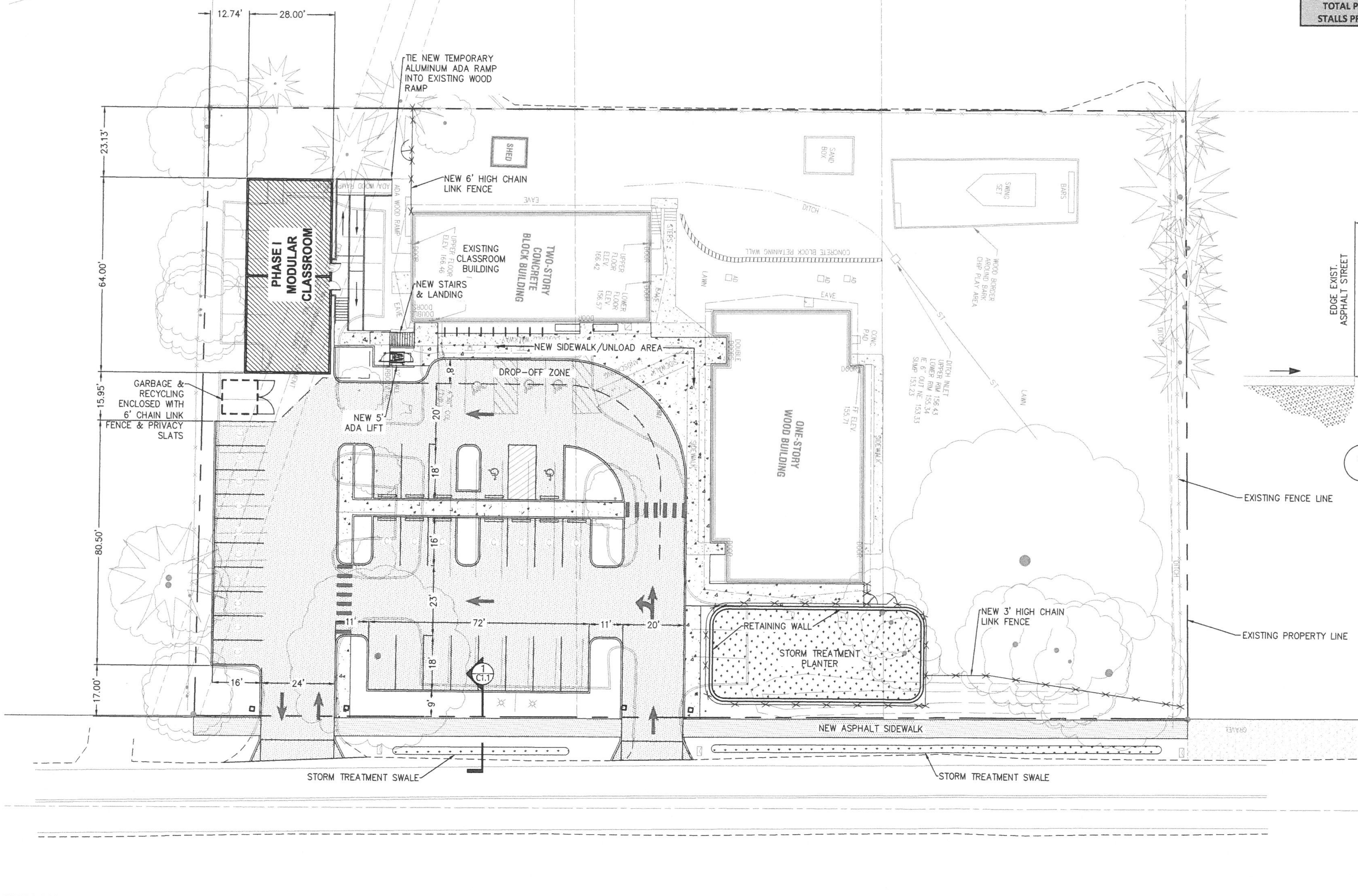
EXISTING CONDITIONS

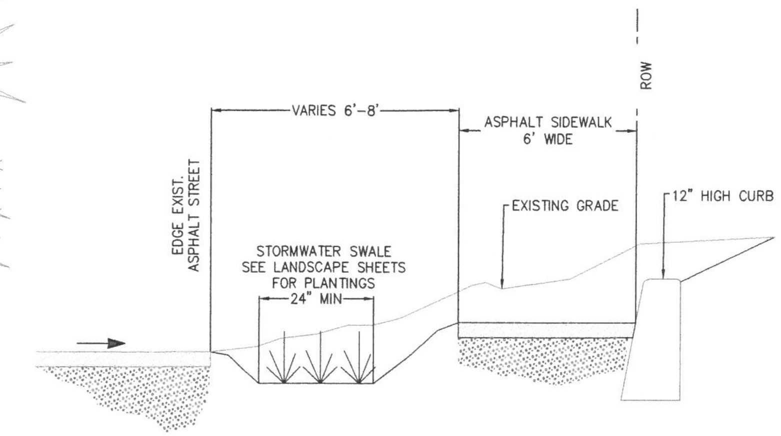
Scale AS INDICATED

Date 08.10.18

Sheet No. C0.1

BUILDING	PROPOSED USE	AREA	PARKING REQ.	NO. STALLS REQUIRED
EXISTING CHURCH ANNEX BUILDING	MIDDLE SCHOOL CLASSROOM	4,000 SF	1 SPACE PER 1,000 SF	4
PROPOSED TEMPORARY PORTABLE	PRIMARY SCHOOL	1,800 SF	1 SPACE PER 1,000 SF	2
EXISTING MAIN CHURCH BUILDING	MULTI-USE COMMONS AREA	4,500 SF	1 SPACE PER 1,000 SF	5
STAFF	10 (AN ANY ONE TIME)			10
TOTAL PARKING STALLS REQUIRED				21
TOTAL PARKING STALLS PROPOSED				30





1 ASPHALT SIDEWALK ALONG OLD RIVER ROAD
SCALE: NTS

kpff
111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

SITE PLAN - PHASE I

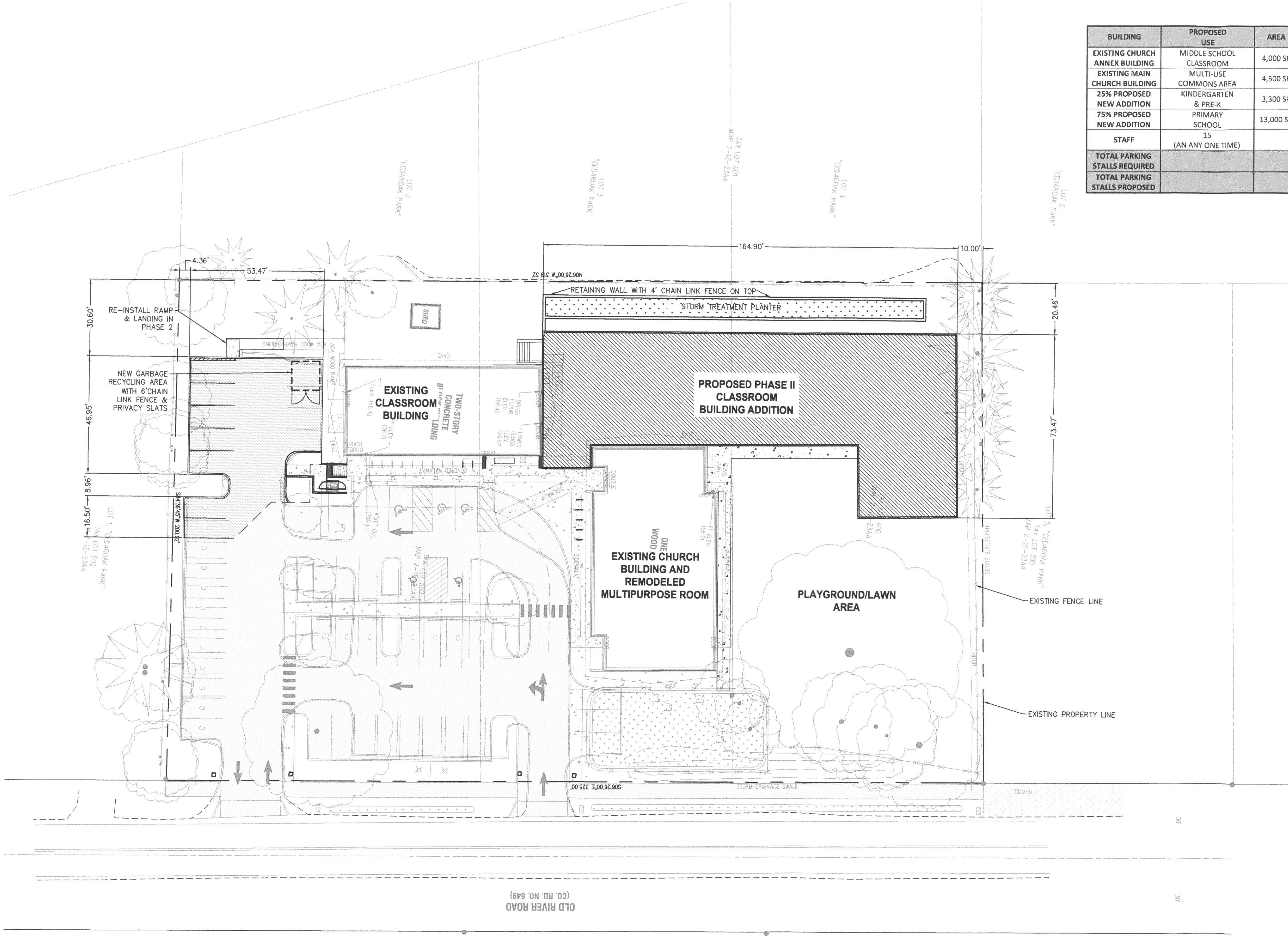
Scale AS INDICATED

Date 08.10.18

Sheet No. C1.0

SCALE 1 INCH = 20 FEET
20 0 20 40

BUILDING	PROPOSED USE	AREA	PARKING REQ.	NO. STALLS REQUIRED
EXISTING CHURCH ANNEX BUILDING	MIDDLE SCHOOL CLASSROOM	4,000 SF	1 SPACE PER 1,000 SF	4
EXISTING MAIN CHURCH BUILDING	MULTI-USE COMMONS AREA	4,500 SF	1 SPACE PER 1,000 SF	5
25% PROPOSED NEW ADDITION	KINDERGARTEN & PRE-K	3,300 SF	1 SPACE PER 300 SF	11
75% PROPOSED NEW ADDITION	PRIMARY SCHOOL	13,000 SF	1 SPACE PER 1,000 SF	13
STAFF	15 (AN ANY ONE TIME)			15
TOTAL PARKING STALLS REQUIRED				48
TOTAL PARKING STALLS PROPOSED				37



kpff

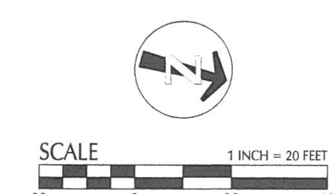
111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18



SITE PLAN - PHASE II

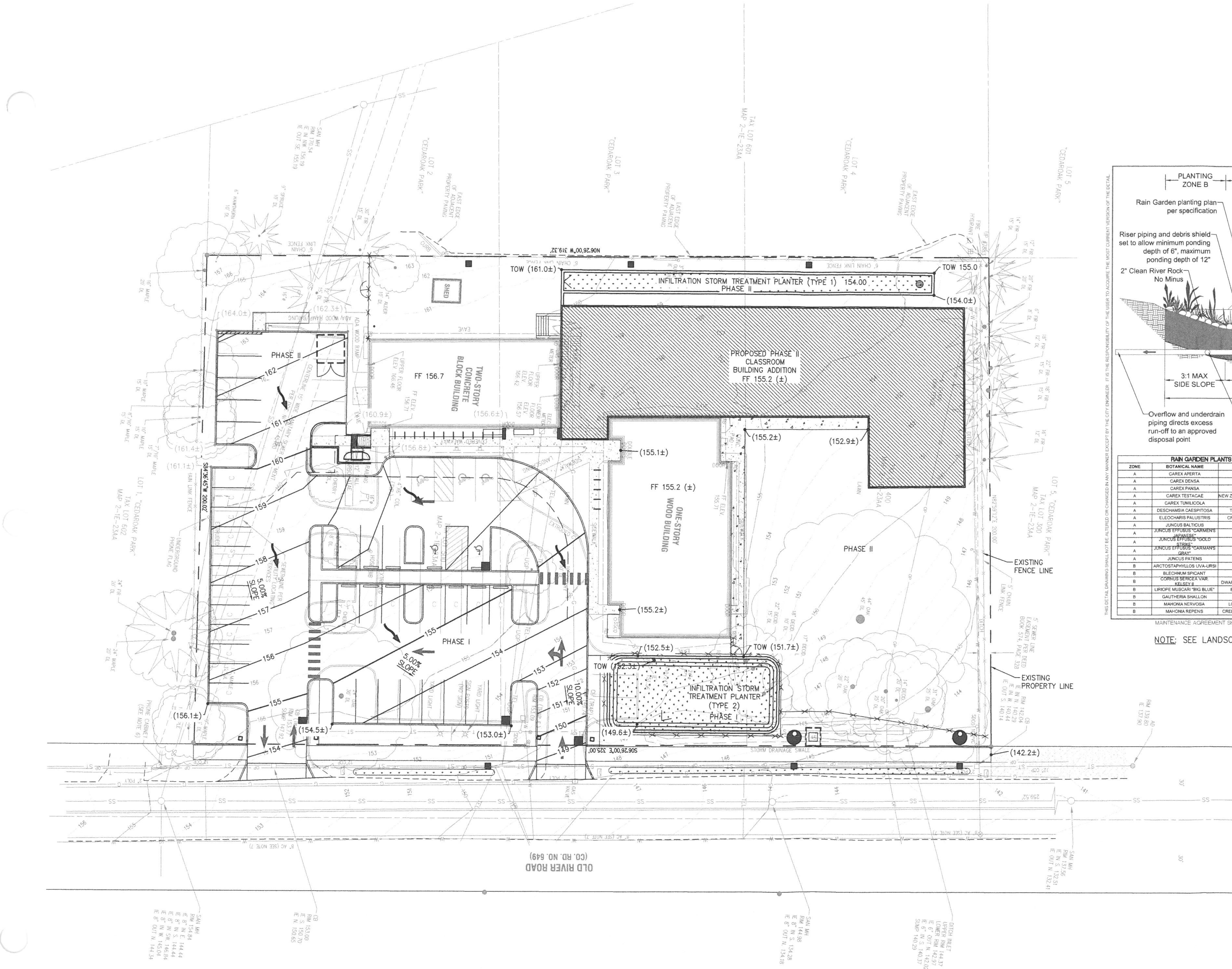
Scale AS INDICATED

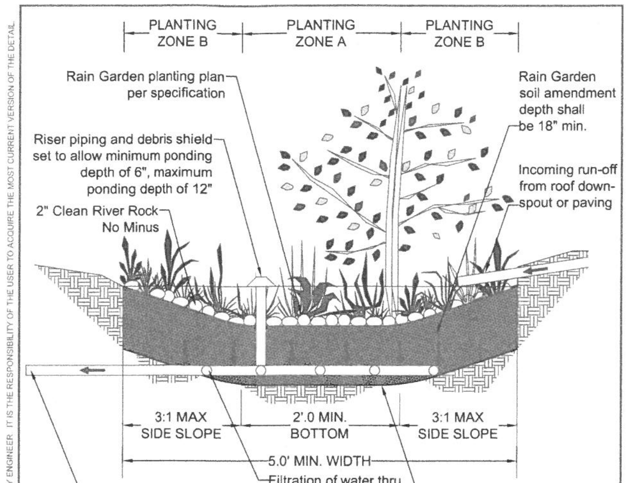
Date 08.10.18

Sheet No.

C1.1

kpff
111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com





Overflow and underdrain piping directs excess run-off to an approved disposal point

Filtration of water thru topsoil into perforated underdrain system (4" ABS) wrapped in 12" thick gravel layer with filter fabric

Impermeable 60 mil. PVC liner where Rain Garden is located within 10' of building foundation or immediately upslope of structures

RAIN GARDEN PLANTS

ZONE	BOTANICAL NAME	COMMON NAME
A	CAREX APERTA	COLUMBIA SEDGE
A	CAREX DENSA	DENSE SEDGE
A	CAREX PANSA	SANDDUNE SEDGE
A	CAREX TESTACAE	NEW ZEALAND ORANGE SEDGE
A	CAREX TUMILICOLA	FOOTHILL SEDGE
A	DESCHAMSIA CAESPITOSA	TUFTED HAIR GRASS
A	ELEOCHARIS PALUSTRIS	CREEPING SPIKE RUSH
A	JUNCUS BALTICUS	BALTIC RUSH
A	JUNCUS EFFUSUS "CARMEN'S JAPANESE"	COMMON RUSH
A	JUNCUS EFFUSUS "GOLD STRIKE"	COMMON RUSH
A	JUNCUS EFFUSUS "CARMAN'S GRAY"	COMMON RUSH
A	JUNCUS PATENS	SPREADING RUSH
B	ARCTOSTAPHYLLOS UVA-URSI	KINNIKINNICK
B	BLECHNUM SPICANT	DEER FERN
B	CORNUS SERICEA VAR. KELSEY II	DWARF REDTWIG DOGWOOD
B	LIRIOPE MUSCARI "BIG BLUE"	BIG BLUE LILY TURF
B	GAUTHERIA SHALLON	SALAL
B	MAHONIA NERVOSA	LOW OREGON GRAPE
B	MAHONIA REPENS	CREEPING OREGON GRAPE

RAIN GARDEN SURFACE AREA = TOTAL IMPERVIOUS AREA x 0.06

NOTE:
PLANT 1 GALLON POTS 18" O.C. IN EACH ZONE. A MINIMUM OF 3 SPECIES SHALL BE USED IN EACH ZONE.

INFILTRATION
RAIN GARDEN TYPE I

City of West Linn
DATE: 2010
DRAWING NO. WL-617A
FILE NO.

THIS DETAIL DRAWING SHALL NOT BE ALTERED OR CHANGED IN ANY MANNER EXCEPT BY THE CITY ENGINEER. IT IS THE RESPONSIBILITY OF THE USER TO ACQUIRE THE MOST CURRENT VERSION OF THE DETAIL.

MAINTENANCE AGREEMENT SHALL BE REQUIRED AND BE RECORDED WITH THE CITY

NOTE: SEE LANDSCAPE DRAWINGS FOR PLANTINGS

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

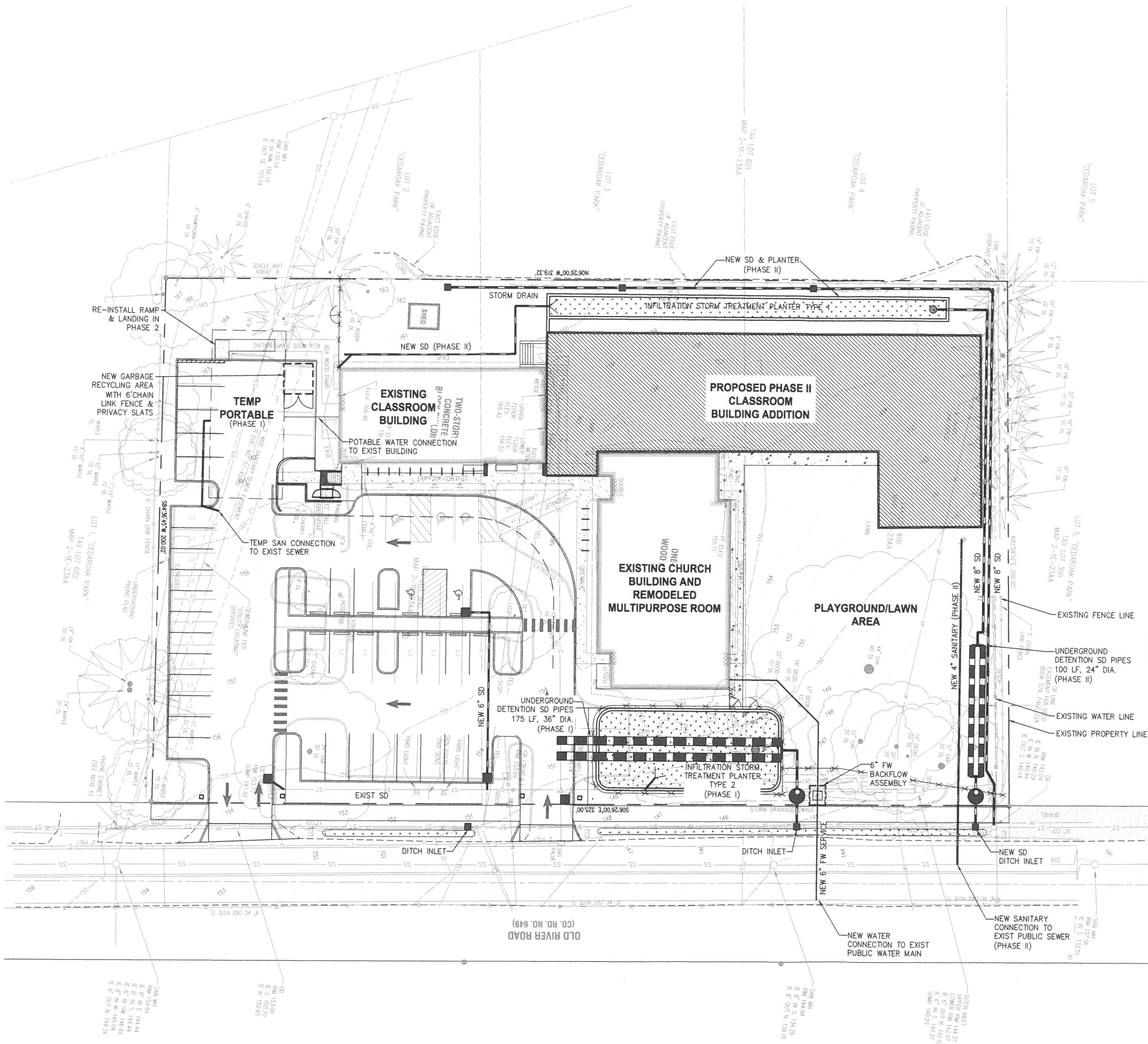
GRADING PLAN

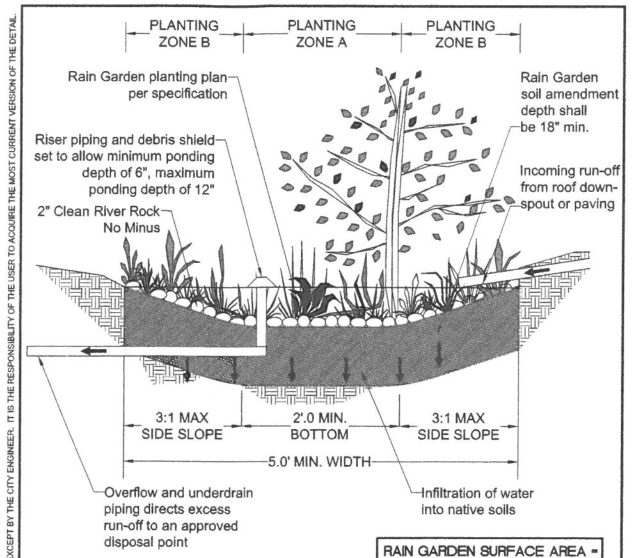
Scale AS INDICATED

Date 08.10.18

Sheet No. C2.0

SCALE 1 INCH = 20 FEET
20 0 20 40





THIS DETAIL DRAWING SHALL NOT BE ALTERED OR CHANGED IN ANY MANNER EXCEPT BY THE CITY ENGINEER. IT IS THE RESPONSIBILITY OF THE USER TO ACQUIRE THE MOST CURRENT VERSION OF THE DETAIL.

RAIN GARDEN SURFACE AREA = TOTAL IMPERVIOUS AREA x 0.06

NOTE:

PLANT 1 GALLON POTS 18" O.C. IN EACH ZONE. A MINIMUM OF 3 SPECIES SHALL BE USED IN EACH ZONE.

RAIN GARDEN PLANTS

ZONE	BOTANICAL NAME	COMMON NAME
A	CAREX APERTA	COLUMBIA SEDGE
A	CAREX DENSA	DENSE SEDGE
A	CAREX PANSA	SANDDUNE SEDGE
A	CAREX TESTACAE	NEW ZEALAND ORANGE SEDGE
A	CAREX TUMILICOLA	FOOTHILL SEDGE
A	DESCHAMSIA CAESPITOSA	TUFTED HAIR GRASS
A	ELEOCHARIS PALUSTRIS	CREEPING SPIKE RUSH
A	JUNCUS BALTICUS	BALTIC RUSH
A	JUNCUS EFFUSUS "CARMEN'S JAPANESE"	COMMON RUSH
A	JUNCUS EFFUSUS "GOLD STRIKE"	COMMON RUSH
A	JUNCUS EFFUSUS "CARMAN'S GRAY"	COMMON RUSH
A	JUNCUS PATENS	SPREADING RUSH
B	ARCTOSTAPHYLLOS UVA-URSI	KINNIKINNICK
B	BLECHNUM SPICANT	DEER FERN
B	CORNUS SERICEA VAR. KELSEY II	DWARF REDTWIG DOGWOOD
B	LIRIOPE MUSCARI "BIG BLUE"	BIG BLUE LILY TURF
B	GAUTHERIA SHALLON	SALAL
B	MAHONIA NERVOSA	LOW OREGON GRAPE
B	MAHONIA REPENS	CREEPING OREGON GRAPE

INFILTRATION RAIN GARDEN TYPE 2

City of West Linn | DATE: 2010 | DRAWING NO. WL-618A | FILE NO.

MAINTENANCE AGREEMENT SHALL BE REQUIRED AND BE RECORDED WITH THE CITY

NOTE: SEE LANDSCAPE DRAWINGS FOR PLANTINGS

kpff

111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
	LAND USE APPLICATION	09.04.18

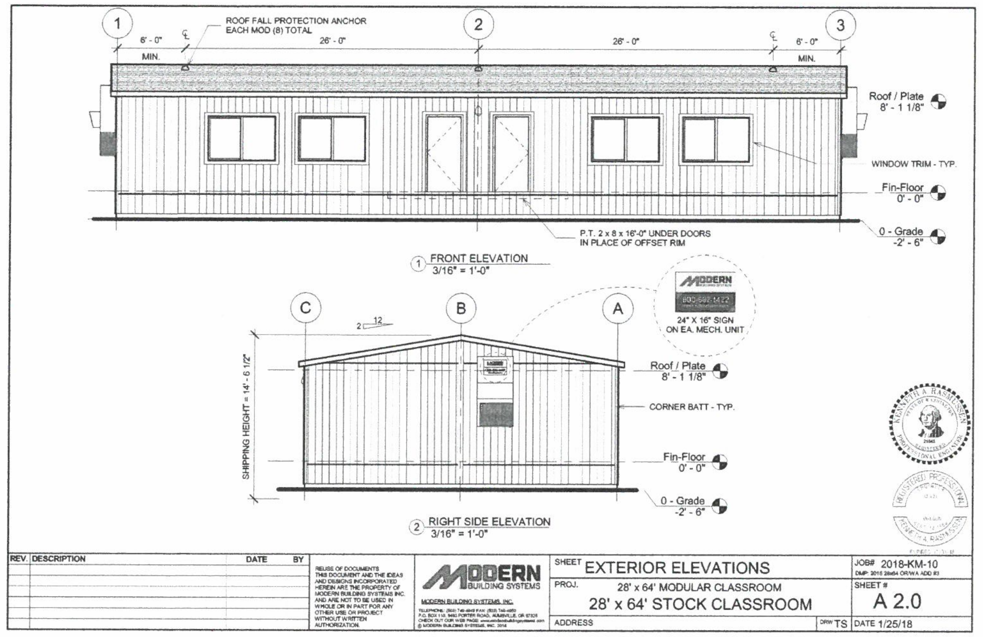
UTILITY PLAN

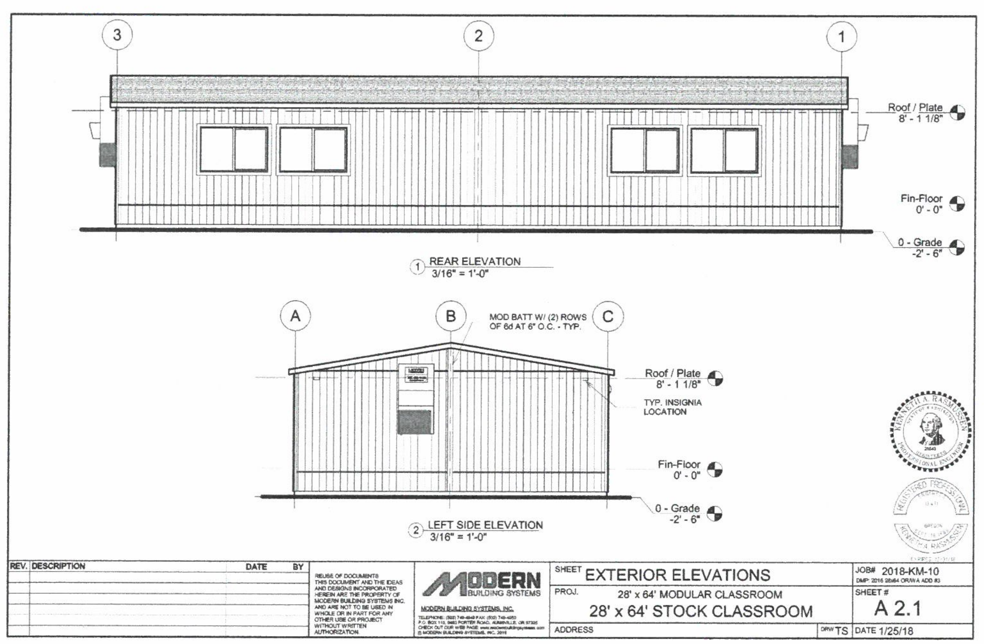
Scale AS INDICATED

Date 08.10.18

Sheet No. C3.0

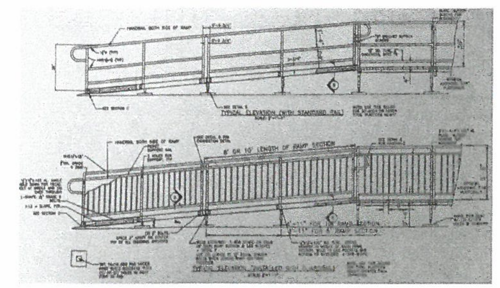
SCALE 1 INCH = 20 FEET
20 0 20 40

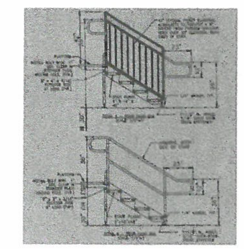




1 PHASE I - MODULAR CLASSROOM BUILDING EXTERIOR ELEVATIONS

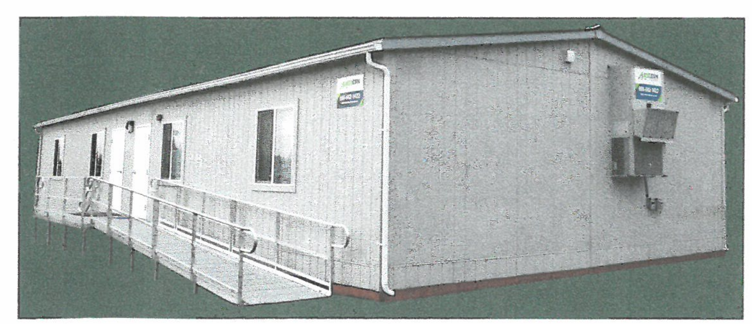
SCALE: NONE





3 PHASE I - STAIR/RAMP SYSTEM EXTERIOR ELEVATIONS

SCALE: NONE



NOTE: EXTERIOR ELEVATIONS ARE REPRESENTATIVE. ACTUAL MODULAR CLASSROOM BUILDING AND STAIR/RAMP SYSTEM MANUFACTURER, ELEVATIONS, AND COLOR MAY VARY.

2 PHASE I - MODULAR CLASSROOM BUILDING AND STAIR/RAMP SYSTEM COLORS

SCALE: NONE

d

deca architecture.inc

935 SE Alder Street : Portland Oregon 97214
tel 503 239 1987 fax 503 239 6559 deca-inc.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

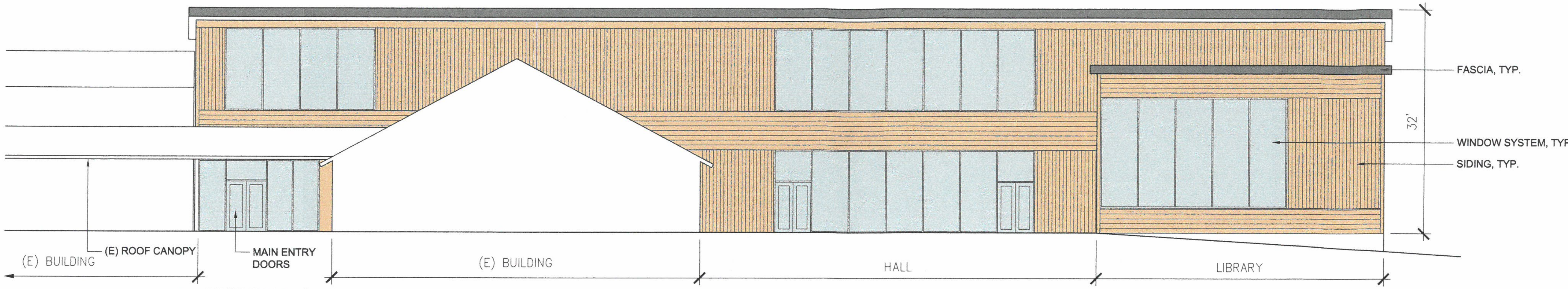
PHASE I
EXTERIOR ELEVATIONS

Scale AS INDICATED

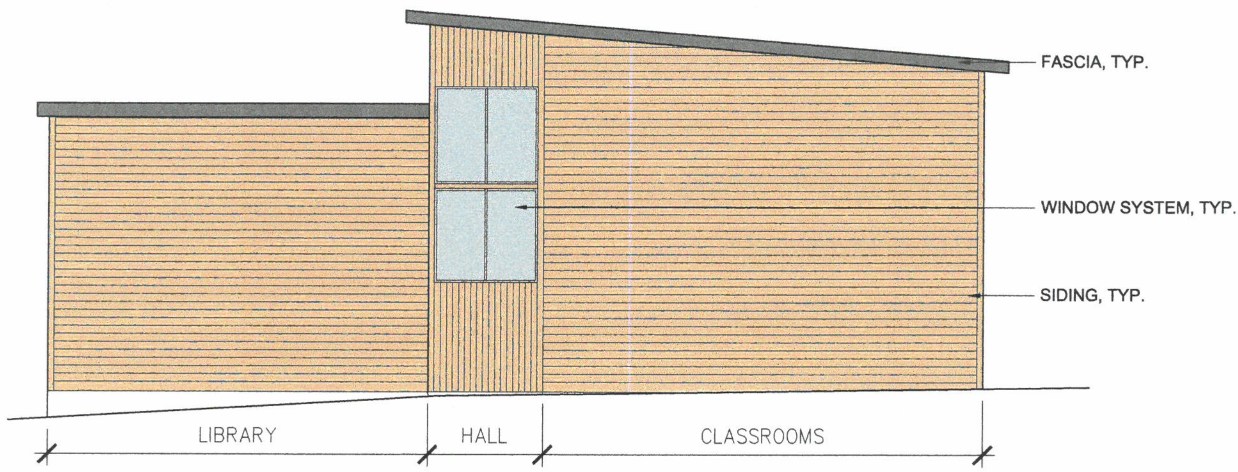
Date 09.04.18

Sheet No.

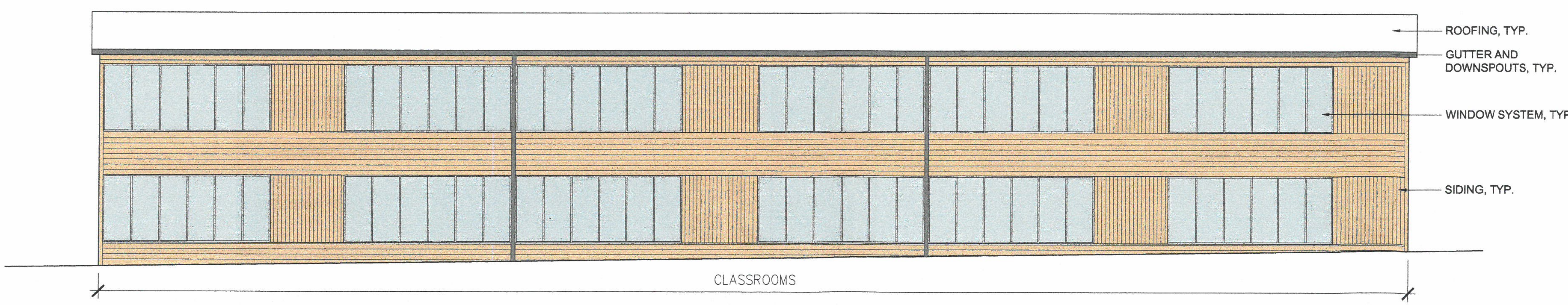
A301



A EAST EXTERIOR ELEVATION



B NORTH EXTERIOR ELEVATION



C WEST EXTERIOR ELEVATION

1 PHASE II - NEW CLASSROOM BUILDING EXTERIOR ELEVATIONS

SCALE: 1/8" = 1'-0"

d

deca
architecture.inc

935 SE Alder Street : Portland Oregon 97214
tel 503 239 1987 fax 503 239 6558 deca-inc.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

PHASE II
EXTERIOR ELEVATIONS

Scale AS INDICATED

Date 09.04.18

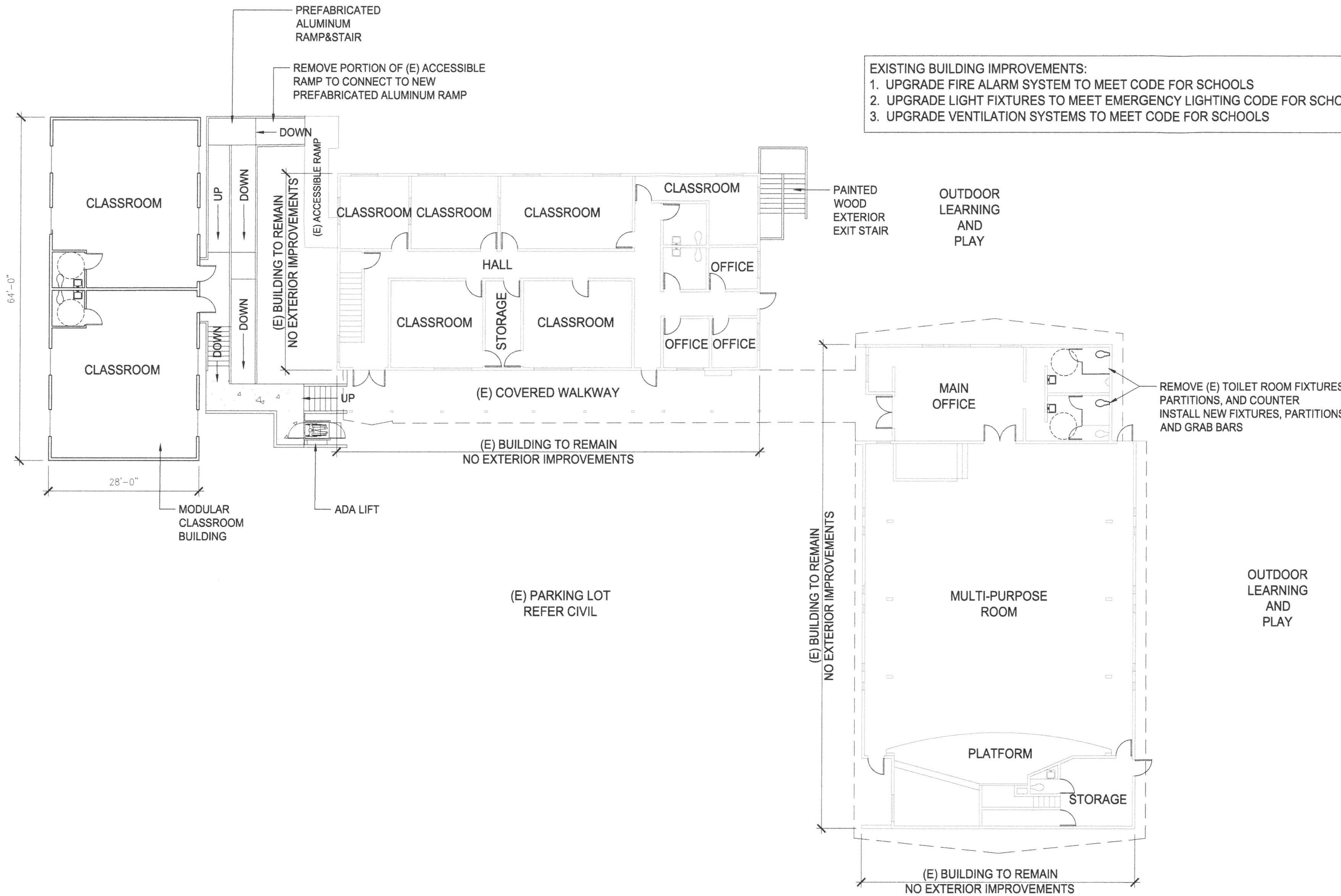
Sheet No.

A302

deca
architecture.inc

935 SE Alder Street : Portland Oregon 97214
tel 503 239 1987 fax 503 239 6558 deca-inc.com

EXISTING BUILDING IMPROVEMENTS:
1. UPGRADE FIRE ALARM SYSTEM TO MEET CODE FOR SCHOOLS
2. UPGRADE LIGHT FIXTURES TO MEET EMERGENCY LIGHTING CODE FOR SCHOOLS
3. UPGRADE VENTILATION SYSTEMS TO MEET CODE FOR SCHOOLS



1 PHASE I - FIRST FLOOR PLAN
SCALE: 3/32" = 1'-0"

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

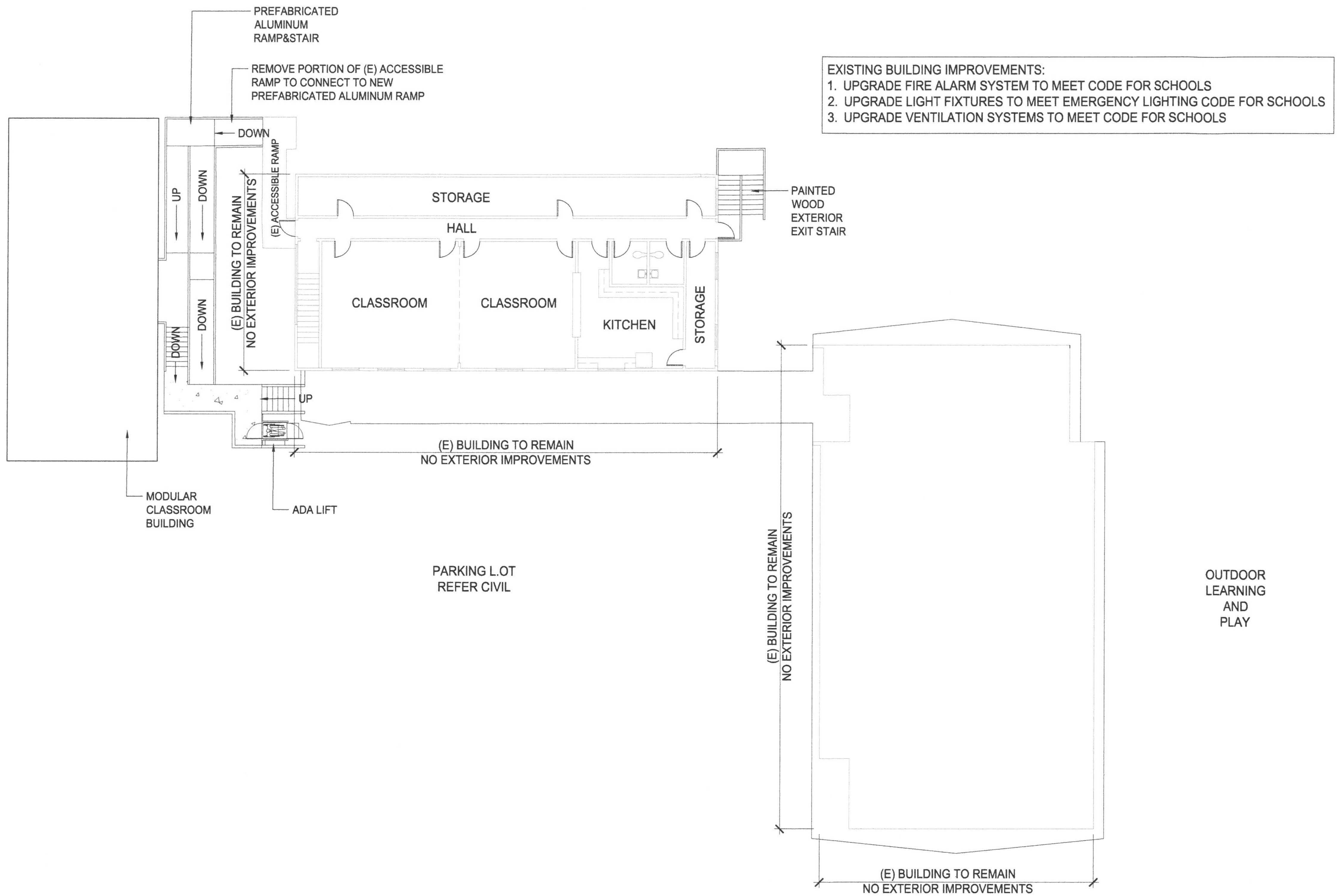
Issue	Revision	Date
LAND USE APPLICATION		09.04.18

PHASE I
FIRST FLOOR PLAN

Scale AS INDICATED
Date 09.04.18
Sheet No.
A101

d
deca
architecture.inc
935 SE Alder Street : Portland Oregon 97214
tel 503 239 1987 fax 503 239 6558 deca-inc.com

EXISTING BUILDING IMPROVEMENTS:
1. UPGRADE FIRE ALARM SYSTEM TO MEET CODE FOR SCHOOLS
2. UPGRADE LIGHT FIXTURES TO MEET EMERGENCY LIGHTING CODE FOR SCHOOLS
3. UPGRADE VENTILATION SYSTEMS TO MEET CODE FOR SCHOOLS



1 PHASE I - SECOND FLOOR PLAN
SCALE: 3/32" = 1'-0"

THE MARYLHURST SCHOOL

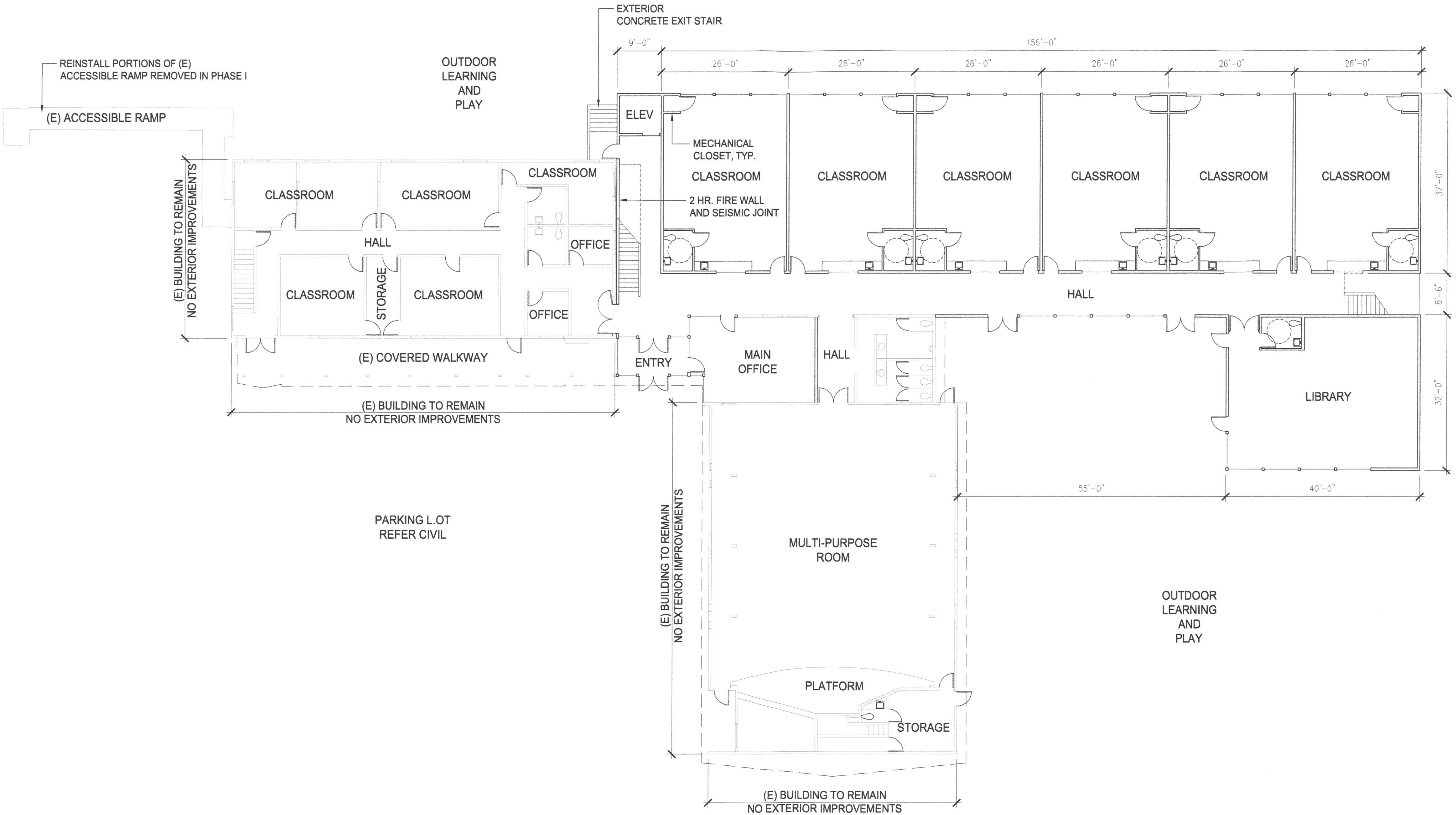
NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

PHASE I
SECOND FLOOR PLAN

Scale AS INDICATED
Date 09.04.18
Sheet No. A102



1 PHASE II - FIRST FLOOR PLAN

SCALE: 3/32" = 1'-0"

d

deca architecture.inc

935 SE Alder Street : Portland Oregon 97214
tel 503 239 1987 fax 503 239 6558 deca-inc.com

THE MARYLHURST SCHOOL

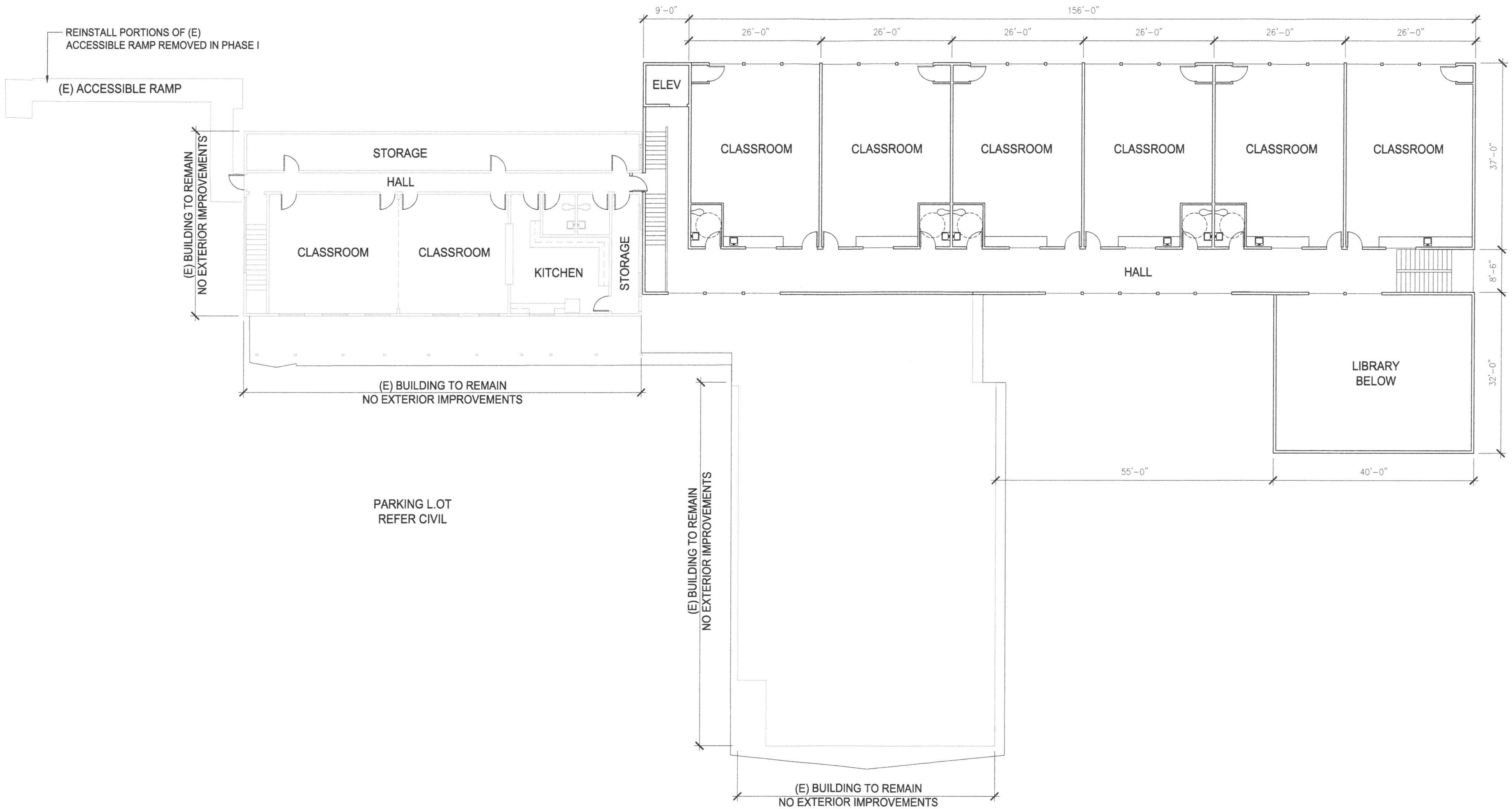
NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

PHASE II
FIRST FLOOR PLAN

Scale	AS INDICATED
Date	09.04.18
Sheet No.	A201



1 PHASE II - SECOND FLOOR PLAN

SCALE: 3/32" = 1'-0"

d
deca
architecture.inc
935 SE Alder Street : Portland Oregon 97214
tel 503 239 1987 fax 503 239 6558 deca-inc.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

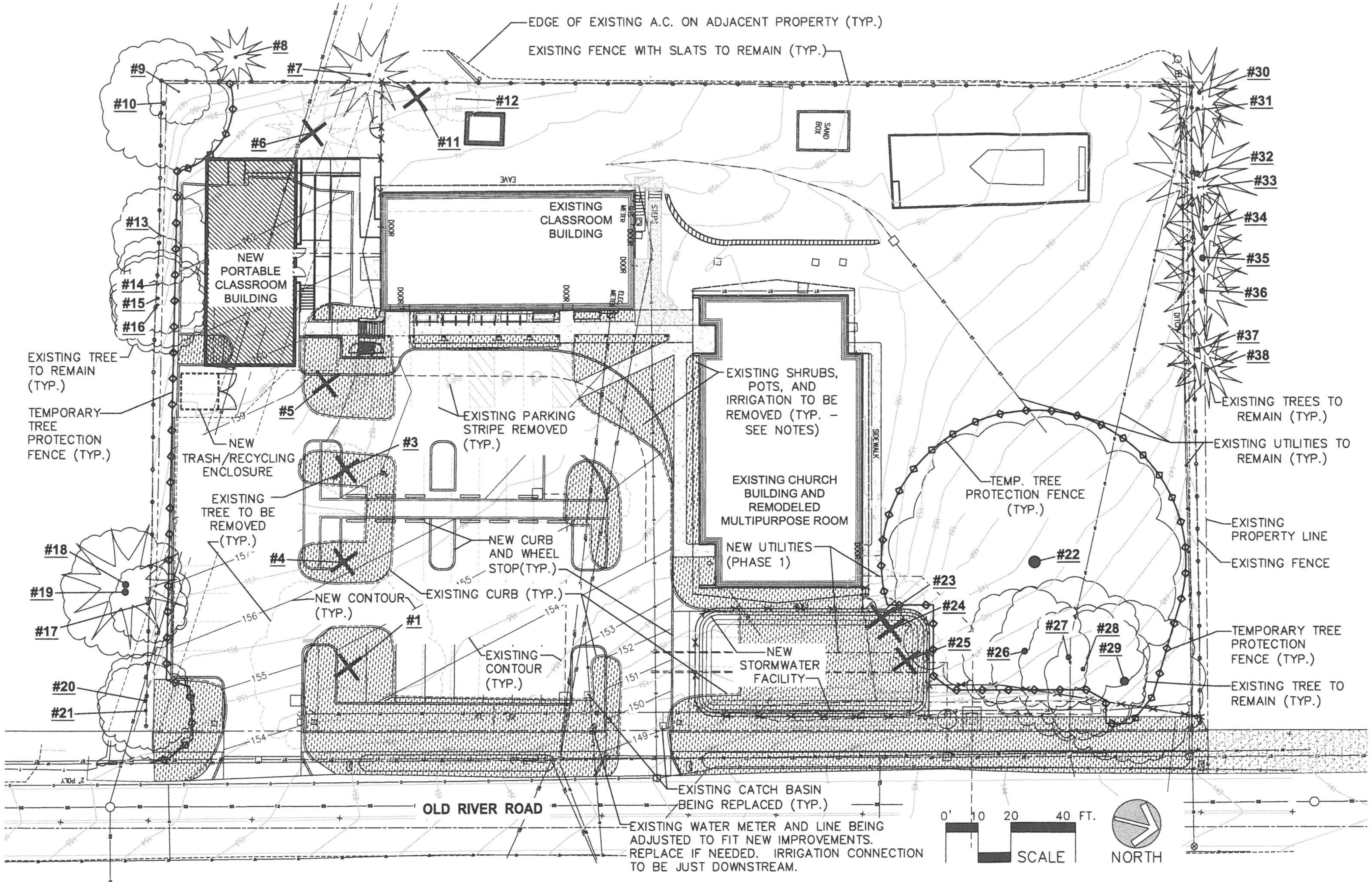
PHASE II
SECOND FLOOR PLAN

Scale AS INDICATED

Date 09.04.18

Sheet No.

A202



NOTES:

1. SEE ARBORIST REPORT FOR NAME, SIZE, AND COMMENTS REGARDING EXISTING TREES.
2. CONFIRM TREATMENT OF EACH TREE ON SITE.
3. ALL WORK TO CONFORM WITH CITY OF WEST LINN "TREE TECHNICAL MANUAL".
4. AREA BETWEEN THE EXISTING TREES AND THE TREE PROTECTION FENCE SHALL BE KEPT FREE OF ALL EROSIVE MATERIALS, TRAFFIC, CONSTRUCTION, CONSTRUCTION TRAFFIC, MATERIALS, AND EXCAVATION. THIS AREA IS TO BE CONSIDERED THE "TREE PROTECTION AREA".
5. TREE PROTECTION FENCE SHALL REMAIN IN PLACE, IN GOOD CONDITION, AND PLUMB UNTIL APPROVED SUBSTANTIAL COMPLETION. AT THAT TIME IT SHALL BE REMOVED AND TAKEN OFF SITE.
6. ANY MOVEMENT OF THE TREE PROTECTION FENCE AND ANY WORK WITHIN THE "TREE PROTECTION AREA" SHALL BE AS APPROVED BY THE CITY'S AND OWNER'S ARBORIST (CERTIFIED). ANY SUCH WORK SHALL BE DONE IN ACCORDANCE WITH THESE ARBORISTS' APPROVAL..
7. THERE SHALL BE NO WORK , STORAGE, TRANSIT, AND DEMOLITION DONE IN THE AREAS BEHIND THE EXISTING BUILDINGS.
8. 'TREE PROTECTION FENCE' SHALL BE A 6' TALL CHAIN LINK FENCE, WITH METAL POLES SET INTO GROUND AT 10 FEET ON CENTER (MAX.) AND AT CHANGES IN DIRECTION, AND AT CORNERS. IT SHALL BE KEPT IN GOOD CONDITION, PLUMB, AND IN-PLACE.
9. INSTALL UTILITIES AND CONDUCT ALL WORK TO MINIMIZE TREE IMPACTS.

PERCIVAL LANDSCAPE ARCHITECTURE
P.O. BOX 14676
PORTLAND, OREGON
97293
perlandscape@gmail.com
503-939-3547

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09/06/2018

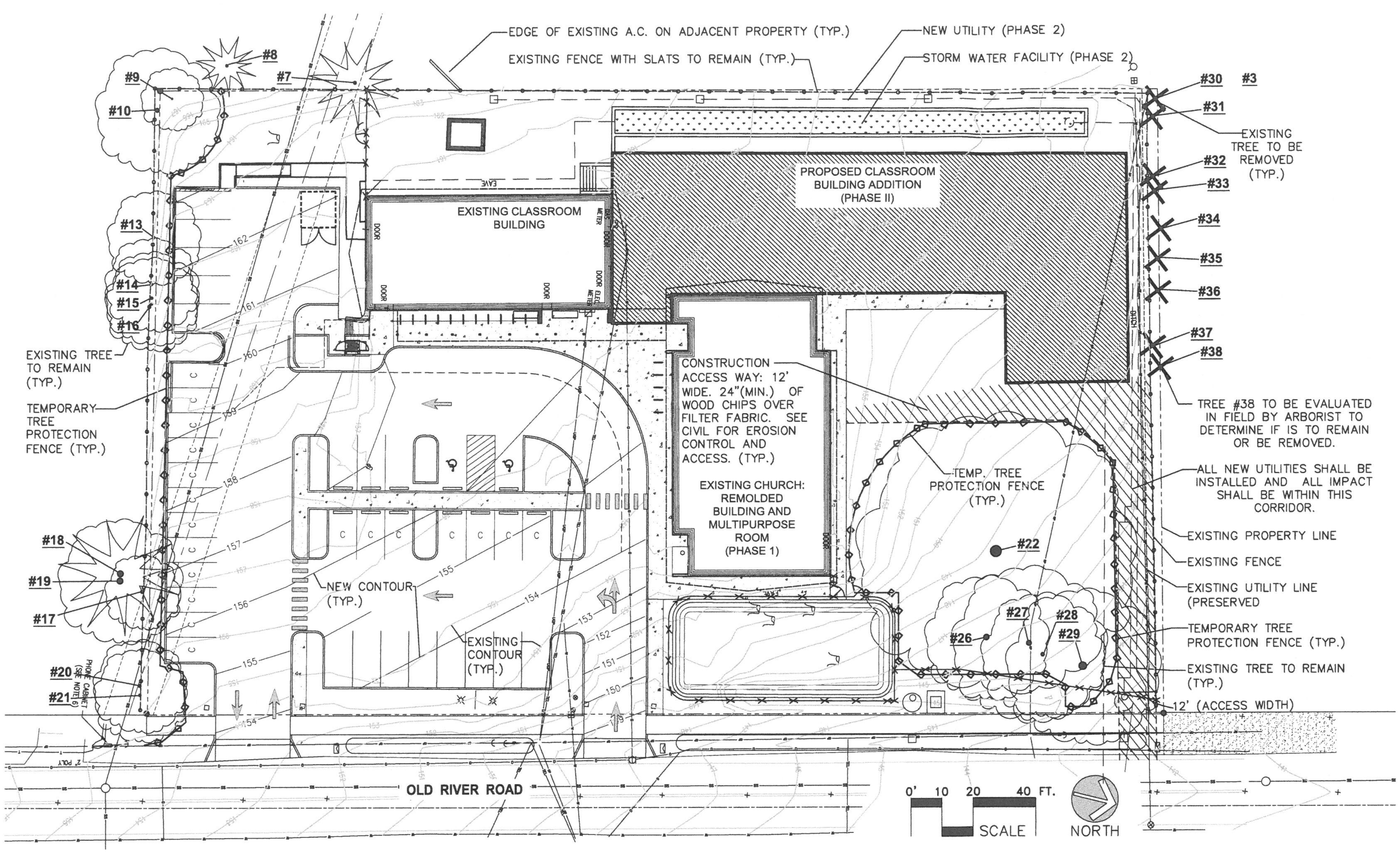
EXISTING TREE AND SHRUBS - PHASE 1

Scale AS INDICATED

Date 09/06/2018

Sheet No.

L0.01



NOTES:

1. SEE ARBORIST REPORT FOR NAME, SIZE, AND COMMENTS REGARDING EXISTING TREES.
2. CONFIRM TREATMENT OF EACH TREE ON SITE.
3. ALL WORK TO CONFORM WITH CITY OF WEST LINN "TREE TECHNICAL MANUAL".
4. AREA BETWEEN THE EXISTING TREES AND THE TREE PROTECTION FENCE SHALL BE KEPT FREE OF ALL EROSIVE MATERIALS, TRAFFIC, CONSTRUCTION, CONSTRUCTION TRAFFIC, MATERIALS, AND EXCAVATION. THIS AREA IS TO BE CONSIDERED THE "TREE PROTECTION AREA".
5. TREE PROTECTION FENCE SHALL REMAIN IN PLACE, IN GOOD CONDITION, AND PLUMB UNTIL APPROVED SUBSTANTIAL COMPLETION. AT THAT TIME IT SHALL BE REMOVED AND TAKEN OFF SITE.
6. ANY MOVEMENT OF THE TREE PROTECTION FENCE AND ANY WORK WITHIN THE "TREE PROTECTION AREA" SHALL BE AS APPROVED BY THE CITY'S AND OWNER'S ARBORIST (CERTIFIED). ANY SUCH WORK SHALL BE DONE IN ACCORDANCE WITH THESE ARBORISTS' APPROVAL..
7. THERE SHALL BE NO WORK , STORAGE, TRANSIT, AND DEMOLITION DONE IN THE AREAS BEHIND THE EXISTING BUILDINGS.
8. 'TREE PROTECTION FENCE' SHALL BE A 6' TALL CHAIN LINK FENCE, WITH METAL POLES SET INTO GROUND AT 10 FEET ON CENTER (MAX.) AND AT CHANGES IN DIRECTION, AND AT CORNERS. IT SHALL BE KEPT IN GOOD CONDITION, PLUMB, AND IN-PLACE.
9. SEE L0.1 (PHASE 1) FOR MISSING TREE NUMBERS.
10. UTILITIES SHOWN ON NORTH END OF PROPERTY SHALL BE INSTALLED IN THE TEMPORARY ACCESS CORRIDOR AND ALL WORK SHALL BE AS APPROVED BY OWNER'S PROJECT ARBORIST PRIOR TO WORK BEGINNING. (LOCATIONS SHOWN HEREON ARE SCHEMATIC).

PERCIVAL LANDSCAPE ARCHITECTURE
P.O. BOX 14676
PORTLAND, OREGON 97293
perlandscape@gmail.com
503-939-3547

THE MARYLHURST SCHOOL

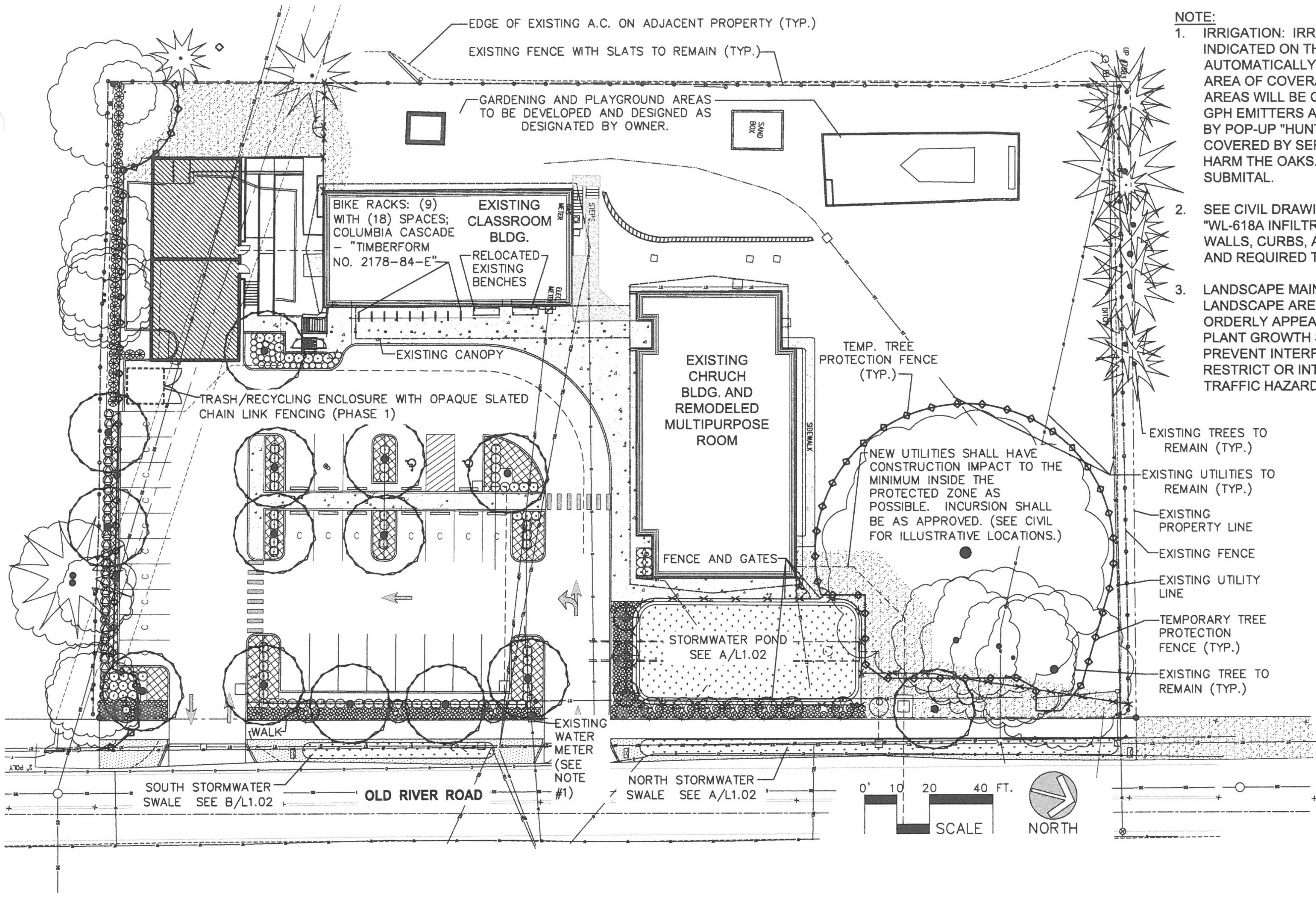
NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		09/06/2018

EXISTING TREE AND ACCESS- PHASE 2

Scale AS INDICATED
Date 09/06/2018
Sheet No.
L0.02



NOTE:

1. IRRIGATION: IRRIGATION SHALL BE SERVED FROM THE RELOCATED WATER LINE AND METER INDICATED ON THIS DRAWING. ALL NEW PLANTINGS SHALL BE SERVED BY AN AUTOMATICALLY CONTROLLED NEW IRRIGATION SYSTEM. THE SYSTEM SHALL BE ZONED TO AREA OF COVERAGE WITH SIMILAR IRRIGATION NEEDS. NEW SHRUB AND GROUND COVER AREAS WILL BE COVERED BY SUB-TERRANIAN DRIPPER LINE ("NETAFIM CV" LINE, WITH O.6 GPH EMITTERS AT 12" ON CENTER). STORMWATER QUALITY PLANTER SHALL BE COVERED BY POP-UP "HUNTER MPR" SPRINKLERS. AREAS OF LAWN BELOW EXISTING OAKS WILL BE COVERED BY SEPARATE TEMPORARY ZONES AS NEEDED TO ESTABLISH LAWNS BUT NOT HARM THE OAKS. A FULL IRRIGATION PLAN WILL BE PROVIDED WITH THE BUILDING PERMIT SUBMITAL.
2. SEE CIVIL DRAWINGS FOR WATER QUALITY AREA S' SECTION AND MATERIALS (City Detail "WL-618A INFILTRATION RAIN GARDEN TYPE 2") AND FOR FURTHER INFORMATION ON PAVING, WALLS, CURBS, AND UTILITIES. ALTER ROUTES AND LOCATION OF UTILITIES AS APPROVED AND REQUIRED TO LIMIT IMPACTS ON EXISTING TREES TO REMAIN.
3. LANDSCAPE MAINTENANCE: THE OWNER, AFTER FINAL ACCEPTANCE, SHALL KEEP ALL LANDSCAPE AREAS IN GOOD CONDITIONS, SO AS TO PROVIDE A HEALTHY, NEAT, AND ORDERLY APPEARANCE AND SHALL KEEP THEM FREE OF ALL WEEDS, REFUSE, AND DEBRIS. PLANT GROWTH SHALL BE CONTROLLED BY TRIMMING, PRUNING, AND OTHERWISE TO: PREVENT INTERFERENCE WITH MAINTENANCE AND REPAIR OF UTILITIES; SO IT WILL NOT RESTRICT OR INTERFERE WITH PEDESTRIAN AND VEHICLES; AND SHALL NOT CONSTITUTE A TRAFFIC HAZARD OR REDUCE VISIBILITY.

LEGEND:
symbol - plant name: size, comments, and (quantity)

- OREGON WHITE OAK / QUERCUS GARYANA: 3" CALIPER; SINGLE TRUNK, STRAIGHT AND WELL FORMED; (12)
- ARBORVITAE / THUJA OCCIDENTALIS 'EMERALD': 6 FT. HT.; DENSE AND STRAIGHT; (37)
- CHINESE WITH HAZEL / HAMAMELIS MOLLIS (YELLOW): 15 GALLON; MULTI-STEMED; (4)
- DWARF NANDINA / NANDINA DOM. 'COMPACTA': 2 GALLON; (28)
- DWARF OREGON GRAPE / MAHONIA REPENS: 2 GALLON; (248)
- MOCK ORANGE / PHILADELPHUS LEWISII: 15 GALLON; (9)
- OTTO LUYKEN LAUREL / PRUNUS L. 'OTTO LUYKEN': 24"X24'; (91)
- RUGOSA ROSE / ROSA RUGOSA: 5 GALLON; (29)
- CREEPING BRAMBLE / RUBUS PENTALOBUS: 4" POTS AT 18" ON CENTER (TRINGULAR SPACING)
- LAWN: SEEDED AND FULLY ESTABLISED
- GRAVEL SURFACING: 6" COMPACTED ¾"-0" CRUSHED ROCK OVER GEO-TEXTILE FABRIC

PERCIVAL LANDSCAPE ARCHITECTURE
P.O. BOX 14676
PORTLAND, OREGON
97293
perlandscape@gmail.com
503-939-3547

THE MARYLHURST SCHOOL

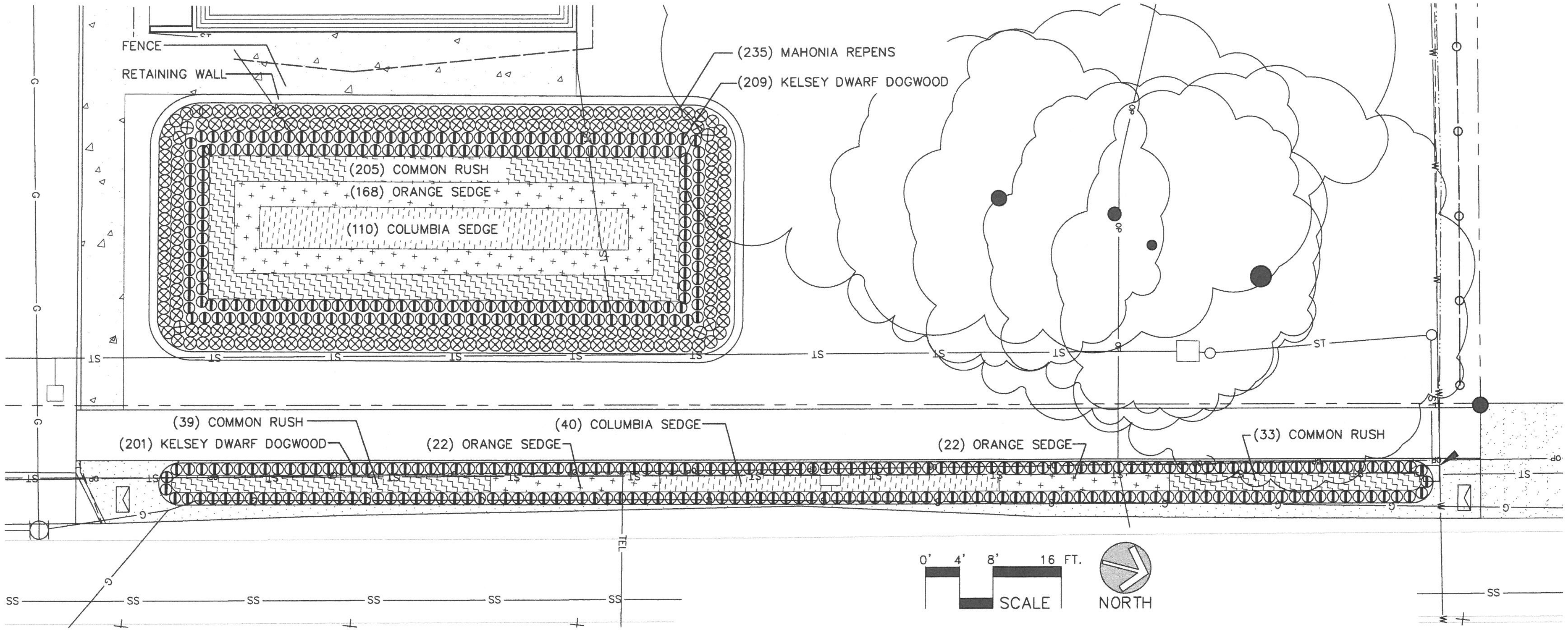
NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

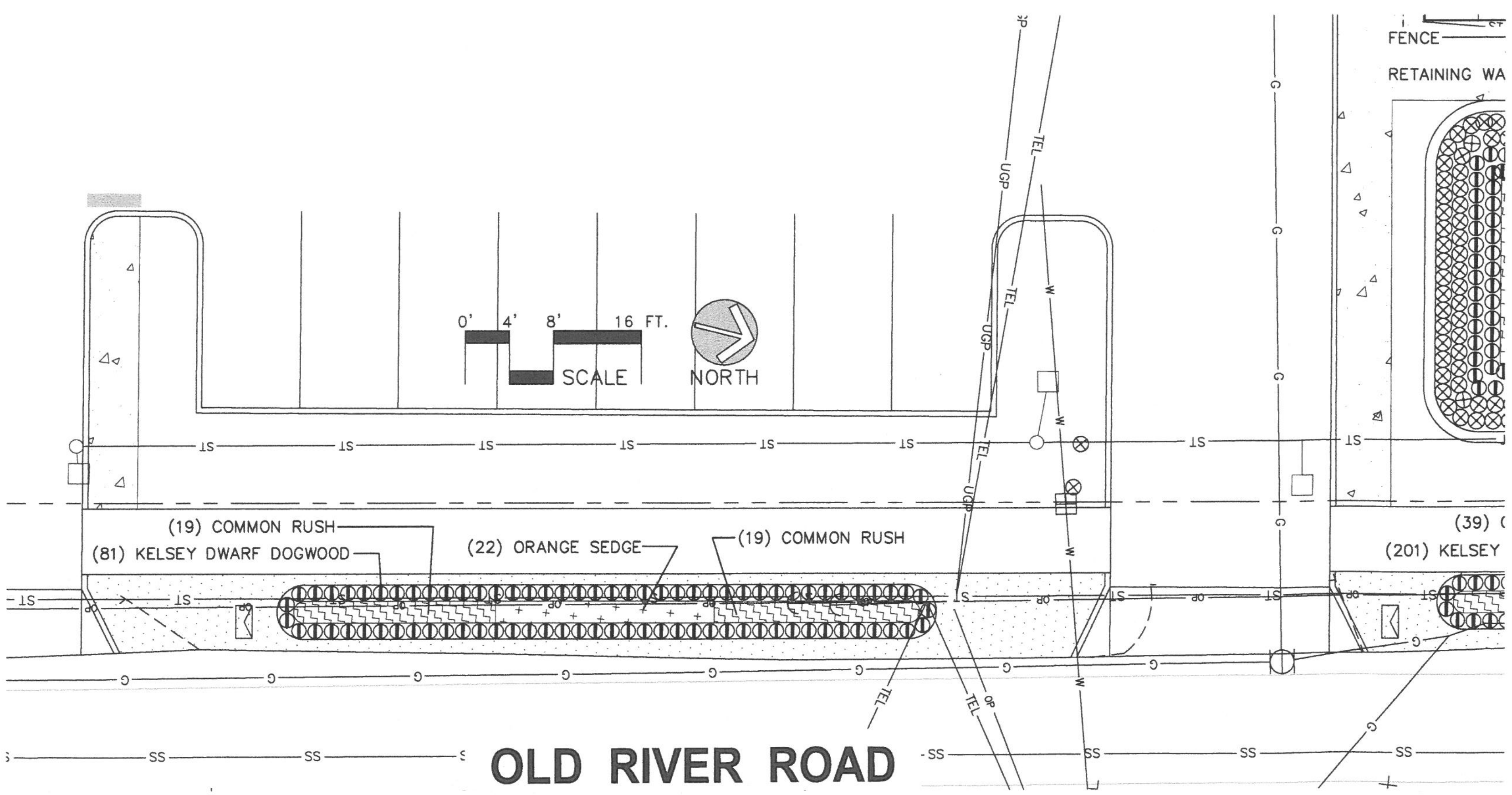
Issue	Revision	Date
LAND USE APPLICATION		09/06/2018

PLANTING PLAN - PARKING LOT AND SITE - PHASE 1

Scale AS INDICATED
Date 09/06/2018
Sheet No.
L1.01



Ⓐ STORMWATER QUALITY FACILITIES



Ⓑ STORMWATER QUALITY FACILITIES

LEGEND:
symbol - plant name: size, comments, and (total quantity)

PLANTS INSIDE STORMWATER FACILITY

(ALL PLANTS TO BE PLANTED AT 18" ON CENTER)

⊗ DWARF OREGON GRAPE / MAHONIA REPENS: 2 GALLON; (235)

Ⓘ KELSEY (DWARF) DOGWOOD/ CORNUS SERICEA 'KELSEY': 1 GALLON; (491)

COLUMBIA SEDGE/ CARES APERTA: I GALLON; (150)

NEW ZEALAND ORANGE SEDGE/ CAREX TESTACAE: 1 GALLON; (234)

COMMON RUSH/ JUNCUS EFFUSUS: 1 GALLON: (315)

IN ADDITION AND IN-BETWEEN THE ABOVE PLANTS PROVIDE (150) 1 GALLON COMMON CAMAS/ CAMASSIA QUAMASH (BLUE).

PERCIVAL LANDSCAPE ARCHITECTURE
P.O. BOX 14676
PORTLAND, OREGON 97293
perlandscape@gmail.com
503-939-3547

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		08.10.18

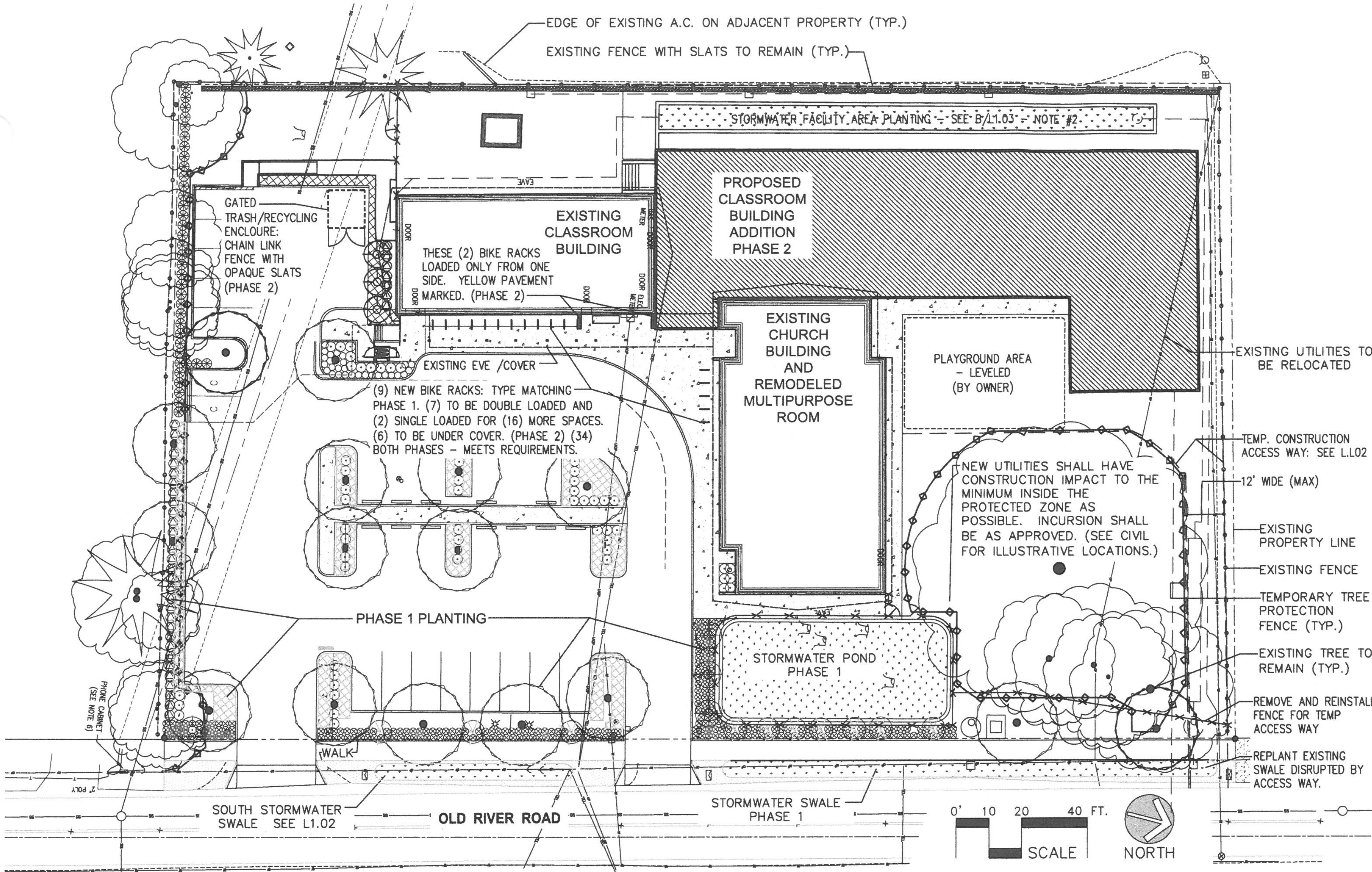
PLANTING PLAN - STORMWATER FACILITIES - PHASE 1

Scale AS INDICATED

Date 09.06.18

Sheet No.

L1.02



(A) SITE PLANTING PLAN

NOTE:

1. IRRIGATION: IRRIGATION SHALL BE SERVED FROM THE RELOCATED WATER LINE AND METER INDICATED ON THIS DRAWING. ALL NEW PLANTINGS SHALL BE SERVED BY AN AUTOMATICALLY CONTROLLED NEW IRRIGATION SYSTEM. THE SYSTEM SHALL BE ZONED TO AREA OF COVERAGE WITH SIMILAR IRRIGATION NEEDS. NEW SHRUB AND GROUND COVER AREAS WILL BE COVERED BY SUB-TERRANIAN DRIPPER LINE ("NETAFIM CV" LINE, WITH O.6 GPH EMITTERS AT 12" ON CENTER). STORMWATER QUALITY PLANTER SHALL BE COVERED BY POP-UP "HUNTER MPR" SPRINKLERS. AREAS OF LAWN BELOW EXISTING OAKS WILL BE COVERED BY SEPARATE TEMPORARY ZONES AS NEEDED TO ESTABLISH LAWNS BUT NOT HARM THE OAKS. A FULL IRRIGATION PLAN WILL BE PROVIDED WITH THE BUILDING PERMIT SUBMITAL.
2. SEE CIVIL DRAWINGS FOR WATER QUALITY AREA SECTION AND MATERIALS (City Detail "WL-618A INFILTRATION RAIN GARDEN TYPE 2") AND FOR FURTHER INFORMATION ON PAVING, WALLS, CURBS, AND UTILITIES. ALTER ROUTES AND LOCATION OF UTILITIES AS APPROVED AND REQUIRED TO LIMIT IMPACTS ON EXISTING TREES TO REMAIN.
3. SEE L1.01 FOR MAINTENANCE REQUIREMENTS

LEGEND:

symbol - plant name and comments

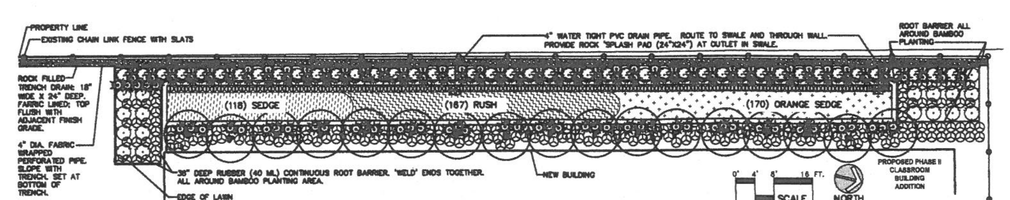
LAWN: SEEDED AND FULLY ESTABLISED

OREGON WHITE OAK / QUERCUS GARYANA: 3" CALIPER; SINGLE TRUNK, STRAIGHT AND WELL FORMED; (2)

CHINESE WITH HAZEL / HAMAMELIS MOLLIS (YELLOW): 15 GALLON; MULTI-STEMED; (3)

RUGOSA ROSE / ROSA RUGOSA: 5 GALLON; (7)

CREEPING BRAMBLE / RUBUS PENTALOBUS: 4" POTS AT 18" ON CENTER (TRINGULAR SPACING)



PLANT LEGEND

symbol common name / botanic name: size, comments, (quantity)

PLANTS OUTSIDE STORMWATER FACILITY

VINE MAPLE/ ACER CIRCINATUM: 12 FT. HT. AND SPREAD; AT LEAST ONE-YEAR IN CONTAINER; MULTI-TRUNKED; (17)

BLACK MONDO GRASS/ OPHIOPOGON PLARISCAPUS 'NIGRESCENS': 1 GALLON, (167)

SWORD FERN/ POLYSTICUM MUNITUM: 1 GALLON; 18" MIN. SPREAD; (139)

TIMBER BAMBOO/ PHYLLOSTACHYS BAMBUSOIDES: (3) MIN. STALK CLUMP; (61)

PLANTS INSIDE STORMWATER FACILITY

(ALL PLANTS TO BE PLANTED AT 18" ON CENTER)

KELSEY (DWARF) DOGWOOD/ CORNUS SERICEA 'KELSEY': 1 GALLON; (99)

COLUMBIA SEDGE/ CARES APERTA: I GALLON; (118)

NEW ZEALAND ORANGE SEDGE/ CAREX TESTACAE: 1 GALLON; (170)

COMMON RUSH/ JUNCUS EFFUSUS: 1 GALLON: (167)

IN ADDITION AND IN-BETWEEN THE ABOVE PLANTS PROVIDE (100) 1 GALLON COMMON CAMAS/ CAMASSIA QUAMASH (BLUE).

(B) STORMWATER TREATMENT AREA PLANTING

PERCIVAL LANDSCAPE ARCHITECTURE
P.O. BOX 14676
PORTLAND, OREGON
97293
perlandscape@gmail.com
503-939-3547

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
LAND USE APPLICATION		08.10.18

PLANTING PLAN - PHASE 2

Scale AS INDICATED

Date 09.06.18

Sheet No.

L1.03

kpff

DATE: September 10, 2018

PROJECT: 1700622-The Marylhurst School

SUBJECT: Land Use Application – Stormwater Management Report

TO: The City of West Linn – Planning
PHONE: 503-742-6060

FROM: Mark Wharry, PE
KPFF Consulting Engineers
PHONE: 503-542-3860
EMAIL: Mark.Wharry@kpff.com

The proposed Marylhurst School project will include a new two-story building addition that will connect the two existing school and church buildings on-site. The project will also involve parking lot improvements and right-of-way frontage upgrades. Currently, the sites impervious areas are collected via roof drains and catch basins, and are routed to an existing on-site storm drainage swale at the northeast corner of the property along Old River Road. The site drains from the southwest to the northeast at a slope of approximately 6.7%. The proposed project plans to maintain the basic drainage patterns that exist today.

This project is located in the West Linn, Oregon and therefore designed to meet the City design standards outlined in the City of West Linn Public Works Design Standards Section Two – Storm Drain Requirements. As modified by the City, West Linn follows the stormwater requirements and methods in the City of Portland Stormwater Manual. Since this development creates over 500 sf of new impervious area, water quality treatment is required in addition to flow control.

The proposed stormwater management plan is to use a combination of conveyance piping, stormwater treatment planters, underground detention piping and flow control manholes to meet the water quality and quantity requirements. The site has been split into two basins. See Exhibit 1 in the attachments for more information on Basins 1 and 2. The water quality rain event for Clackamas County is a 1-year intensity storm with a total rainfall amount of 0.83 inches. Per the City of West Linn Design Standards for flow control, the underground piping must detain up to the 25-year storm event. The post development discharge rate must be that of the pre-development discharge rate for the 2, 5, 10, and 25-year events. In order to size the stormwater treatment planters and detention piping, Autodesk Storm and Sanitary Analysis was used to model pre- and post-development condition, as well as route the water quality and 25-year design storms through the proposed planters and detention piping to ensure they are sized properly. Table 1 outlines the pre- and post-development flows for both Basins 1 and 2 for the 25-year storm event.

Table 1: Pre- and Post-Development Flows

Basin	Pre-Development Flow (prior to any development) [cfs]	Post-Development Un-detained Flow [cfs]	Post-Development Detained Flow [cfs]
1	0.102	0.468	0.18*
2	0.037	0.169	0.12*

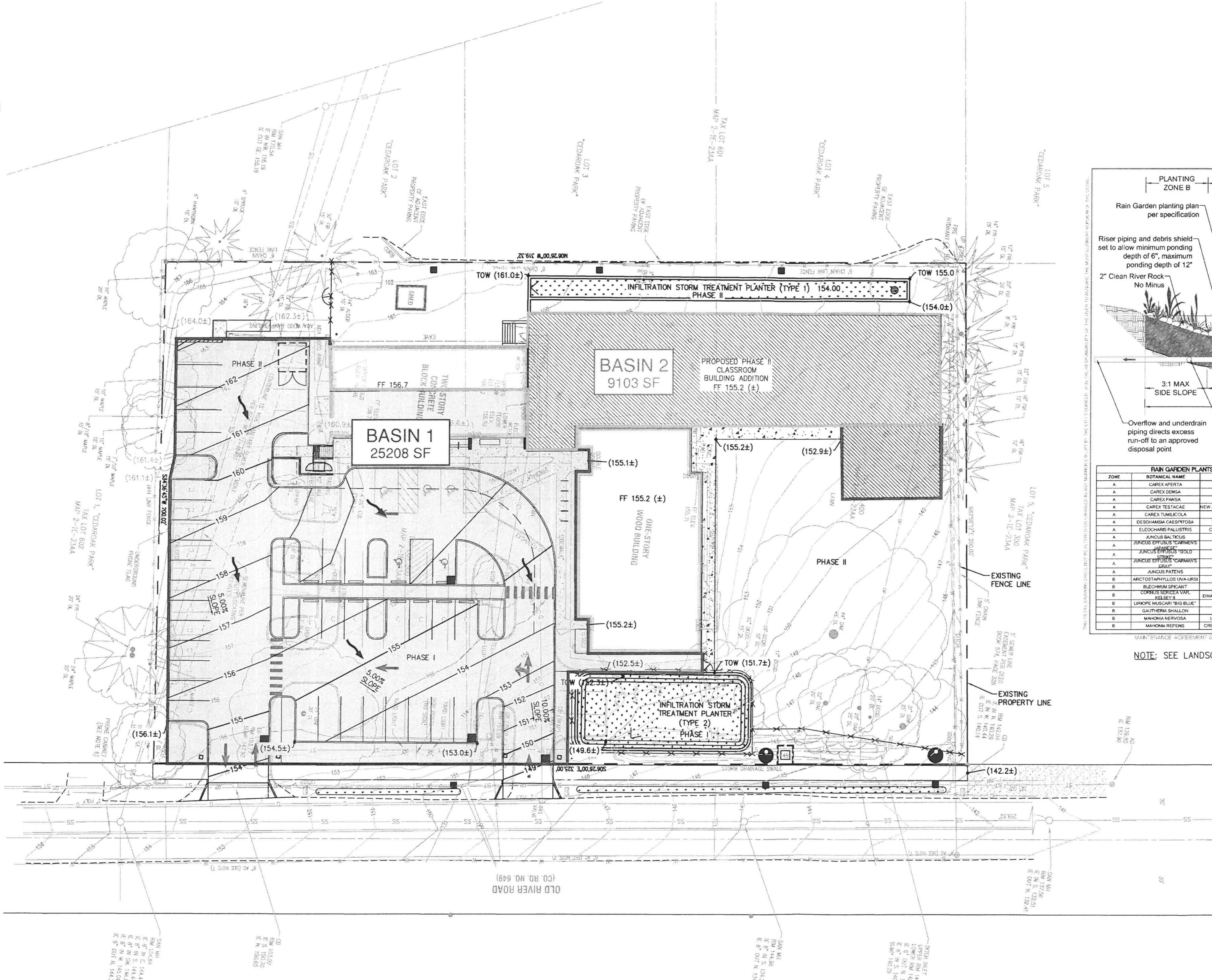
*flow control designed to minimum orifice size per the City of West Linn Design Standards

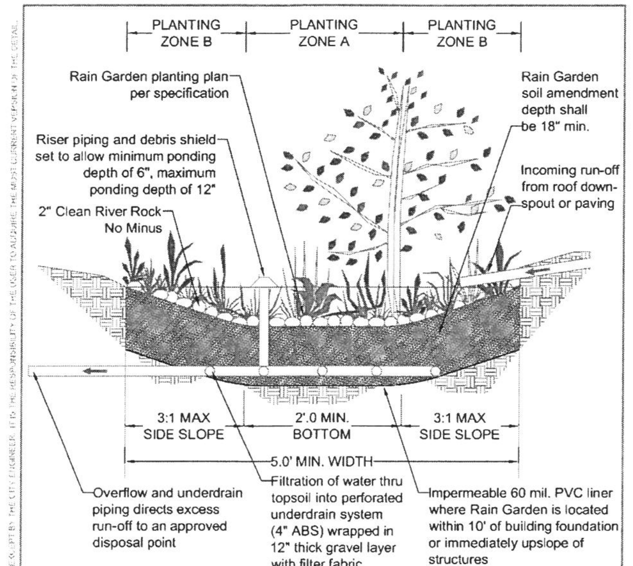
The parking lot will use catch basins to collect runoff, which will be routed to a stormwater treatment planter at the northeast corner of the site at the location of the existing drainage swale. This Type 2 planter will also collect roof runoff from the existing buildings (runoff from Basin 1). The underground detention piping required for this drainage basin is 170 LF of 36" diameter pipe. Another stormwater treatment planter (Type 1) will be located in the rear of the new proposed building addition to manage water quality treatment for the new and existing buildings. The necessary detention for Basin 2 is 100 LF of 24" diameter piping. See the attached Utility Plan for site location and layout of these planters and detention pipes.

Mark Wharry, PE
KPFF Consulting Engineers

Attachments: Basin Map
Utility Plan

10101700622- pm





RAIN GARDEN PLANTS

ZONE	BOTANICAL NAME	COMMON NAME
A	CAREX APERTA	COLUMBIA SEDGE
A	CAREX DENSA	DENSE SEDGE
A	CAREX PANSA	SANDDUNE SEDGE
A	CAREX TESTACAE	NEW ZEALAND ORANGE SEDGE
A	CAREX TUMILICOLA	FOOTHILL SEDGE
A	DESCHAMSIA CAESPITOSA	TUFTED HAIR GRASS
A	ELEOCHARIS PALUSTRIS	CREEPING SPIKE RUSH
A	JUNCUS BALTICUS	BALTIC RUSH
A	JUNCUS EFFUSUS "CARMEN'S JAPANESE"	COMMON RUSH
A	JUNCUS EFFUSUS "GOLD STRIKE"	COMMON RUSH
A	JUNCUS EFFUSUS "CARMAN'S GRAY"	COMMON RUSH
A	JUNCUS PATENS	SPREADING RUSH
B	ARCTOSTAPHYLLOS UVA-URSI	KINNIKINNICK
B	BLECHNUM SPICANT	DEER FERN
B	CORNUS SERICEA VAR. KELSEY II	DWARF REDTWIG DOGWOOD
B	LIRIOPE MUSCARI "BIG BLUE"	BIG BLUE LILY TURF
B	GAUTHERIA SHALLON	SALAL
B	MAHONIA NERVOSA	LOW OREGON GRAPE
B	MAHONIA REPENS	CREEPING OREGON GRAPE

RAIN GARDEN SURFACE AREA = TOTAL IMPERVIOUS AREA x 0.06

NOTE:

PLANT 1 GALLON POTS 18" O.C. IN EACH ZONE. A MINIMUM OF 3 SPECIES SHALL BE USED IN EACH ZONE.

INFILTRATION RAIN GARDEN TYPE 1

City of West Linn

DATE: 2010

DRAWING NO: WL-617A

FILE NO:

MAINTENANCE AGREEMENT SHALL BE REQUIRED AND BE RECORDED WITH THE CITY

NOTE: SEE LANDSCAPE DRAWINGS FOR PLANTINGS

kpff
111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION

Issue	Revision	Date
	LAND USE APPLICATION	09.04.18

BASIN MAP

Scale: AS INDICATED

Date: 08.10.18

Sheet No.

EXHIBIT 1

SCALE 1 INCH = 20 FEET
20 0 20 40

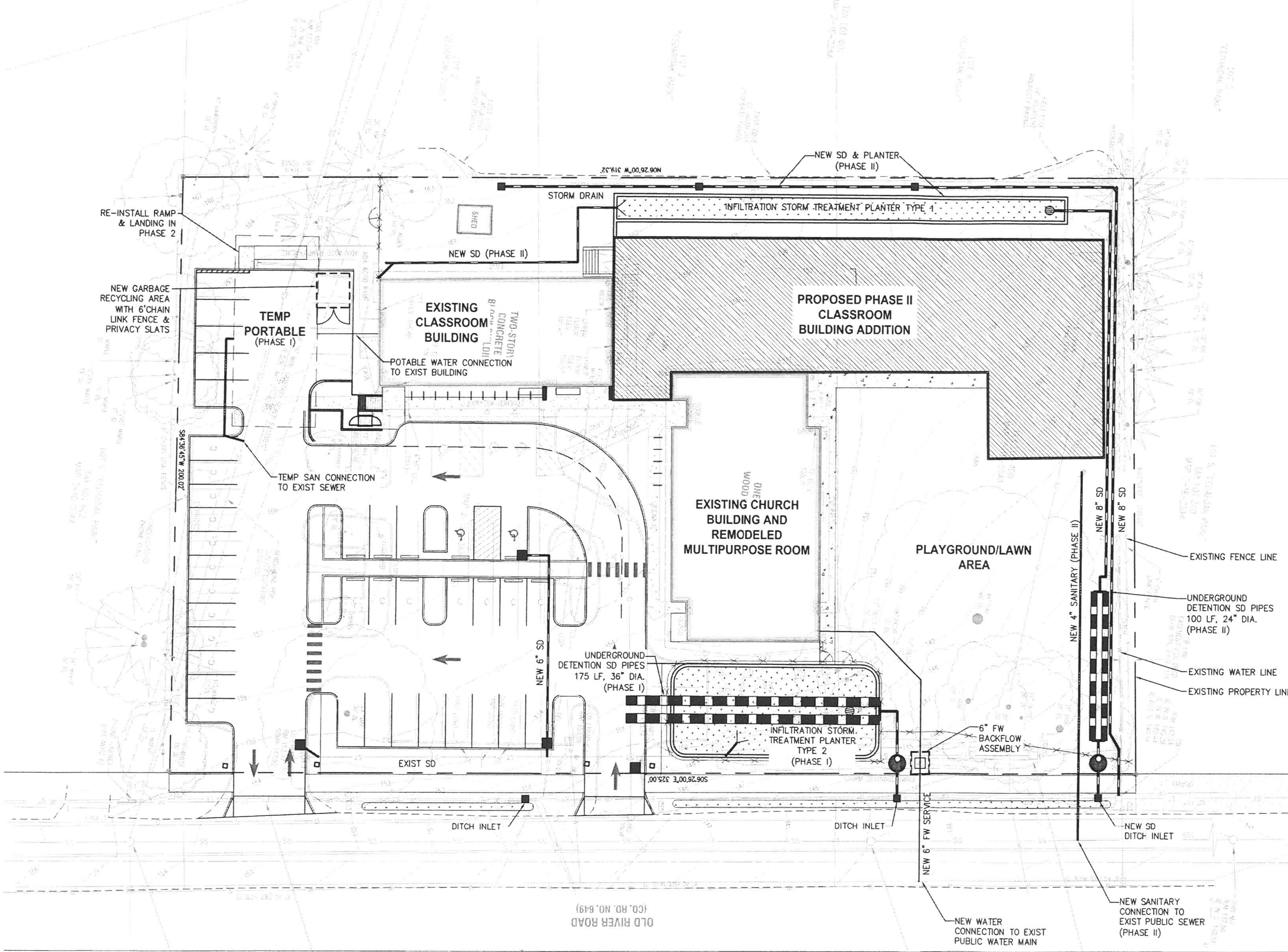
kpff

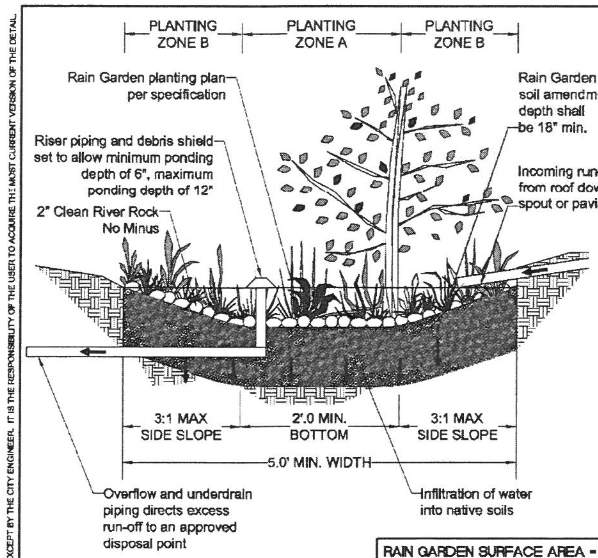
111 SW Fifth Ave., Suite 2400
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

THE MARYLHURST SCHOOL

NEW LIFE CHURCH SITE
19915 Old Lower River Road
West Linn, Oregon, 97068

LAND USE APPLICATION





THIS DETAIL DRAWING SHALL NOT BE ALTERED OR CHANGED IN ANY MANNER EXCEPT BY THE CITY ENGINEER. IT IS THE RESPONSIBILITY OF THE USER TO ACQUIRE THE MOST CURRENT VERSION OF THE DETAIL.

RAIN GARDEN SURFACE AREA = TOTAL IMPERVIOUS AREA x 0.06

RAIN GARDEN PLANTS

ZONE	BOTANICAL NAME	COMMON NAME
A	CAREX APERTA	COLUMBIA SEDGE
A	CAREX DENSA	DENSE SEDGE
A	CAREX PANSA	SANDDUNE SEDGE
A	CAREX TESTACAE	NEW ZEALAND ORANGE SEDGE
A	CAREX TUMILICOLA	FOOTHILL SEDGE
A	DESCHAMSIA CAESPITOSA	TUFTED HAIR GRASS
A	ELEOCHARIS PALUSTRIS	CREEPING SPIKE RUSH
A	JUNCUS BALTICUS	BALTIC RUSH
A	JUNCUS EFFUSUS "CARMEN'S JAPANESE"	COMMON RUSH
A	JUNCUS EFFUSUS "GOLD STRIKE"	COMMON RUSH
A	JUNCUS EFFUSUS "CARMAN'S GRAY"	COMMON RUSH
A	JUNCUS PATENS	SPREADING RUSH
B	ARCTOSTAPHYLLOS UVA-URSI	KINNIKINNICK
B	BLECHNUM SPICANT	DEER FERN
B	CORNUS SERICEA VAR. KELSEY II	DWARF REDTWIG DOGWOOD
B	LIRIOPE MUSCARI "BIG BLUE"	BIG BLUE LILY TURF
B	GAUTHERIA SHALLON	SALAL
B	MAHONIA NERVOSA	LOW OREGON GRAPE
B	MAHONIA REPENS	CREEPING OREGON GRAPE

NOTE:

PLANT 1 GALLON POTS 18" O.C. IN EACH ZONE. A MINIMUM OF 3 SPECIES SHALL BE USED IN EACH ZONE.

INFILTRATION RAIN GARDEN TYPE 2

City of West Linn

DATE: 2010
DRAWING NO. WL-618A
FILE NO.

MAINTENANCE AGREEMENT SHALL BE REQUIRED AND BE RECORDED WITH THE CITY

NOTE: SEE LANDSCAPE DRAWINGS FOR PLANTINGS

Issue	Revision	Date
LAND USE APPLICATION		09.04.18

UTILITY PLAN

Scale AS INDICATED

Date 08.10.18

Sheet No.

SCALE 1 INCH = 20 FEET
20 0 20 40

EXHIBIT 2

REGISTERED PROFESSIONAL ENGINEER
79004PE
Miranda Wells
OREGON
JUNE 2016
MIRANDA WELLS
RENEWS: July 2020

The Marylhurst School

Traffic Impact Study

West Linn, Oregon

Date:
August 14, 2018

Prepared for:
Sheila Walker

Prepared by:
Richard Martin, EI
Jessica Hijar, EI
Miranda Wells, PE

LANCASTER ENGINEERING

321 SW 4th Ave., Suite 400 | Portland, OR 97204 | 503.248.0313 | lancasterengineering.com

Table of Contents

Table of Figures

Table of Tables

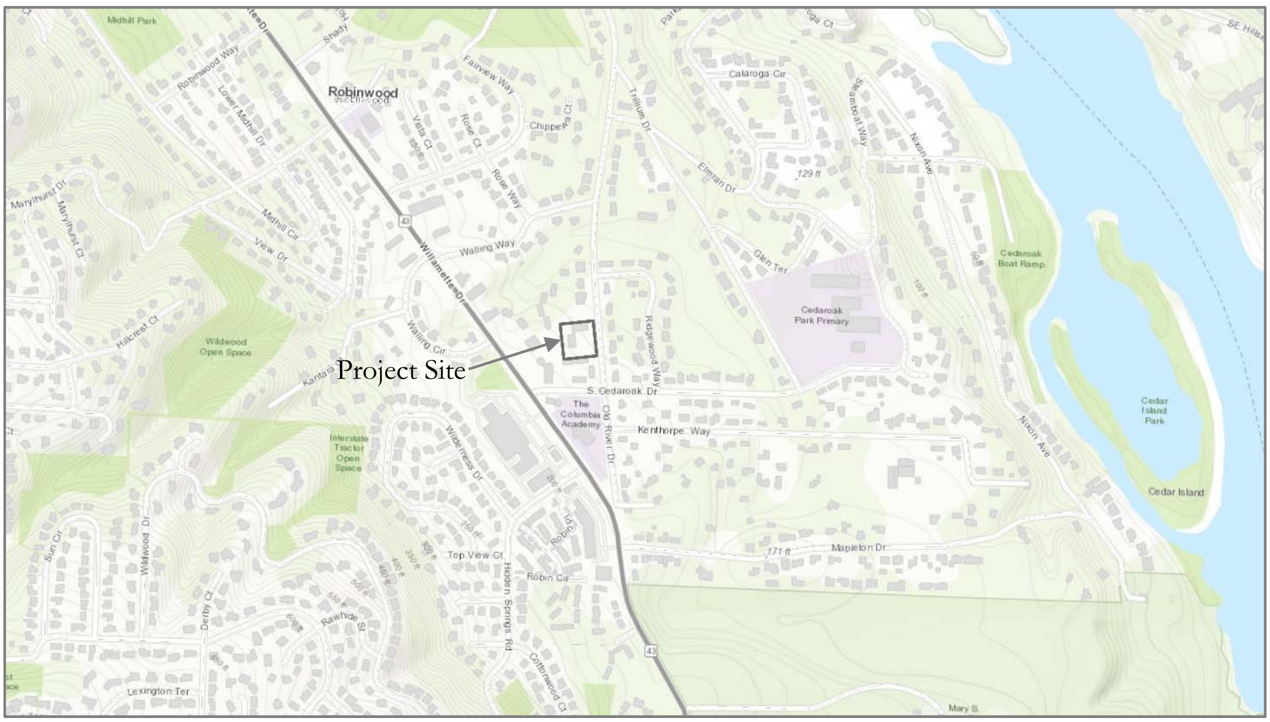
Executive Summary

- The Marylhurst School is proposed for development at 19915 Old River Drive in West Linn, Oregon. The site previously hosted a church with a pre-school program.
- There are two phases for the school construction, the first is a temporary facility and use of two existing buildings which is planned to support up to 115 students. The second phase is the construction of the new school building. The new construction is anticipated to have a maximum capacity of 194 students.
- The trip generation calculations show that the proposed development is projected to generate 105 morning peak hour, 71 afternoon peak hour, and 30 evening peak hour site trips for the first phase of development. In the second phase of development, the school is projected to generate 177 morning peak hour, 120 afternoon peak hour, and 50 evening peak hour site trips.
- All study intersections are projected to operate within the City of West Linn and ODOT standards under all analysis scenarios. No capacity related mitigation is necessary or recommended.
- Queues for the turning movements at Highway 43 at Cedar Oak Drive do not exceed the available storage length. Queue length at the City intersections do not exceed three vehicles.
- Due to the low number of crashes and the low severity of collisions, there do not appear to be any significant safety hazards at the nearby transportation facilities. No safety mitigation is recommended.

Introduction

A new school is proposed at 19915 Old River Drive in West Linn, Oregon. The site previously hosted the New Life Church Robinwood. The project site is located east of Willamette Drive and north of Cedar Oak Drive at 19915 Old River Drive in West Linn, Oregon (see Figure 1). The applicant is proposing to develop the property in two phases. The first phase includes a new temporary building and will utilize two existing buildings. This first phase is anticipated to have a maximum capacity of 115 students. The second phase will be a permanent development which is anticipated to have a maximum capacity of 194 students.

Figure 1: Project Site Location



Access between the site and the greater transportation system will be provided via the two existing driveways onto Old River Road. For drop-off and pick-up, parents enter through the northern driveway, and exit through the southern driveway. General parking can enter/exit through the southern driveway. The proposed site plan is shown in Figure 2 on page 3.

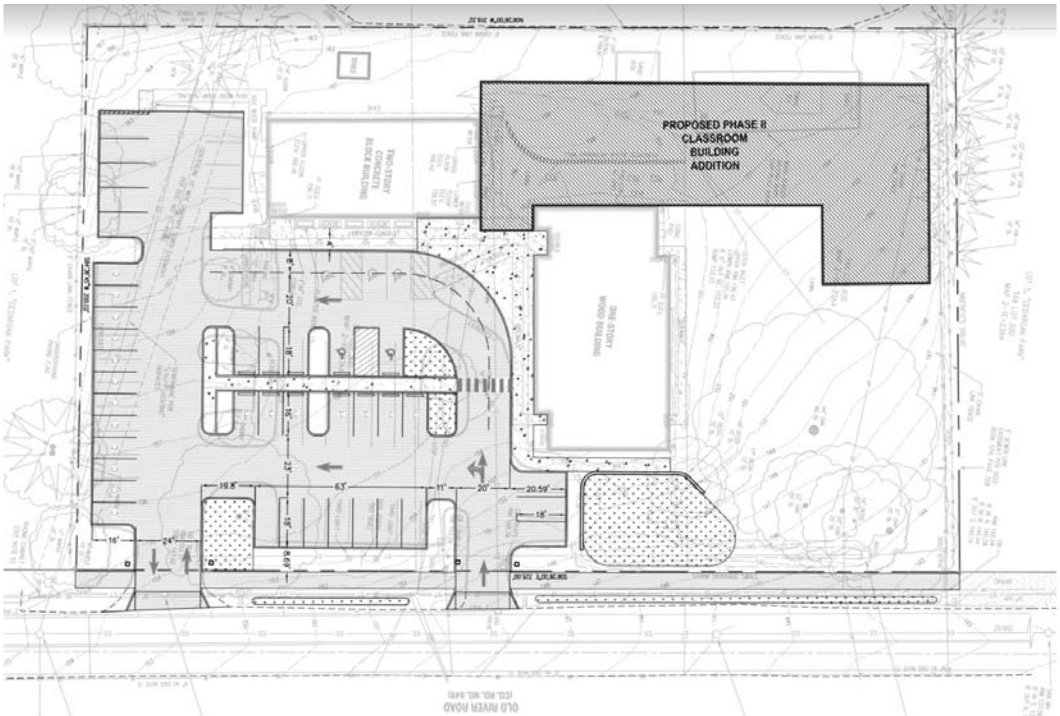


Figure 2 - Proposed Site Plan

Supporting Transportation Network

The trips associated with the proposed development are anticipated to predominantly use the following three nearby vicinity roadways: Old River Drive, Cedar Oak Drive, and Willamette Drive/Highway 43. Table 1 provides a description of each of the vicinity roadways.

Table 1 – Vicinity Roadway Descriptions

Roadway	Jurisdiction	Functional Classification	Cross-Section	Speed	On-street Parking	Bicycle Lanes	Curbs	Sidewalks
Old River Road	West Linn	Neighborhood Route	2 Lanes	25 mph Posted	Not Permitted	Both Sides	Both Sides	Partial Both Sides
Cedar Oak Drive	West Linn	Neighborhood Route	2 Lanes	25 mph Posted	Not Permitted	None	Partial Both Sides	Partial Both Sides
Willamette Drive / Highway 43	ODOT	Major Arterial	2 Lanes	35 mph Posted	Not Permitted	None	Both Sides	Both Sides

Study Intersections

It is anticipated that the majority of traffic traveling to and from the project site will be traveling along Old River Drive to Cedar Oak Drive and then onto Willamette Drive. These assumptions were confirmed with the City of West Linn[1] and ODOT. As a result, the intersections of Old River Drive at Cedar Oak Drive and Willamette Drive at Cedar Oak Drive were evaluated for potential operational and safety impact.

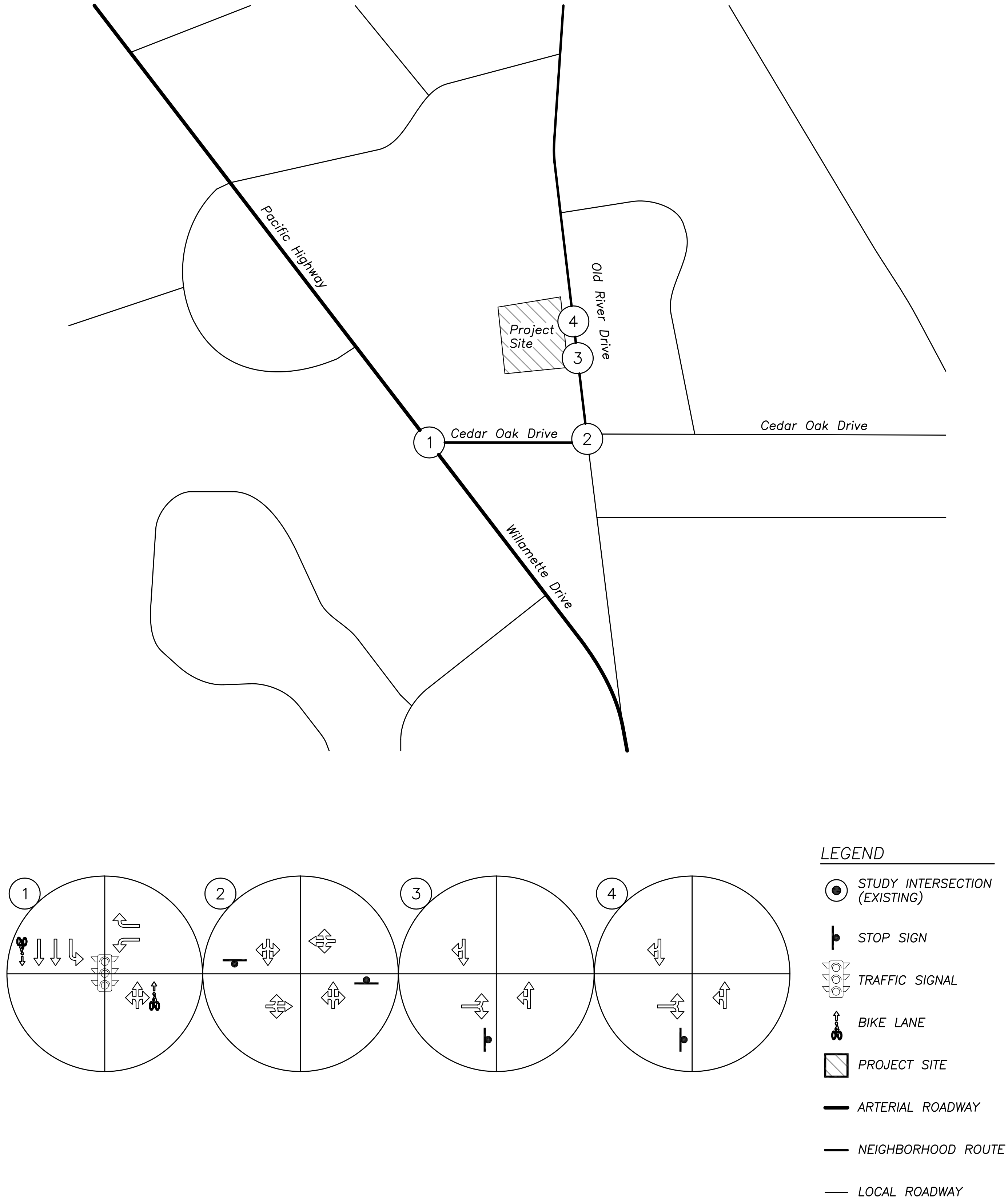
The intersection of Old River Drive at Cedar Oak Drive is a four-legged intersection under City of West Linn Jurisdiction that is stop-controlled for the minor street approaches of Old River Drive. Each approach has one shared lane for all turning movements. There is a striped crosswalk on the southern approach.

The intersection of Willamette Drive/Highway 43 at Cedar Oak Drive is a three-legged signalized intersection under ODOT jurisdiction. The southbound approach has one left-turn lane, two through lanes, and a bicycle lane. The northbound approach has one through / right-turn lane and a bicycle lane. The westbound approach has a left-turn lane and a right-turn lane. Crosswalks are marked across all approaches.

Figure 3 on the following page shows the study intersection configurations and traffic control devices.

---

[1] Scope approval via email on July 30th from Amy Pepper



STUDY INTERSECTION CONFIGURATIONS

FIGURE 3

Trip Generation

The proposed Marylhurst School includes two phases of development, the first including space and staff to accommodate 115 students, and the second to accommodate 194 students. To estimate the number of trips that will be generated by the proposed phases, trip rates from the *Trip Generation Manual*[2] were used. Data from land-use code 534, *Private School (K-8)*, was used to estimate the proposed development's trip generation of the site based on the number of students.

The trip generation calculations show that the proposed development is projected to generate 105 morning peak hour, 71 afternoon peak hour, and 30 evening peak hour site trips for the first phase of development. In the second phase of development, the school is projected to generate 177 morning peak hour, 120 afternoon peak hour, and 50 evening peak hour site trips, respectively. The trip generation estimates are summarized in Table 2. Detailed trip generation calculations are included as an attachment to this study.

Table 2 –Trip Generation Summary

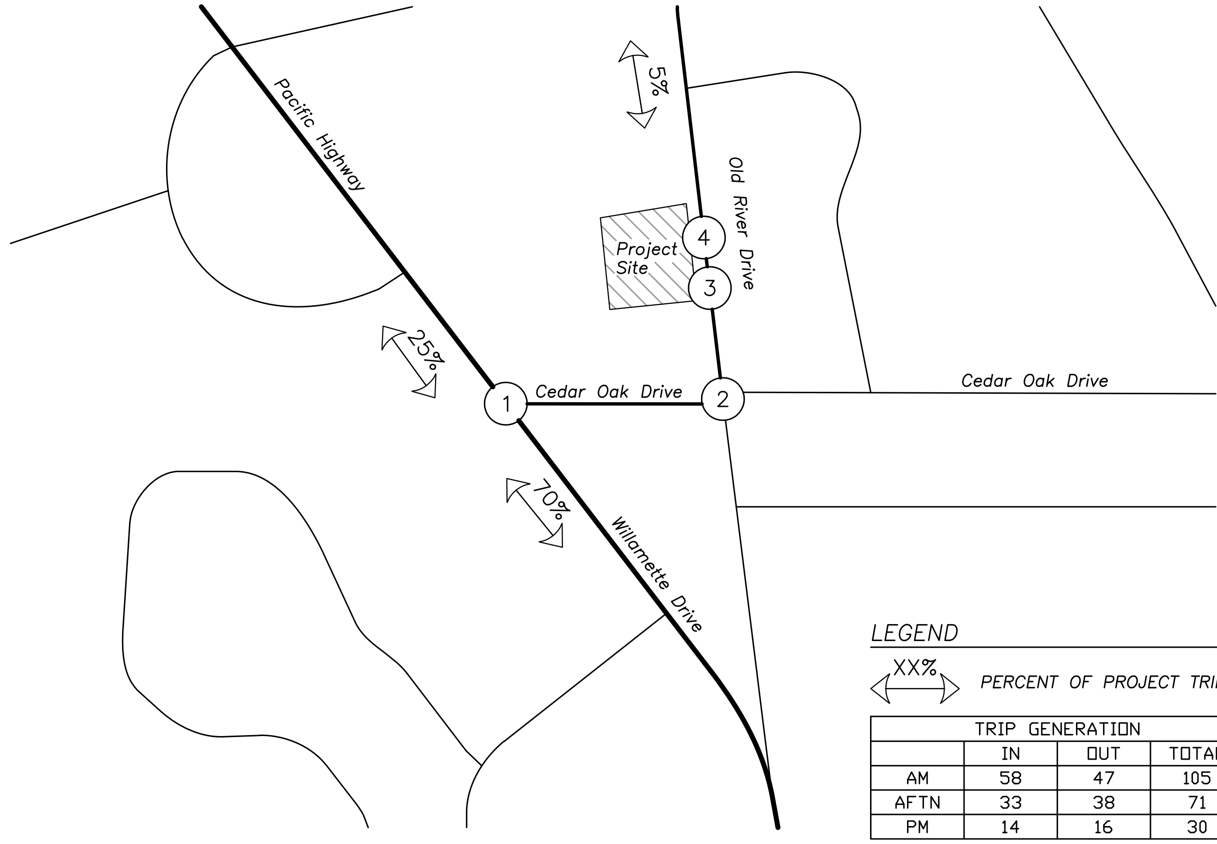
ITE Code	Size (Students)	Morning Peak Hour			Afternoon Peak Hour			Evening Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Phase One - Temporary										
Private School (K-8) - 534	115	58	47	105	33	38	71	14	16	30
Phase Two - Permanent										
Private School (K-8) - 534	194	97	80	177	56	64	120	23	27	50

Trip Distribution

The directional distribution of site trips to and from the proposed development was estimated based on existing traffic patterns as well as the locations of where trips would most likely be coming to and from. Based on the local destinations and the proximity to major transportation facilities, the trip distribution is shown in Figure 4 and Figure 5.

The total site trip assignment for Phase 1 is shown in Figure 4 on page 7. The total site trip assignment for Phase 2 is shown in Figure 5 on page 8.

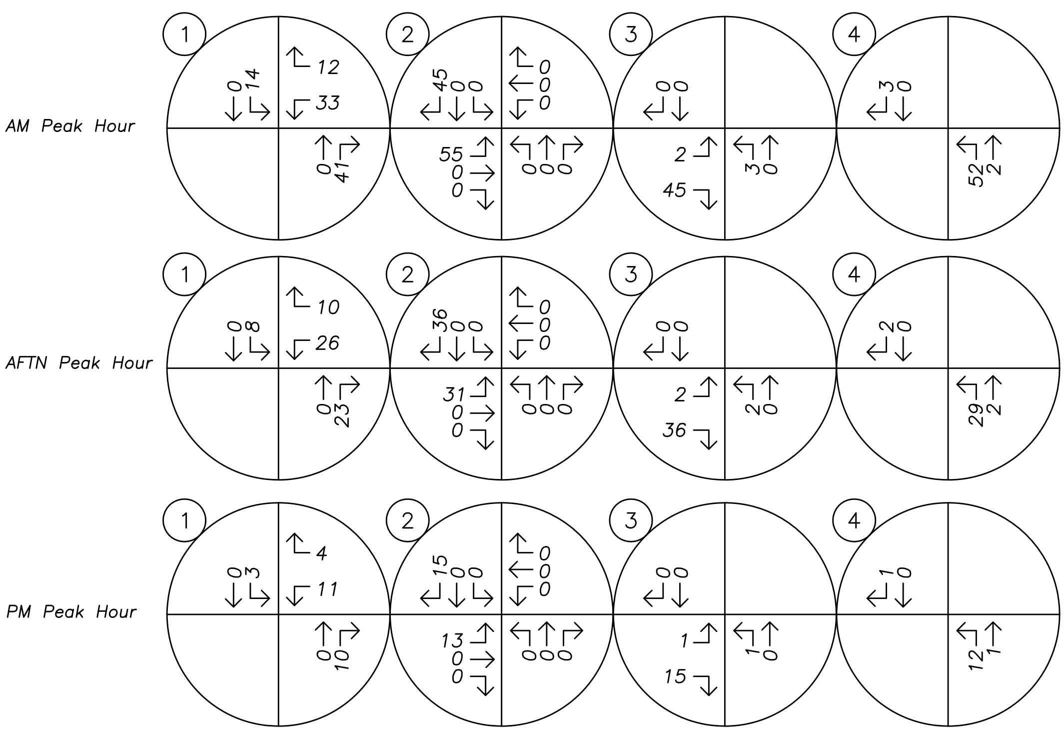
[2] Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 10th Edition, 2017.



LEGEND

XX% PERCENT OF PROJECT TRIPS

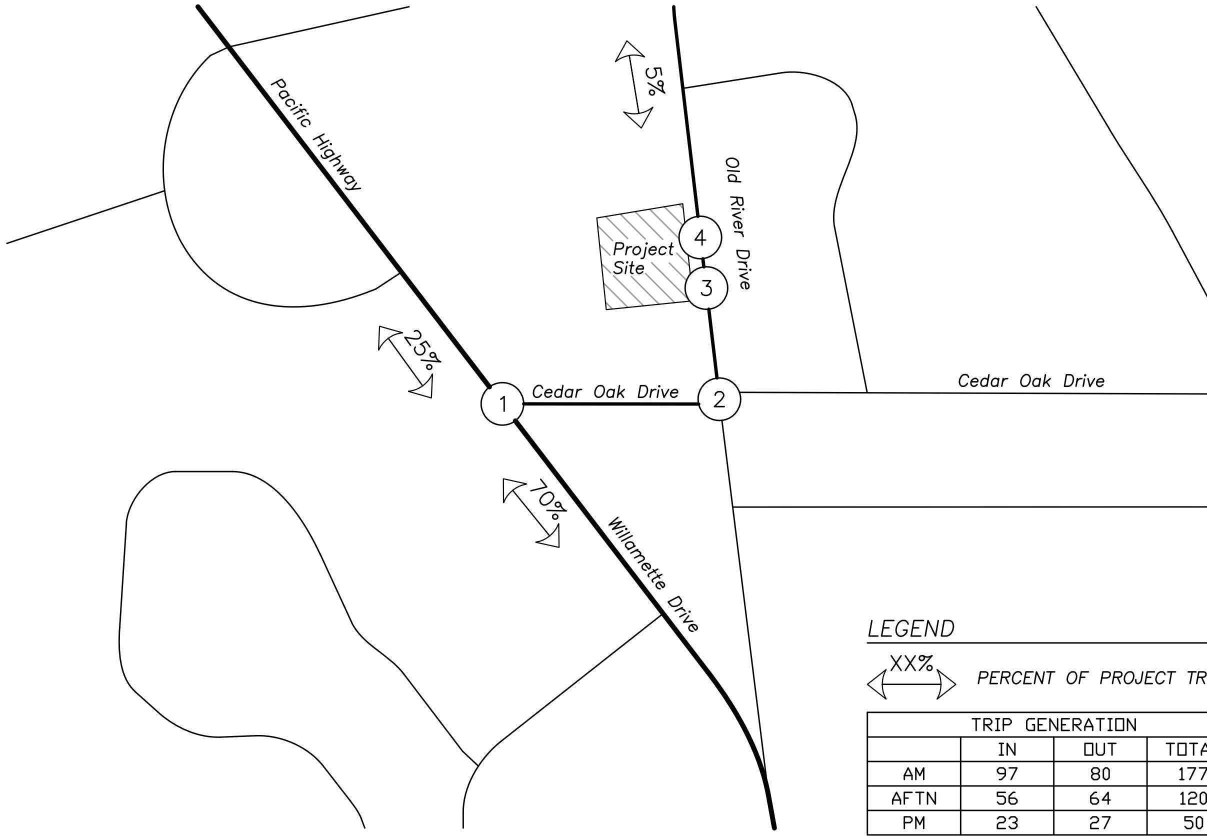
TRIP GENERATION	IN	OUT	TOTAL
AM	58	47	105
AFTN	33	38	71
PM	14	16	30



SITE TRIP DISTRIBUTION & ASSIGNMENT
Proposed Development Plan – Phase 1
AM, AFTN, & PM Peak Hours

no scale

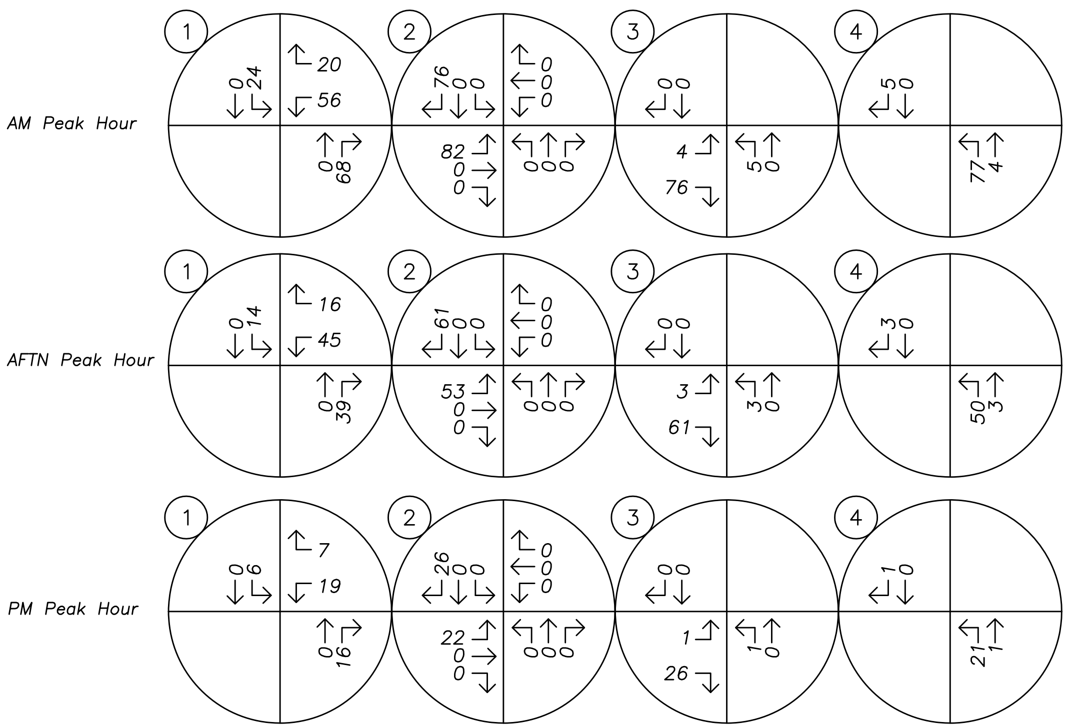
FIGURE 4



LEGEND

XX% PERCENT OF PROJECT TRIPS

TRIP GENERATION			
	IN	OUT	TOTAL
AM	97	80	177
AFTN	56	64	120
PM	23	27	50



SITE TRIP DISTRIBUTION & ASSIGNMENT
Proposed Development Plan – Phase 2
AM, AFTN, & PM Peak Hours

no scale

FIGURE 5

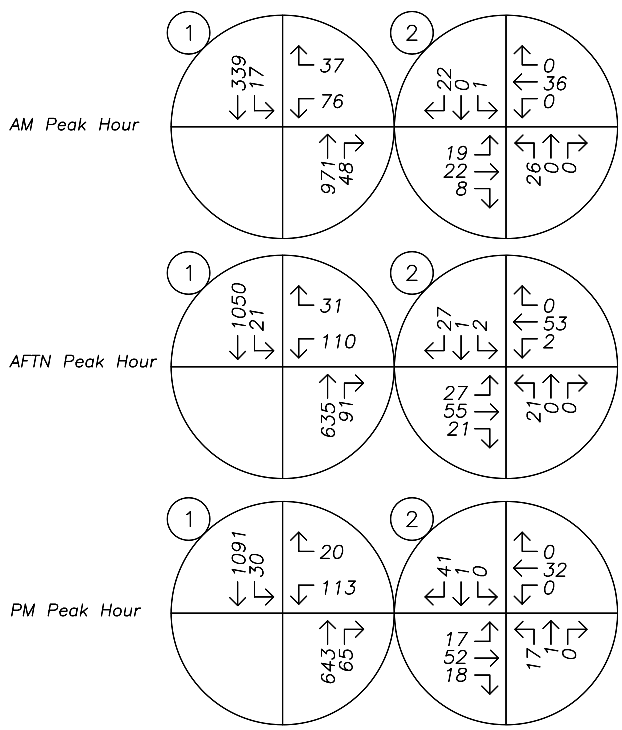
Traffic Volumes

To determine if the nearby transportation facilities can adequately accommodate future trips to and from the proposed development in addition to the existing uses within the site vicinity, peak hour observations of traffic conditions were conducted. Traffic observations were conducted at the study intersections on Tuesday, July 31st, 2018 between 7:00 AM and 9:00 AM, 2:00 PM and 4:00 PM, and 4:00 PM and 6:00 PM, and on Wednesday, August 1st, 2018 between 2:00 PM and 4:00 PM, in order to account for the morning, afternoon, and evening peak hours. Data from each intersection's peak hour was used for analysis. The existing volumes are shown in Figure 6 on page 10. Technical data is provided in the technical appendix.

Future Traffic Volumes

Future traffic volumes along ODOT highways were projected in conformance with the requirements established in ODOT's Analysis Procedures Manual. This includes the determination of the 30th-highest hour volumes. Based on seasonal trend variations, an adjustment factor of 1.012 was applied to highway volumes. Additionally, annual growth factors for ODOT facilities were determined based on data from ODOT's Future Volumes Table and estimated to be 0.93% per year. Detailed information in provided in the Appendix. To estimate future traffic volumes along all City roadways, a growth rate of two percent per year was used. These growth rates were applied to estimate background conditions before accounting for trips to be generated from the proposed development.

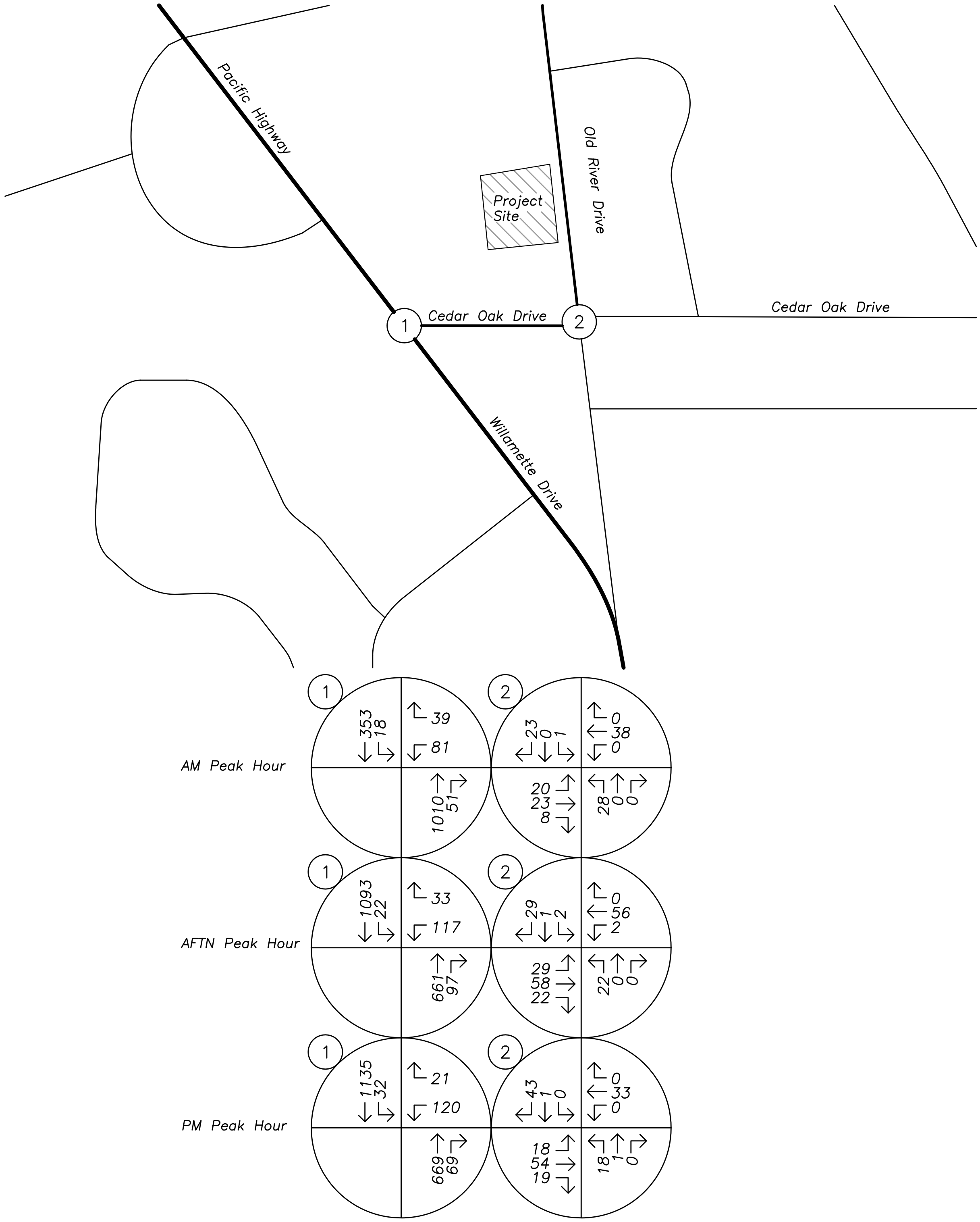
The anticipated completion of the temporary school is 2019 and the anticipated completion of the permanent school structures is 2021. The 2021 background traffic volumes are shown in Figure 7 on page 11. The year 2021 background conditions with the addition of site trips from Phase Two is shown in Figure 8.



TRAFFIC VOLUMES
Year 2018 Existing Traffic Volumes
AM, AFTN, & PM Peak Hours

no scale

FIGURE 6

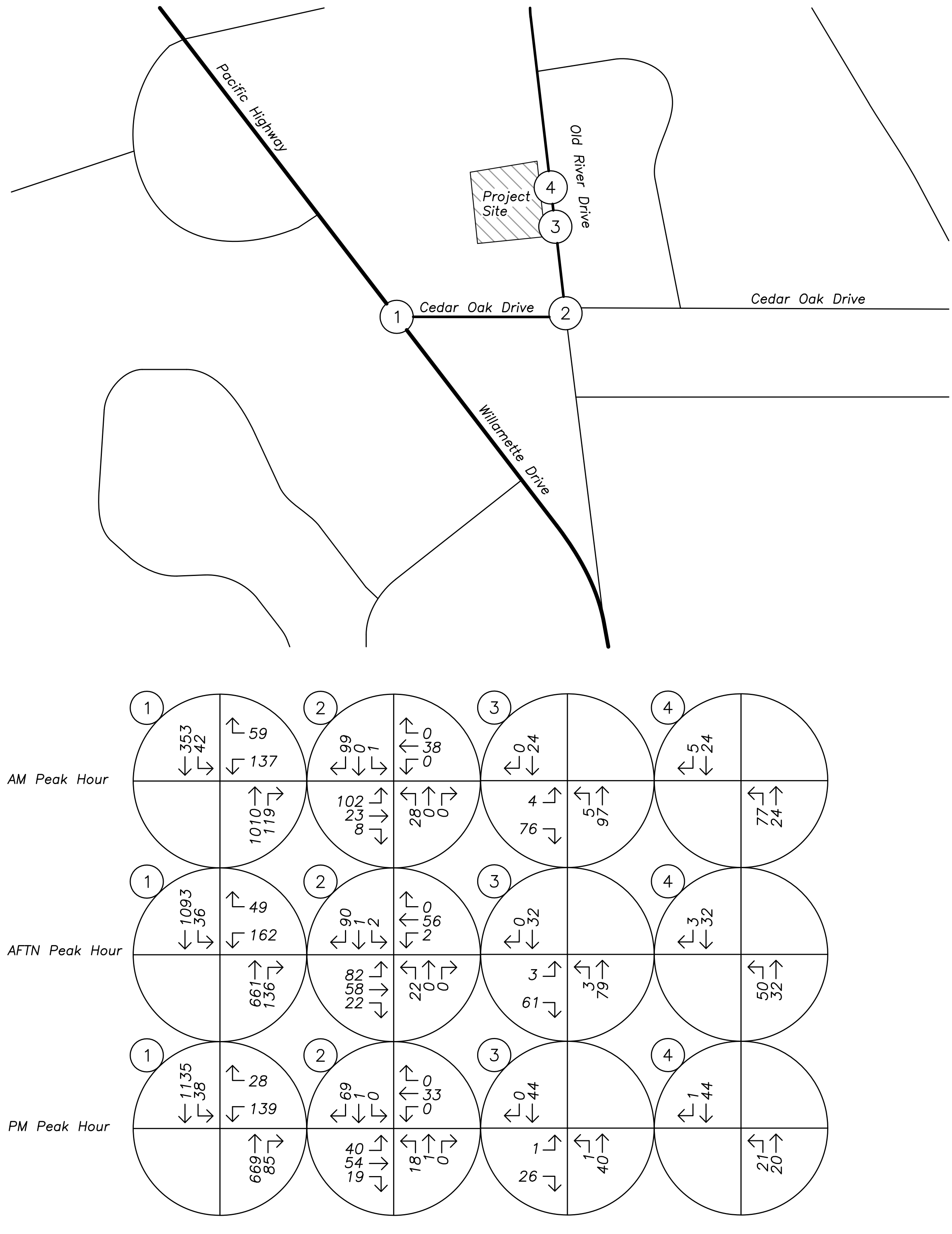


ODOT FACILITY GROWTH RATE: 0.93 PERCENT PER YEAR LINEAR
LOCAL FACILITY GROWTH RATE: 2.0 PERCENT PER YEAR COMPOUNDED

TRAFFIC VOLUMES
Year 2021 Background Conditions
AM, AFTN, & PM Peak Hours

no scale

FIGURE 7



TRAFFIC VOLUMES
Year 2021 Background Conditions plus Phase Two
AM, AFTN, & PM Peak Hours

FIGURE 8

PAGE 12

Operational Analysis

To determine the capacity and level-of-service at the study intersections, a capacity analysis was conducted. The analysis was conducted using the intersection analysis methodologies in the Highway Capacity Manual (HCM). The level of service (LOS) of an intersection can range from LOS A, which indicates little or no delay experienced by vehicles, to LOS F, which indicates a high degree of congestion and delay. The minimum operational standard specified in the city of West Linn Comprehensive Plan (April 2006) is LOS D for all facilities except major arterials where the minimum is LOS E. The intersection of Highway 43/Willamette Drive operates under the jurisdiction of the Oregon Department of Transportation and must meet the v/c ratio targets established under the Oregon Highway Plan. For intersections inside the Urban Growth Boundary and within the Portland Metropolitan Region, there is a maximum v/c ratio of 0.99.

All study intersections are projected to operate within the City of West Linn and ODOT standards under all analysis scenarios. The results of the capacity analysis are summarized in the following table. The applicable performance standard is shown in bold for each intersection. No mitigation is necessary or recommended with regard to intersection capacity or operation as part of the proposed development. Detailed data sheets, as well as the year 2019 background plus Phase One analysis results, are attached in the technical appendix.

Table 3 - Capacity Analysis Summary

	Morning Peak			Afternoon Peak			Evening Peak		
	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
Highway 43 at Cedar Oak Drive									
Year 2018 Existing Conditions	14	B	**0.79**	12	B	**0.82**	11	B	**0.79**
Year 2021 Background Conditions	16	B	**0.83**	14	B	**0.85**	13	B	**0.83**
Year 2021 Background + Phase 2	37	D	**0.94**	19	B	**0.90**	15	B	**0.84**
Cedar Oak Drive at Old River Road									
Year 2018 Existing Conditions	10	**A**	0.04	10	**B**	0.04	10	**B**	0.05
Year 2021 Background Conditions	10	**A**	0.04	11	**B**	0.04	10	**B**	0.05
Year 2021 Background + Phase 2	13	**B**	0.08	13	**B**	0.11	11	**B**	0.09
Old River Road at Southern Site Access									
Year 2021 Background + Phase 2	9	**A**	0.08	9	**A**	0.07	9	**A**	0.03
Old River Road at Northern Site Access									
Year 2021 Background + Phase 2	7	**A**	0.05	7	**A**	0.04	7	**A**	0.02

Queuing Analysis

Queues were examined for the study intersections under Year 2021 Background plus Phase Two morning peak hour scenario because this peak hour experiences the highest number of site trips and traffic volumes. The queue lengths were calculated using a Synchro/SimTraffic simulation, with the reported values based on the 95th percentile queue lengths. This means that during the peak hour, 95 percent of the time the queue lengths will be less than or equal to the reported values. The results show that the calculated 95th percentile queues for left-turn movements at the intersection of Highway 43 at Cedar Oak Drive do not exceed the storage length of the turn lanes. The calculated 95th percentile queue lengths at the intersections of Cedar Oak Drive at Old River Drive and Old River Drive at the southern site access do not exceed 60 feet, or approximately three vehicles. The northern site access has a 95th percentile queue length of approximately one vehicle. Detailed queuing analysis worksheets are provided in the appendix.

Crash Analysis

Using data obtained from the Oregon Department of Transportation's (ODOT) Crash Analysis and Reporting Unit, a review was performed for the most recent five years of available crash data (January 2012 through December 2016) at the study intersections. Crash rates were calculated under the common assumption that traffic counted during the evening peak hour represents 10 percent of annual average daily traffic (AADT) at the intersection. The crash data was evaluated based on the number of crashes, the type of collisions, and the severity of the collisions at the nearby transportation facilities. Crash rates greater than 1.0 CMEV are generally indicative of a need for further investigation and possible mitigation. Willamette Drive at Cedar Oak Drive is an ODOT intersection. As such, crash data at the intersection was evaluated by comparing the 90th percentile crash rates in accordance with the Analysis Procedures Manual.

There were nine crashes reported at the intersection of Willamette Drive at Cedar Oak Drive. Eight of the crashes were rear-end collisions and one crash was an angle-type collision. All of the rear-end collisions occurred between vehicles traveling along Willamette Drive, split evenly in each direction. The crashes resulted in two reports of Injury B – *Non-Incapacitating Injury*, and five reports of Injury C – *Possible Injury or Complaint of Pain*. The crash rate for this intersection was calculated to be 0.249 CMEV, which is less than the 90th percentile rate of 0.509 identified by ODOT for three-legged signalized intersections within urban areas.

No other crashes were reported within the immediate site vicinity. Due to the low number of crashes and the low severity of collisions, there do not appear to be any significant safety hazards at the nearby transportation facilities. Accordingly, no safety mitigation is necessary or recommended.

Detailed crash history information is provided in the technical appendix.

Conclusions

All study intersections are projected to operate within the City of West Linn and ODOT standards under all analysis scenarios. No mitigation is necessary or recommended with regard to intersection capacity or operation as part of the proposed development.

Queues for the turning movements at Highway 43 at Cedar Oak Drive do not exceed the available storage length. Queue length at the City intersections do not exceed three vehicles.

Due to the low number of crashes and the low severity of collisions, there do not appear to be any significant safety hazards at the nearby transportation facilities. No safety mitigation is recommended.

Appendix

TRIP GENERATION CALCULATIONS

Land Use: Private School (K-8)
Land Use Code: 534
Setting/Location General Urban/Suburban
Variable: Students
Variable Value: 115

AM PEAK HOUR

Trip Rate: 0.91

	Enter	Exit	Total
Directional Distribution	55%	45%	
Trip Ends	**58**	**47**	**105**

PM PEAK HOUR

Trip Rate: 0.26

	Enter	Exit	Total
Directional Distribution	46%	54%	
Trip Ends	**14**	**16**	**30**

WEEKDAY

Trip Rate: 4.11

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	**237**	**236**	**473**

PM PEAK HOUR OF GENERATOR

Trip Rate: 0.62

	Enter	Exit	Total
Directional Distribution	47%	53%	
Trip Ends	**33**	**38**	**71**

Source: TRIP GENERATION, Tenth Edition

TRIP GENERATION CALCULATIONS

Land Use: Private School (K-8)
Land Use Code: 534
Setting/Location General Urban/Suburban
Variable: Students
Variable Value: 194

AM PEAK HOUR

Trip Rate: 0.91

	Enter	Exit	Total
Directional Distribution	55%	45%	
Trip Ends	**97**	**80**	**177**

PM PEAK HOUR

Trip Rate: 0.26

	Enter	Exit	Total
Directional Distribution	46%	54%	
Trip Ends	**23**	**27**	**50**

WEEKDAY

Trip Rate: 4.11

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	**399**	**398**	**797**

PM PEAK HOUR OF GENERATOR

Trip Rate: 0.62

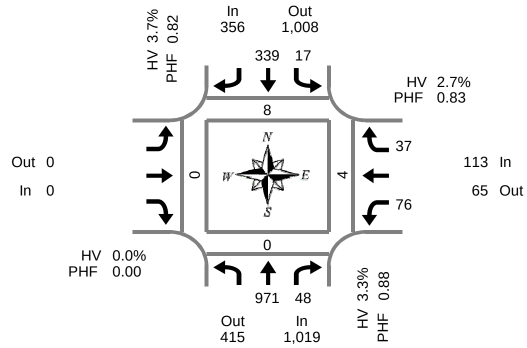
	Enter	Exit	Total
Directional Distribution	47%	53%	
Trip Ends	**56**	**64**	**120**

Source: TRIP GENERATION, Tenth Edition

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
7:10 AM to 8:10 AM

Hwy 43 & Cedar Oak Dr

Wednesday, August 01, 2018
7:00 AM to 9:00 AM

5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
7:00 AM		73	5	0	2	25		0				0	1		3	0	109	0	0	0	0
7:05 AM		65	3	0	1	33		0				0	3		3	0	108	0	0	0	0
7:10 AM		89	5	0	0	21		0				0	4		4	0	123	0	0	0	0
7:15 AM		89	1	0	2	23		0				0	7		4	0	126	0	0	3	0
7:20 AM		95	7	0	0	33		0				0	6		6	0	147	0	0	0	0
7:25 AM		91	3	0	2	28		0				0	5		1	0	130	1	0	0	0
7:30 AM		90	3	0	1	19		0				0	6		2	0	121	0	0	0	0
7:35 AM		84	3	0	1	25		0				0	12		4	0	129	1	0	1	0
7:40 AM		86	2	1	1	28		0				0	5		2	0	124	0	0	0	0
7:45 AM		67	1	0	3	39		0				0	9		2	0	121	2	0	0	0
7:50 AM		68	5	0	0	31		0				0	4		6	0	114	0	0	0	0
7:55 AM		73	3	0	2	34		0				0	6		4	0	122	3	0	0	0
8:00 AM		66	10	0	2	29		0				0	4		1	0	112	0	0	0	0
8:05 AM		73	5	0	3	29		0				0	8		1	0	119	1	0	0	0
8:10 AM		63	7	0	0	41		0				0	3		2	0	116	1	0	2	0
8:15 AM		67	5	0	1	29		0				0	7		4	0	113	0	0	1	0
8:20 AM		75	3	0	1	38		0				0	8		3	1	128	0	0	1	0
8:25 AM		78	1	0	4	37		0				0	4		8	0	132	1	0	0	0
8:30 AM		86	1	0	0	34		0				0	9		5	0	135	0	0	0	0
8:35 AM		65	2	0	0	31		0				0	3		1	0	102	2	1	1	0
8:40 AM		87	5	0	3	35		0				0	6		4	0	140	0	0	0	0
8:45 AM		62	4	0	3	43		1				0	5		6	0	123	1	0	0	0
8:50 AM		82	1	0	2	40		0				0	5		2	0	132	0	0	0	0
8:55 AM		69	6	0	0	34		0				0	6		1	0	116	2	0	0	0
Total Survey		1,843	91	1	34	759		1				0	136		79	1	2,942	15	1	9	0

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
7:00 AM		227	13	0	3	79		0				0	8		10	0	340	0	0	0	0
7:15 AM		275	11	0	4	84		0				0	18		11	0	403	1	0	3	0
7:30 AM		260	8	1	3	72		0				0	23		8	0	374	1	0	1	0
7:45 AM		208	9	0	5	104		0				0	19		12	0	357	5	0	0	0
8:00 AM		202	22	0	5	99		0				0	15		4	0	347	2	0	2	0
8:15 AM		220	9	0	6	104		0				0	19		15	1	373	1	0	2	0
8:30 AM		238	8	0	3	100		0				0	18		10	0	377	2	1	1	0
8:45 AM		213	11	0	5	117		1				0	16		9	0	371	3	0	0	0
Total Survey		1,843	91	1	34	759		1				0	136		79	1	2,942	15	1	9	0

Peak Hour Summary
7:10 AM to 8:10 AM

By Approach	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	1,019	415	1,434	1	356	1,008	1,364	0	0	0	0	0	113	65	178	0	1,488	8	0	4	0
%HV	3.3%				3.7%				0.0%				2.7%				3.4%				
PHF	0.88				0.82				0.00				0.83				0.92				

By Movement	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		971	48	1,019	17	339		356				0	76		37	113	1,488
%HV	NA	2.9%	12.5%	3.3%	0.0%	3.8%	NA	3.7%	NA	NA	NA	0.0%	3.9%	NA	0.0%	2.7%	3.4%
PHF		0.88	0.67	0.88	0.61	0.81		0.82				0.00	0.73		0.66	0.83	0.92

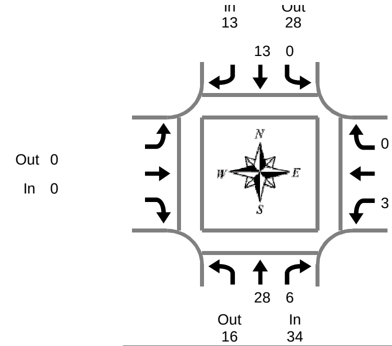
Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
7:00 AM		970	41	1	15	339		0				0	68		41	0	1,474	7	0	4	0
7:15 AM		945	50	1	17	359		0				0	75		35	0	1,481	9	0	6	0
7:30 AM		890	48	1	19	379		0				0	76		39	1	1,451	9	0	5	0
7:45 AM		868	48	0	19	407		0				0	71		41	1	1,454	10	1	5	0
8:00 AM		873	50	0	19	420		1				0	68		38	1	1,468	8	1	5	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
7:10 AM to 8:10 AM

Hwy 43 & Cedar Oak Dr

Wednesday, August 01, 2018
7:00 AM to 9:00 AM

Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
7:00 AM		4	0	4	0	2		2				0	0		0	0	6
7:05 AM		0	3	3	0	0		0				0	0		0	0	3
7:10 AM		3	1	4	0	0		0				0	0		0	0	4
7:15 AM		3	0	3	0	0		0				0	0		0	0	3
7:20 AM		2	1	3	0	2		2				0	1		0	1	6
7:25 AM		4	0	4	0	2		2				0	0		0	0	6
7:30 AM		0	1	1	0	1		1				0	1		0	1	3
7:35 AM		3	0	3	0	2		2				0	0		0	0	5
7:40 AM		3	0	3	0	1		1				0	1		0	1	5
7:45 AM		1	0	1	0	1		1				0	0		0	0	2
7:50 AM		0	1	1	0	1		1				0	0		0	0	2
7:55 AM		4	0	4	0	1		1				0	0		0	0	5
8:00 AM		3	1	4	0	2		2				0	0		0	0	6
8:05 AM		2	1	3	0	0		0				0	0		0	0	3
8:10 AM		2	2	4	0	2		2				0	0		0	0	6
8:15 AM		6	0	6	0	1		1				0	1		1	2	9
8:20 AM		4	0	4	0	0		0				0	0		0	0	4
8:25 AM		2	0	2	0	2		2				0	1		0	1	5
8:30 AM		2	0	2	0	1		1				0	1		1	2	5
8:35 AM		0	0	0	0	1		1				0	0		0	0	1
8:40 AM		2	0	2	0	0		0				0	0		0	0	2
8:45 AM		2	0	2	0	1		1				0	0		0	0	3
8:50 AM		2	0	2	0	1		1				0	0		0	0	3
8:55 AM		0	0	0	0	3		3				0	0		0	0	3
Total Survey		54	11	65	0	27		27				0	6		2	8	100

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
7:00 AM		7	4	11	0	2		2				0	0		0	0	13
7:15 AM		9	1	10	0	4		4				0	1		0	1	15
7:30 AM		6	1	7	0	4		4				0	2		0	2	13
7:45 AM		5	1	6	0	3		3				0	0		0	0	9
8:00 AM		7	4	11	0	4		4				0	0		0	0	15
8:15 AM		12	0	12	0	3		3				0	2		1	3	18
8:30 AM		4	0	4	0	2		2				0	1		1	2	8
8:45 AM		4	0	4	0	5		5				0	0		0	0	9
Total Survey		54	11	65	0	27		27				0	6		2	8	100

Heavy Vehicle Peak Hour Summary
7:10 AM to 8:10 AM

By Approach	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	34	16	50		13	28	41		0	0	0		3	6	9		50
PHF	0.77				0.65				0.00				0.38				0.83

By Movement	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		28	6	34	0	13		13				0	3		0	3	50
PHF		0.78	0.75	0.77	0.00	0.65		0.65				0.00	0.38		0.00	0.38	0.83

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

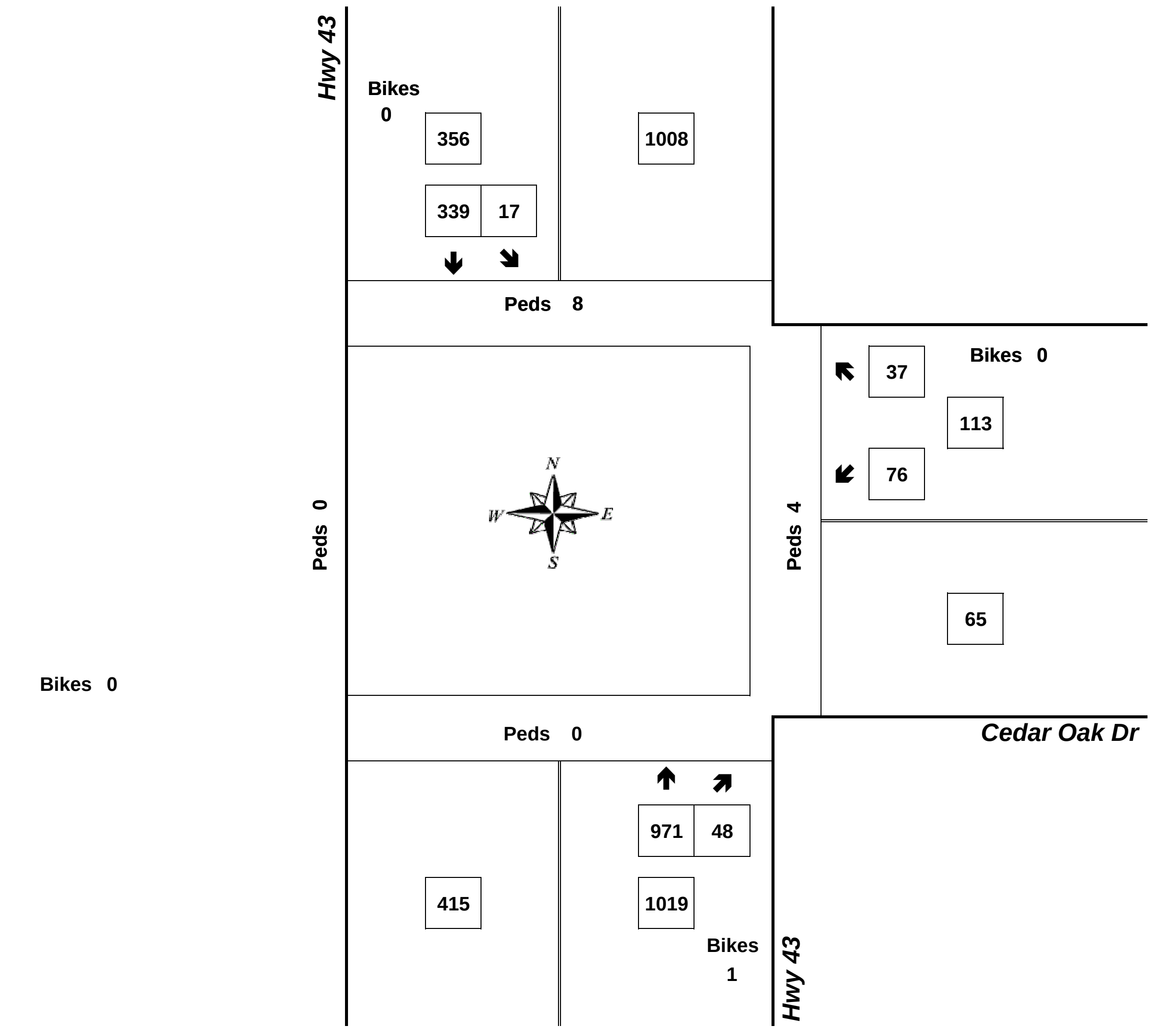
Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
7:00 AM		27	7	34	0	13		13				0	3		0	3	50
7:15 AM		27	7	34	0	15		15				0	3		0	3	52
7:30 AM		30	6	36	0	14		14				0	4		1	5	55
7:45 AM		28	5	33	0	12		12				0	3		2	5	50
8:00 AM		27	4	31	0	14		14				0	3		2	5	50

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Hwy 43 & Cedar Oak Dr

7:10 AM to 8:10 AM
Wednesday, August 01, 2018

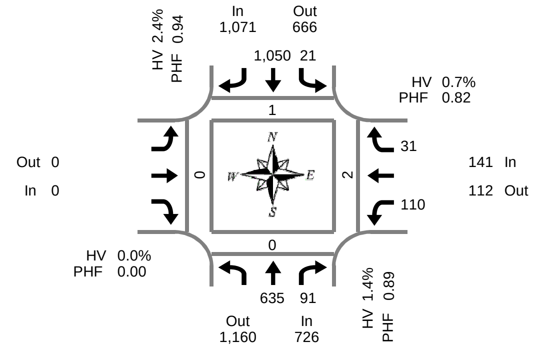


Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.83	2.7%	113
NB	0.88	3.3%	1,019
SB	0.82	3.7%	356
Intersection	0.92	3.4%	1,488

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
_3:00 PM to 4:00 PM_

Hwy 43 & Cedar Oak Dr

Tuesday, July 31, 2018
2:00 PM to 4:00 PM

5-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
2:00 PM		49	5	0	1	63		0				0	9		3	0	130	1	0	0	0
2:05 PM		53	3	0	2	54		0				0	14		4	0	130	1	0	1	0
2:10 PM		40	4	0	2	60		0				0	12		1	0	119	0	0	1	0
2:15 PM		41	5	0	2	56		0				0	7		2	0	113	0	0	0	0
2:20 PM		53	5	0	2	71		0				0	9		4	0	144	0	0	0	0
2:25 PM		45	6	0	2	61		0				0	12		2	0	128	0	0	0	0
2:30 PM		50	10	0	3	61		0				0	6		1	0	131	0	1	1	0
2:35 PM		47	3	0	2	67		0				0	11		3	0	133	1	0	0	0
2:40 PM		59	6	0	1	102		0				0	8		3	0	179	0	1	1	0
2:45 PM		46	6	0	4	71		0				0	10		1	0	138	0	0	0	0
2:50 PM		53	8	0	1	87		0				0	12		2	0	163	2	0	0	0
2:55 PM		43	7	0	3	73		0				0	9		4	0	139	0	0	0	0
3:00 PM		59	6	0	1	94		0				0	8		3	0	171	0	0	0	0
3:05 PM		45	9	0	4	79		0				0	13		2	0	152	0	0	2	0
3:10 PM		58	4	0	1	94		0				0	12		4	0	173	0	0	0	0
3:15 PM		54	4	0	3	92		0				0	7		1	0	161	0	0	0	0
3:20 PM		44	5	0	1	85		0				0	12		2	0	149	0	0	0	0
3:25 PM		44	7	0	1	83		0				0	13		6	0	154	0	0	0	0
3:30 PM		52	12	0	2	80		0				0	9		1	0	156	1	0	0	0
3:35 PM		65	13	0	1	89		0				0	6		2	0	176	0	0	0	0
3:40 PM		51	9	0	4	88		0				0	10		3	0	165	0	0	0	0
3:45 PM		59	7	0	2	101		0				0	1		3	0	173	0	0	0	0
3:50 PM		45	4	0	0	81		0				0	11		2	0	143	0	0	0	0
3:55 PM		59	11	1	1	84		0				0	8		2	0	165	0	0	0	0
Total Survey		1,214	159	1	46	1,876		0				0	229		61	0	3,585	6	2	6	0

15-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
2:00 PM		142	12	0	5	177		0				0	35		8	0	379	2	0	2	0
2:15 PM		139	16	0	6	188		0				0	28		8	0	385	0	0	0	0
2:30 PM		156	19	0	6	230		0				0	25		7	0	443	1	2	2	0
2:45 PM		142	21	0	8	231		0				0	31		7	0	440	2	0	0	0
3:00 PM		162	19	0	6	267		0				0	33		9	0	496	0	0	2	0
3:15 PM		142	16	0	5	260		0				0	32		9	0	464	0	0	0	0
3:30 PM		168	34	0	7	257		0				0	25		6	0	497	1	0	0	0
3:45 PM		163	22	1	3	266		0				0	20		7	0	481	0	0	0	0
Total Survey		1,214	159	1	46	1,876		0				0	229		61	0	3,585	6	2	6	0

Peak Hour Summary
3:00 PM to 4:00 PM

By Approach	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	726	1,160	1,886	1	1,071	666	1,737	0	0	0	0	0	141	112	253	0	1,938
%HV	1.4%				2.4%				0.0%				0.7%				1.9%
PHF	0.89				0.94				0.00				0.82				0.94

Pedestrians Crosswalk			
North	South	East	West
1	0	2	0

By Movement	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		635	91	726	21	1,050		1,071				0	110		31	141	1,938
%HV	NA	1.4%	1.1%	1.4%	4.8%	2.4%	NA	2.4%	NA	NA	NA	0.0%	0.9%	NA	0.0%	0.7%	1.9%
PHF		0.91	0.67	0.89	0.66	0.94		0.94				0.00	0.81		0.86	0.82	0.94

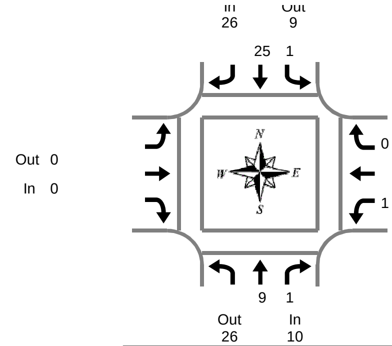
Rolling Hour Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
2:00 PM		579	68	0	25	826		0				0	119		30	0	1,647	5	2	4	0
2:15 PM		599	75	0	26	916		0				0	117		31	0	1,764	3	2	4	0
2:30 PM		602	75	0	25	988		0				0	121		32	0	1,843	3	2	4	0
2:45 PM		614	90	0	26	1,015		0				0	121		31	0	1,897	3	0	2	0
3:00 PM		635	91	1	21	1,050		0				0	110		31	0	1,938	1	0	2	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
3:00 PM to 4:00 PM

Hwy 43 & Cedar Oak Dr

Tuesday, July 31, 2018
2:00 PM to 4:00 PM

Heavy Vehicle 5-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
2:00 PM		1	1	2	0	1		1				0	0		0	0	3
2:05 PM		2	0	2	0	0		0				0	0		0	0	2
2:10 PM		1	0	1	0	2		2				0	0		0	0	3
2:15 PM		2	0	2	0	0		0				0	0		0	0	2
2:20 PM		0	0	0	0	2		2				0	0		1	1	3
2:25 PM		2	0	2	0	0		0				0	1		0	1	3
2:30 PM		0	0	0	0	1		1				0	0		0	0	1
2:35 PM		0	0	0	0	1		1				0	0		0	0	1
2:40 PM		1	0	1	1	1		2				0	0		0	0	3
2:45 PM		0	0	0	0	5		5				0	1		0	1	6
2:50 PM		2	0	2	0	4		4				0	0		0	0	6
2:55 PM		0	0	0	0	3		3				0	0		0	0	3
3:00 PM		2	0	2	0	2		2				0	0		0	0	4
3:05 PM		0	0	0	0	4		4				0	1		0	1	5
3:10 PM		1	0	1	0	2		2				0	0		0	0	3
3:15 PM		1	0	1	1	2		3				0	0		0	0	4
3:20 PM		1	0	1	0	1		1				0	0		0	0	2
3:25 PM		0	0	0	0	0		0				0	0		0	0	0
3:30 PM		1	0	1	0	3		3				0	0		0	0	4
3:35 PM		1	0	1	0	4		4				0	0		0	0	5
3:40 PM		0	0	0	0	1		1				0	0		0	0	1
3:45 PM		1	0	1	0	2		2				0	0		0	0	3
3:50 PM		0	0	0	0	0		0				0	0		0	0	0
3:55 PM		1	1	2	0	4		4				0	0		0	0	6
Total Survey		20	2	22	2	45		47				0	3		1	4	73

Heavy Vehicle 15-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
2:00 PM		4	1	5	0	3		3				0	0		0	0	8
2:15 PM		4	0	4	0	2		2				0	1		1	2	8
2:30 PM		1	0	1	1	3		4				0	0		0	0	5
2:45 PM		2	0	2	0	12		12				0	1		0	1	15
3:00 PM		3	0	3	0	8		8				0	1		0	1	12
3:15 PM		2	0	2	1	3		4				0	0		0	0	6
3:30 PM		2	0	2	0	8		8				0	0		0	0	10
3:45 PM		2	1	3	0	6		6				0	0		0	0	9
Total Survey		20	2	22	2	45		47				0	3		1	4	73

Heavy Vehicle Peak Hour Summary
3:00 PM to 4:00 PM

By Approach	Northbound Hwy 43			Southbound Hwy 43			Eastbound Cedar Oak Dr			Westbound Cedar Oak Dr			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	10	26	36	26	9	35	0	0	0	1	2	3	37
PHF	0.83			0.72			0.00			0.25			0.77

By Movement	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		9	1	10	1	25		26				0	1		0	1	37
PHF		0.75	0.25	0.83	0.25	0.78		0.72				0.00	0.25		0.00	0.25	0.77

Heavy Vehicle Rolling Hour Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
2:00 PM		11	1	12	1	20		21				0	2		1	3	36
2:15 PM		10	0	10	1	25		26				0	3		1	4	40
2:30 PM		8	0	8	2	26		28				0	2		0	2	38
2:45 PM		9	0	9	1	31		32				0	2		0	2	43
3:00 PM		9	1	10	1	25		26				0	1		0	1	37

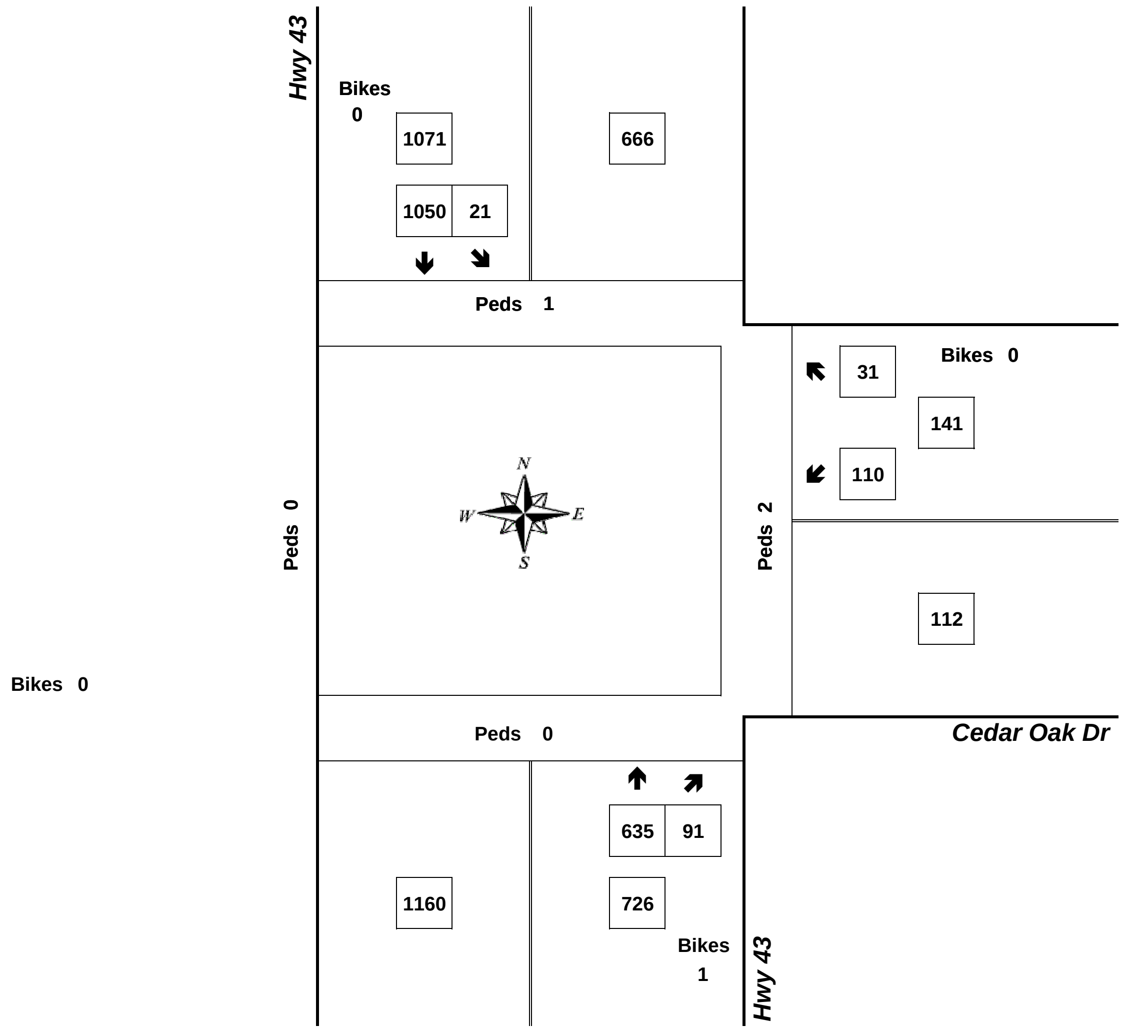
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Hwy 43 & Cedar Oak Dr

3:00 PM to 4:00 PM
Tuesday, July 31, 2018

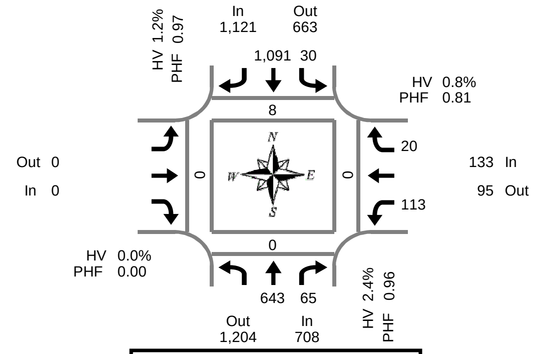


Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.82	0.7%	141
NB	0.89	1.4%	726
SB	0.94	2.4%	1,071
Intersection	0.94	1.9%	1,938

Count Period: 2:00 PM to 4:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
4:15 PM to 5:15 PM

Hwy 43 & Cedar Oak Dr

Tuesday, July 31, 2018
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		54	15	0	2	77		1				0	12		0	0	160	2	0	0	0
4:05 PM		42	1	0	2	83		0				0	14		4	0	146	1	0	0	0
4:10 PM		49	6	0	3	88		0				0	5		3	0	154	0	0	0	0
4:15 PM		60	2	0	4	78		1				0	17		3	0	164	2	0	0	0
4:20 PM		60	6	0	3	92		1				0	5		2	0	168	1	0	0	0
4:25 PM		36	5	0	3	97		0				0	8		0	0	149	0	0	0	0
4:30 PM		64	9	0	1	91		0				0	4		2	0	171	0	0	0	0
4:35 PM		52	5	0	3	94		0				0	13		2	0	169	0	0	0	0
4:40 PM		48	7	0	2	89		0				0	11		2	0	159	0	0	0	0
4:45 PM		43	6	0	2	89		0				0	11		2	0	153	0	0	0	0
4:50 PM		60	6	0	2	96		0				0	9		1	0	174	5	0	0	0
4:55 PM		62	7	0	1	90		0				0	9		1	0	170	0	0	0	0
5:00 PM		43	3	0	0	93		0				0	13		3	0	155	0	0	0	0
5:05 PM		61	3	0	5	85		0				0	6		0	0	160	0	0	0	0
5:10 PM		54	6	0	4	97		0				0	7		2	0	170	0	0	0	0
5:15 PM		48	2	0	2	89		0				0	16		0	0	157	1	0	0	0
5:20 PM		42	4	0	3	100		0				0	11		1	0	161	0	0	0	0
5:25 PM		52	7	0	4	77		0				0	8		4	0	152	0	0	0	0
5:30 PM		51	3	0	2	78		0				0	11		2	0	147	0	0	0	0
5:35 PM		55	7	0	2	93		0				0	14		4	0	175	1	0	0	0
5:40 PM		46	9	0	6	83		0				0	11		2	0	157	0	0	1	0
5:45 PM		47	6	0	3	88		0				0	5		2	0	151	0	0	0	0
5:50 PM		43	5	0	2	69		0				0	10		1	0	130	0	0	0	0
5:55 PM		34	6	0	1	70		0				0	12		2	0	125	0	1	0	0
Total Survey		1,206	136	0	62	2,086		3				0	242		45	0	3,777	13	1	1	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		145	22	0	7	248		1				0	31		7	0	460	3	0	0	0
4:15 PM		156	13	0	10	267		2				0	30		5	0	481	3	0	0	0
4:30 PM		164	21	0	6	274		0				0	28		6	0	499	0	0	0	0
4:45 PM		165	19	0	5	275		0				0	29		4	0	497	5	0	0	0
5:00 PM		158	12	0	9	275		0				0	26		5	0	485	0	0	0	0
5:15 PM		142	13	0	9	266		0				0	35		5	0	470	1	0	0	0
5:30 PM		152	19	0	10	254		0				0	36		8	0	479	1	0	1	0
5:45 PM		124	17	0	6	227		0				0	27		5	0	406	0	1	0	0
Total Survey		1,206	136	0	62	2,086		3				0	242		45	0	3,777	13	1	1	0

Peak Hour Summary
4:15 PM to 5:15 PM

By Approach	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	708	1,204	1,912	0	1,121	663	1,784	2	0	0	0	0	133	95	228	0	1,962	8	0	0	0
%HV	2.4%				1.2%				0.0%				0.8%				1.6%				
PHF	0.96				0.97				0.00				0.81				0.98				

By Movement	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		643	65	708	30	1,091		1,121				0	113		20	133	1,962
%HV	NA	2.5%	1.5%	2.4%	3.3%	1.2%	NA	1.2%	NA	NA	NA	0.0%	0.9%	NA	0.0%	0.8%	1.6%
PHF		0.97	0.77	0.96	0.75	0.97		0.97				0.00	0.81		0.83	0.81	0.98

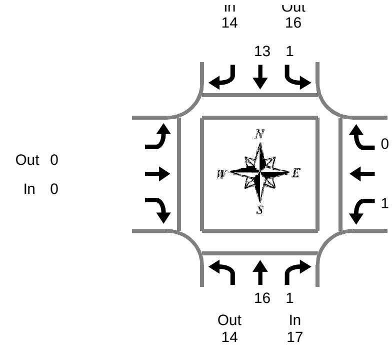
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
		T	R	Bikes	L	T		Bikes				Bikes	L		R	Bikes		North	South	East	West
4:00 PM		630	75	0	28	1,064		3				0	118		22	0	1,937	11	0	0	0
4:15 PM		643	65	0	30	1,091		2				0	113		20	0	1,962	8	0	0	0
4:30 PM		629	65	0	29	1,090		0				0	118		20	0	1,951	6	0	0	0
4:45 PM		617	63	0	33	1,070		0				0	126		22	0	1,931	7	0	1	0
5:00 PM		576	61	0	34	1,022		0				0	124		23	0	1,840	2	1	1	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:15 PM to 5:15 PM

Hwy 43 & Cedar Oak Dr

Tuesday, July 31, 2018
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		0	0	0	0	2		2				0	0		0	0	2
4:05 PM		0	0	0	0	3		3				0	0		0	0	3
4:10 PM		0	0	0	0	2		2				0	0		0	0	2
4:15 PM		2	0	2	0	3		3				0	0		0	0	5
4:20 PM		0	1	1	0	0		0				0	0		0	0	1
4:25 PM		1	0	1	0	0		0				0	1		0	1	2
4:30 PM		0	0	0	0	2		2				0	0		0	0	2
4:35 PM		3	0	3	0	1		1				0	0		0	0	4
4:40 PM		1	0	1	0	1		1				0	0		0	0	2
4:45 PM		1	0	1	0	2		2				0	0		0	0	3
4:50 PM		1	0	1	0	2		2				0	0		0	0	3
4:55 PM		3	0	3	0	0		0				0	0		0	0	3
5:00 PM		0	0	0	0	1		1				0	0		0	0	1
5:05 PM		3	0	3	1	0		1				0	0		0	0	4
5:10 PM		1	0	1	0	1		1				0	0		0	0	2
5:15 PM		1	0	1	0	1		1				0	0		0	0	2
5:20 PM		0	0	0	0	0		0				0	0		0	0	0
5:25 PM		1	0	1	0	0		0				0	0		0	0	1
5:30 PM		1	0	1	0	2		2				0	1		0	1	4
5:35 PM		0	0	0	0	3		3				0	0		1	1	4
5:40 PM		0	1	1	0	0		0				0	0		0	0	1
5:45 PM		1	0	1	0	0		0				0	0		0	0	1
5:50 PM		0	1	1	0	1		1				0	0		0	0	2
5:55 PM		2	0	2	0	2		2				0	0		0	0	4
Total Survey		22	3	25	1	29		30				0	2		1	3	58

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		0	0	0	0	7		7				0	0		0	0	7
4:15 PM		3	1	4	0	3		3				0	1		0	1	8
4:30 PM		4	0	4	0	4		4				0	0		0	0	8
4:45 PM		5	0	5	0	4		4				0	0		0	0	9
5:00 PM		4	0	4	1	2		3				0	0		0	0	7
5:15 PM		2	0	2	0	1		1				0	0		0	0	3
5:30 PM		1	1	2	0	5		5				0	1		1	2	9
5:45 PM		3	1	4	0	3		3				0	0		0	0	7
Total Survey		22	3	25	1	29		30				0	2		1	3	58

Heavy Vehicle Peak Hour Summary
4:15 PM to 5:15 PM

By Approach	Northbound Hwy 43			Southbound Hwy 43			Eastbound Cedar Oak Dr			Westbound Cedar Oak Dr			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	17	14	31	14	16	30	0	0	0	1	2	3	32
PHF	0.71			0.70			0.00			0.25			0.89

By Movement	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		16	1	17	1	13		14				0	1		0	1	32
PHF		0.67	0.25	0.71	0.25	0.65		0.70				0.00	0.25		0.00	0.25	0.89

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Hwy 43				Southbound Hwy 43				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
		T	R	Total	L	T		Total				Total	L		R	Total	
4:00 PM		12	1	13	0	18		18				0	1		0	1	32
4:15 PM		16	1	17	1	13		14				0	1		0	1	32
4:30 PM		15	0	15	1	11		12				0	0		0	0	27
4:45 PM		12	1	13	1	12		13				0	1		1	2	28
5:00 PM		10	2	12	1	11		12				0	1		1	2	26

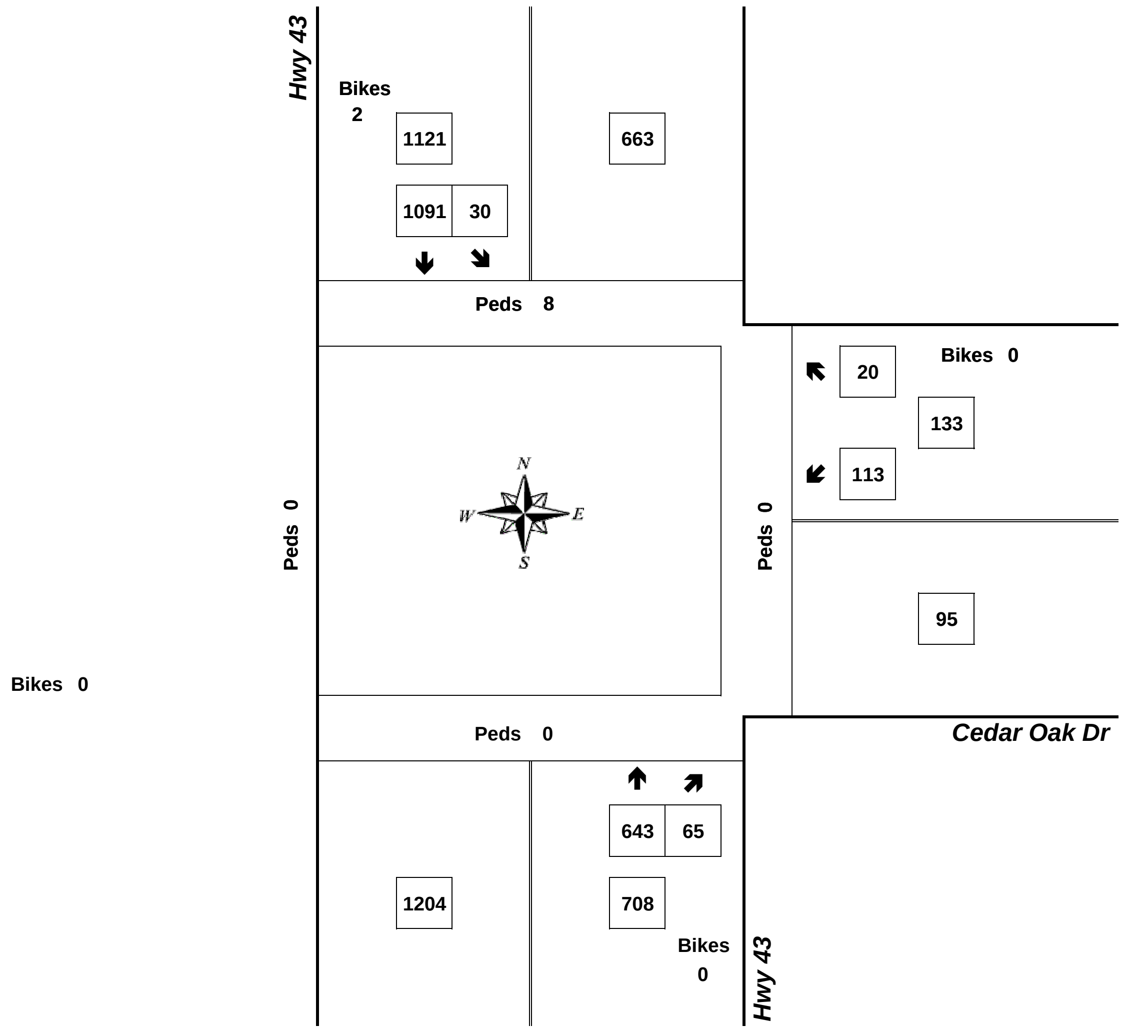
Peak Hour Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740

Hwy 43 & Cedar Oak Dr

4:15 PM to 5:15 PM
Tuesday, July 31, 2018

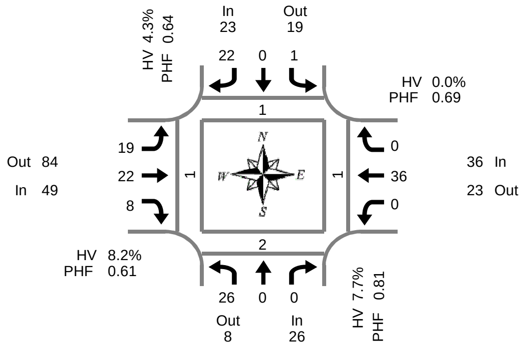


Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.81	0.8%	133
NB	0.96	2.4%	708
SB	0.97	1.2%	1,121
Intersection	0.98	1.6%	1,962

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:10 AM to 8:10 AM

Old River Rd & Cedar Oak Dr

Wednesday, August 01, 2018
7:00 AM to 9:00 AM

5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval	Pedestrians Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
7:00 AM	2	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	6	0	0	0	0
7:05 AM	2	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	5	0	0	0	0
7:10 AM	4	0	0	0	0	0	1	0	3	0	1	0	0	2	0	0	11	1	0	0	0
7:15 AM	1	0	0	0	0	0	3	0	0	1	0	0	0	5	0	0	10	0	1	1	0
7:20 AM	3	0	0	0	0	0	1	0	3	2	1	0	0	2	0	0	12	0	0	0	0
7:25 AM	2	0	0	0	0	0	0	1	2	0	1	0	0	0	0	0	5	0	1	0	0
7:30 AM	1	0	0	0	0	0	3	0	2	0	3	0	0	3	0	0	12	0	0	0	0
7:35 AM	4	0	0	1	0	0	5	0	1	0	0	0	0	2	0	0	12	0	0	0	1
7:40 AM	2	0	0	0	0	0	1	0	1	1	0	0	0	3	0	0	8	0	0	0	0
7:45 AM	0	0	0	0	0	0	2	0	1	2	0	0	0	5	0	0	10	0	0	0	0
7:50 AM	3	0	0	0	1	0	2	0	3	1	0	0	0	5	0	0	15	0	0	0	0
7:55 AM	2	0	0	0	0	0	1	0	0	3	0	0	0	3	0	0	9	0	0	0	0
8:00 AM	3	0	0	0	0	0	1	0	3	5	0	0	0	2	0	0	14	0	0	0	0
8:05 AM	1	0	0	0	0	0	2	0	0	7	2	0	0	4	0	0	16	0	0	0	0
8:10 AM	1	0	0	0	0	0	1	0	2	3	0	0	0	2	0	0	9	0	3	0	0
8:15 AM	2	0	0	0	0	0	0	0	3	1	0	0	0	2	0	0	8	0	2	0	0
8:20 AM	0	0	0	1	0	0	2	1	0	2	0	0	0	2	0	0	6	0	2	1	2
8:25 AM	4	0	0	0	0	0	1	0	0	1	0	0	0	2	0	0	8	0	0	0	0
8:30 AM	3	1	0	1	0	0	5	0	0	0	1	0	0	3	0	0	13	0	0	1	0
8:35 AM	1	0	0	0	0	0	2	0	1	1	0	0	0	1	0	0	6	0	0	2	0
8:40 AM	0	0	0	0	0	0	4	0	3	0	2	0	0	6	0	0	15	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	0	0	3	3	0	0	3	0	0	10	0	0	0	0
8:50 AM	3	0	0	0	0	0	1	0	1	0	0	0	0	4	0	0	9	0	1	0	0
8:55 AM	2	0	0	0	0	0	0	0	1	1	0	0	0	4	0	0	8	0	0	0	0
Total Survey	46	1	0	3	2	0	41	2	33	34	15	0	0	65	0	0	237	1	10	5	3

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval	Pedestrians Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
7:00 AM	8	0	0	0	1	0	3	0	6	0	2	0	0	2	0	0	22	1	0	0	0
7:15 AM	6	0	0	0	0	0	4	1	5	3	2	0	0	7	0	0	27	0	2	1	0
7:30 AM	7	0	0	1	0	0	9	0	4	1	3	0	0	8	0	0	32	0	0	0	1
7:45 AM	5	0	0	0	1	0	5	0	4	6	0	0	0	13	0	0	34	0	0	0	0
8:00 AM	5	0	0	0	0	0	4	0	5	15	2	0	0	8	0	0	39	0	3	0	0
8:15 AM	6	0	0	1	0	0	3	1	3	4	0	0	0	6	0	0	22	0	4	1	2
8:30 AM	4	1	0	1	0	0	11	0	4	1	3	0	0	10	0	0	34	0	0	3	0
8:45 AM	5	0	0	0	0	0	2	0	2	4	3	0	0	11	0	0	27	0	1	0	0
Total Survey	46	1	0	3	2	0	41	2	33	34	15	0	0	65	0	0	237	1	10	5	3

Peak Hour Summary
7:10 AM to 8:10 AM

By Approach	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	26	8	34	1	23	19	42	1	49	84	133	0	36	23	59	0	134
%HV	7.7%				4.3%				8.2%				0.0%				5.2%
PHF	0.81				0.64				0.61				0.69				0.86

Pedestrians Crosswalk			
North	South	East	West
1	2	1	1

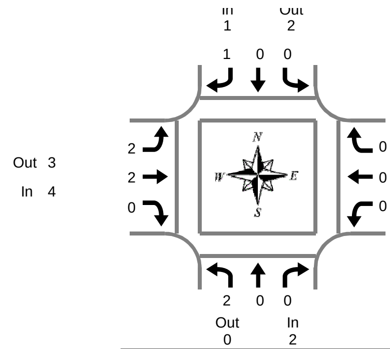
By Movement	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	26	0	0	26	1	0	22	23	19	22	8	49	0	36	0	36	134
%HV	7.7%	0.0%	0.0%	7.7%	0.0%	0.0%	4.5%	4.3%	10.5%	9.1%	0.0%	8.2%	0.0%	0.0%	0.0%	0.0%	5.2%
PHF	0.81	0.00	0.00	0.81	0.25	0.00	0.61	0.64	0.68	0.37	0.40	0.61	0.00	0.69	0.00	0.69	0.86

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval	Pedestrians Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
7:00 AM	26	0	0	1	2	0	21	1	19	10	7	0	0	30	0	0	115	1	2	1	1
7:15 AM	23	0	0	1	1	0	22	1	18	25	7	0	0	36	0	0	132	0	5	1	1
7:30 AM	23	0	0	2	1	0	21	1	16	26	5	0	0	35	0	0	127	0	7	1	3
7:45 AM	20	1	0	2	1	0	23	1	16	26	5	0	0	37	0	0	129	0	7	4	2
8:00 AM	20	1	0	2	0	0	20	1	14	24	8	0	0	35	0	0	122	0	8	4	2

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
7:10 AM to 8:10 AM

Old River Rd & Cedar Oak Dr

Wednesday, August 01, 2018
7:00 AM to 9:00 AM

Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:05 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
7:10 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
7:20 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:25 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
7:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:40 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:50 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
7:55 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
8:05 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
8:10 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:20 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:25 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
8:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:40 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:50 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:55 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	0	0	3	0	0	2	2	3	3	0	6	0	1	0	1	12

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	2
7:15 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
7:30 AM	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	1	4
8:15 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	0	0	3	0	0	2	2	3	3	0	6	0	1	0	1	12

Heavy Vehicle Peak Hour Summary
7:10 AM to 8:10 AM

By Approach	Northbound Old River Rd			Southbound Old River Rd			Eastbound Cedar Oak Dr			Westbound Cedar Oak Dr			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	2	0	2	1	2	3	4	3	7	0	2	2	7
PHF	0.50			0.25			0.50			0.00			0.88

By Movement	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	2	0	0	2	0	0	1	1	2	2	0	4	0	0	0	0	7
PHF	0.50	0.00	0.00	0.50	0.00	0.00	0.25	0.25	0.50	0.25	0.00	0.50	0.00	0.00	0.00	0.00	0.88

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	2	0	0	2	0	0	1	1	3	0	0	3	0	0	0	0	6
7:15 AM	1	0	0	1	0	0	1	1	2	3	0	5	0	1	0	1	8
7:30 AM	2	0	0	2	0	0	0	0	2	3	0	5	0	1	0	1	8
7:45 AM	1	0	0	1	0	0	1	1	1	3	0	4	0	1	0	1	7
8:00 AM	1	0	0	1	0	0	1	1	0	3	0	3	0	1	0	1	6

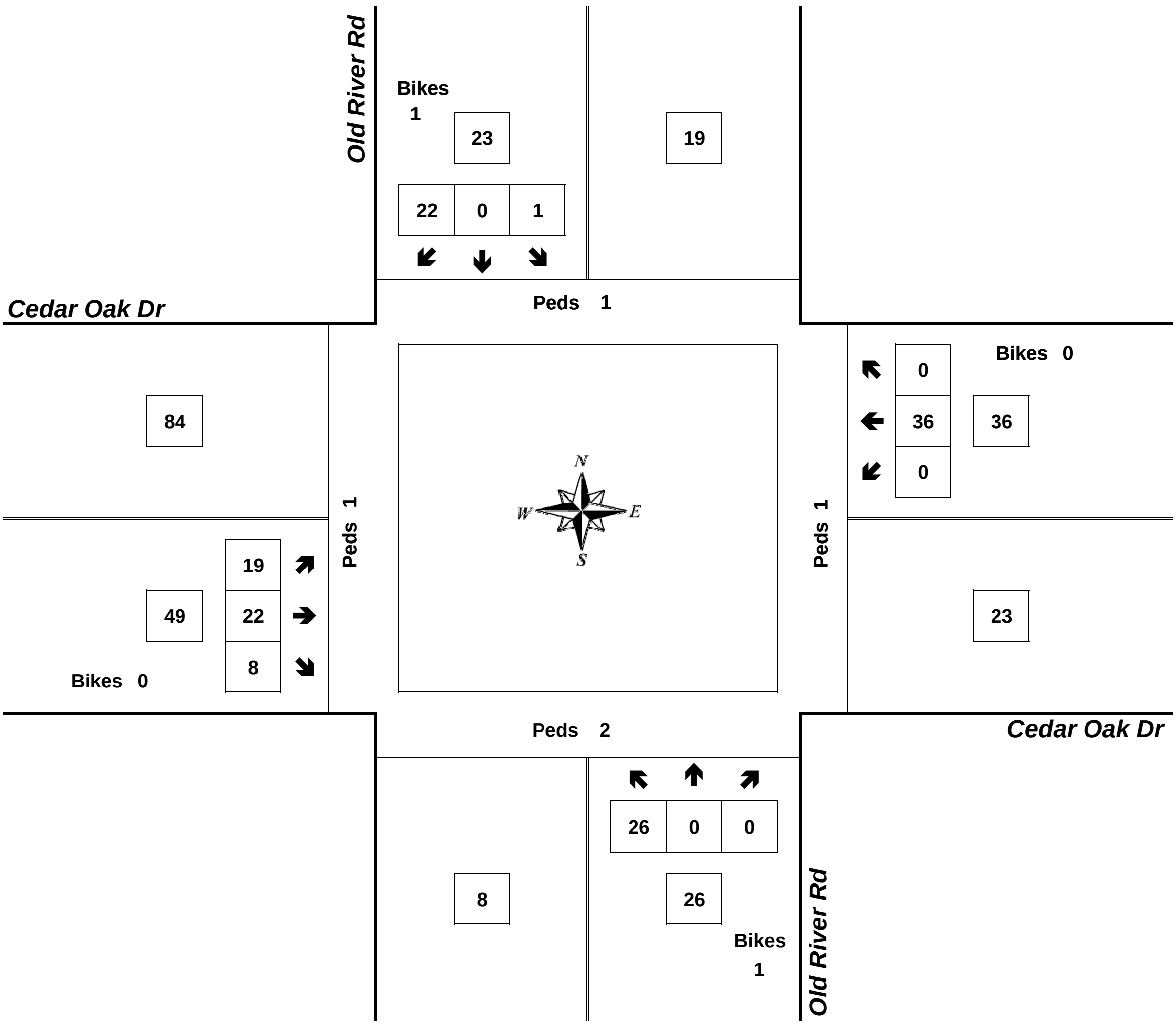
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Old River Rd & Cedar Oak Dr

7:10 AM to 8:10 AM
Wednesday, August 01, 2018

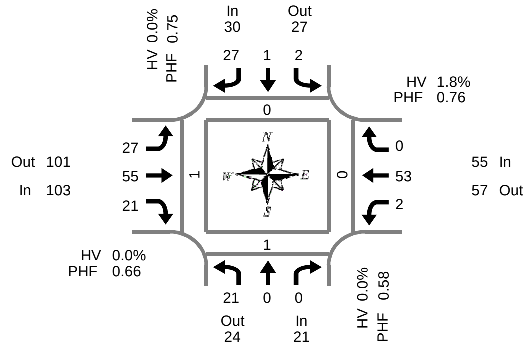


Approach	PHF	HV%	Volume
EB	0.61	8.2%	49
WB	0.69	0.0%	36
NB	0.81	7.7%	26
SB	0.64	4.3%	23
Intersection	0.86	5.2%	134

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
2:45 PM to 3:45 PM

Old River Rd & Cedar Oak Dr

Tuesday, July 31, 2018
2:00 PM to 4:00 PM

5-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
2:00 PM	1	0	0	0	0	0	1	0	1	4	0	0	0	4	0	0	11	0	2	0	0
2:05 PM	1	0	0	0	0	1	5	0	1	2	1	0	0	3	0	0	14	0	1	0	0
2:10 PM	0	0	0	0	0	0	2	0	1	2	2	0	0	3	0	0	10	0	0	0	0
2:15 PM	1	0	0	0	0	0	3	0	3	3	0	0	0	0	0	0	10	0	0	0	0
2:20 PM	1	0	0	0	0	0	2	1	1	5	2	0	0	6	1	0	18	0	0	0	0
2:25 PM	1	0	0	0	0	0	4	0	1	3	3	0	0	4	0	0	16	0	0	0	0
2:30 PM	1	0	1	0	0	0	1	0	4	3	4	0	0	5	0	0	19	0	0	0	0
2:35 PM	1	0	0	0	0	0	4	0	1	0	1	0	0	3	0	0	10	0	0	0	0
2:40 PM	4	0	0	0	1	0	4	0	1	3	2	0	0	3	0	0	18	0	0	0	0
2:45 PM	1	0	0	0	0	0	1	0	1	5	1	0	0	5	0	0	14	0	0	0	0
2:50 PM	1	0	0	0	0	0	2	0	0	3	0	0	1	4	0	0	11	0	0	0	0
2:55 PM	1	0	0	0	0	0	4	0	3	6	3	0	1	7	0	0	25	0	1	0	0
3:00 PM	3	0	0	0	0	0	0	0	1	5	0	0	0	4	0	0	13	0	0	0	0
3:05 PM	2	0	0	0	0	1	2	0	5	5	3	0	0	5	0	0	23	0	0	0	1
3:10 PM	1	0	0	0	0	0	3	0	0	1	3	0	0	6	0	0	14	0	0	0	0
3:15 PM	3	0	0	0	0	0	3	0	1	5	1	0	0	4	0	0	17	0	0	0	0
3:20 PM	2	0	0	0	0	0	3	0	2	4	0	0	0	4	0	0	15	0	0	0	0
3:25 PM	4	0	0	0	0	0	4	0	2	3	1	0	0	4	0	0	18	0	0	0	0
3:30 PM	0	0	0	0	1	0	1	0	5	7	5	0	0	0	0	0	19	0	0	0	0
3:35 PM	1	0	0	0	0	0	2	1	4	8	1	0	0	4	0	0	20	0	0	0	0
3:40 PM	2	0	0	0	1	0	2	0	3	3	3	0	0	6	0	0	20	0	0	0	0
3:45 PM	2	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	5	0	0	0	0
3:50 PM	2	0	0	0	0	1	2	0	1	4	0	0	0	2	0	0	12	0	0	2	0
3:55 PM	2	0	0	0	0	0	1	0	1	6	6	1	0	3	0	0	19	0	0	0	0
Total Survey	38	0	1	0	3	3	57	2	44	90	43	1	2	89	1	0	371	0	4	2	1

15-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
2:00 PM	2	0	0	0	0	1	8	0	3	8	3	0	0	10	0	0	35	0	3	0	0
2:15 PM	3	0	0	0	0	0	9	1	5	11	5	0	0	10	1	0	44	0	0	0	0
2:30 PM	6	0	1	0	1	0	9	0	6	6	7	0	0	11	0	0	47	0	0	0	0
2:45 PM	3	0	0	0	0	0	7	0	4	14	4	0	2	16	0	0	50	0	1	0	0
3:00 PM	6	0	0	0	0	1	5	0	6	11	6	0	0	15	0	0	50	0	0	0	1
3:15 PM	9	0	0	0	0	0	10	0	5	12	2	0	0	12	0	0	50	0	0	0	0
3:30 PM	3	0	0	0	2	0	5	1	12	18	9	0	0	10	0	0	59	0	0	0	0
3:45 PM	6	0	0	0	0	1	4	0	3	10	7	1	0	5	0	0	36	0	0	2	0
Total Survey	38	0	1	0	3	3	57	2	44	90	43	1	2	89	1	0	371	0	4	2	1

Peak Hour Summary
2:45 PM to 3:45 PM

By Approach	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	21	24	45	0	30	27	57	1	103	101	204	0	55	57	112	0	209	0	1	0	1
%HV	0.0%				0.0%				0.0%				1.8%				0.5%				
PHF	0.58				0.75				0.66				0.76				0.86				

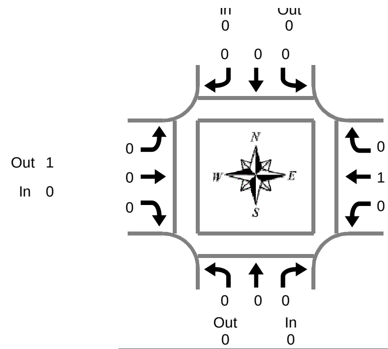
By Movement	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	21	0	0	21	2	1	27	30	27	55	21	103	2	53	0	55	209
%HV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	1.8%	0.5%
PHF	0.58	0.00	0.00	0.58	0.25	0.25	0.68	0.75	0.56	0.76	0.58	0.66	0.25	0.83	0.00	0.76	0.86

Rolling Hour Summary
2:00 PM to 4:00 PM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
2:00 PM	14	0	1	0	1	1	33	1	18	39	19	0	2	47	1	0	176	0	4	0	0
2:15 PM	18	0	1	0	1	1	30	1	21	42	22	0	2	52	1	0	191	0	1	0	1
2:30 PM	24	0	1	0	1	1	31	0	21	43	19	0	2	54	0	0	197	0	1	0	1
2:45 PM	21	0	0	0	2	1	27	1	27	55	21	0	2	53	0	0	209	0	1	0	1
3:00 PM	24	0	0	0	2	2	24	1	26	51	24	1	0	42	0	0	195	0	0	2	1

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
2:45 PM to 3:45 PM

Old River Rd & Cedar Oak Dr

Tuesday, July 31, 2018
2:00 PM to 4:00 PM

Heavy Vehicle 5-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
2:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
2:05 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
2:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:55 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
Total Survey	0	0	0	0	0	1	0	1	0	1	1	2	0	2	0	2	5

Heavy Vehicle 15-Minute Interval Summary
2:00 PM to 4:00 PM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
2:00 PM	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	2
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
Total Survey	0	0	0	0	0	1	0	1	0	1	1	2	0	2	0	2	5

Heavy Vehicle Peak Hour Summary
2:45 PM to 3:45 PM

By Approach	Northbound Old River Rd			Southbound Old River Rd			Eastbound Cedar Oak Dr			Westbound Cedar Oak Dr			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	0	0	0	0	0	0	1	1	1	0	1	1
PHF	0.00			0.00			0.00			0.25			0.25

By Movement	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
PHF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.25

Heavy Vehicle Rolling Hour Summary
2:00 PM to 4:00 PM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	Total
2:00 PM	0	0	0	0	0	1	0	1	0	1	0	1	0	2	0	2	4
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
3:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1

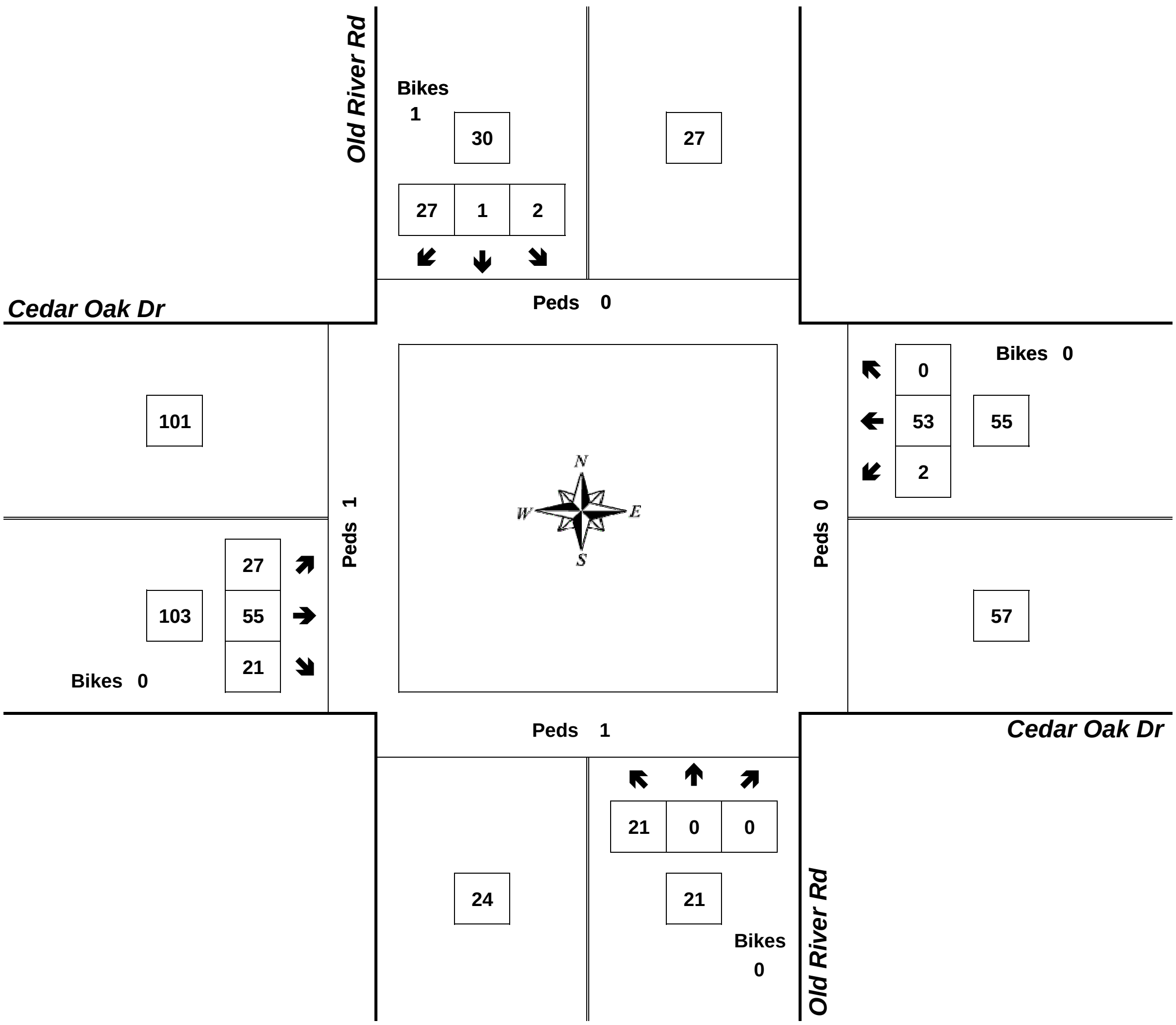
Peak Hour Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740

Old River Rd & Cedar Oak Dr

2:45 PM to 3:45 PM
Tuesday, July 31, 2018



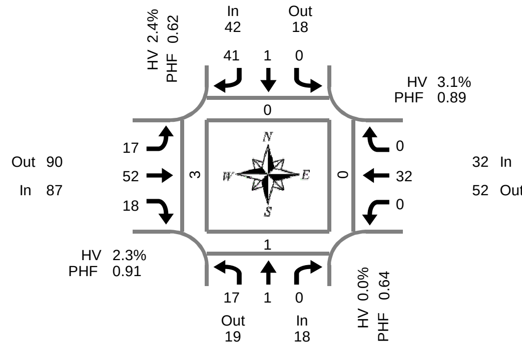
Approach	PHF	HV%	Volume
EB	0.66	0.0%	103
WB	0.76	1.8%	55
NB	0.58	0.0%	21
SB	0.75	0.0%	30
Intersection	0.86	0.5%	209

Count Period: 2:00 PM to 4:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:45 PM to 5:45 PM

Old River Rd & Cedar Oak Dr

Tuesday, July 31, 2018
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval	Pedestrians Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
4:00 PM	0	0	0	0	0	1	5	0	2	12	5	0	0	3	0	0	28	0	0	0	0
4:05 PM	2	0	0	0	0	1	1	0	1	2	0	0	0	2	0	0	9	0	0	0	0
4:10 PM	0	0	1	0	0	0	1	0	2	3	4	0	0	4	0	0	15	0	0	0	0
4:15 PM	2	1	0	0	1	0	4	0	1	1	1	0	0	3	0	0	14	0	0	0	0
4:20 PM	0	0	0	0	0	0	2	0	1	3	3	0	0	3	0	0	12	0	0	0	0
4:25 PM	0	0	0	0	0	1	0	0	0	5	2	0	0	2	0	0	10	0	0	0	0
4:30 PM	1	0	0	0	0	0	5	0	1	3	3	0	0	3	0	0	16	0	0	0	1
4:35 PM	0	1	0	0	1	0	6	0	3	1	1	0	0	2	0	0	15	0	0	0	0
4:40 PM	1	0	0	0	0	0	1	0	0	7	0	0	0	5	0	0	14	0	0	0	0
4:45 PM	2	0	0	0	0	0	4	0	3	3	2	0	0	3	0	0	17	0	0	0	0
4:50 PM	0	0	0	0	0	0	2	0	1	4	3	0	0	3	0	0	13	0	0	0	0
4:55 PM	2	1	0	0	0	0	2	0	0	6	2	0	0	1	0	0	14	0	0	0	0
5:00 PM	0	0	0	0	0	0	4	0	3	1	0	0	0	2	0	0	10	0	0	0	1
5:05 PM	3	0	0	2	0	0	1	0	0	4	1	0	0	4	0	0	13	0	0	0	0
5:10 PM	1	0	0	0	0	0	5	0	0	4	5	0	0	3	0	0	18	0	0	0	0
5:15 PM	1	0	0	0	0	0	4	0	1	4	0	0	0	1	0	0	11	0	0	0	0
5:20 PM	1	0	0	0	0	0	1	0	1	3	3	0	0	4	0	0	13	0	0	0	0
5:25 PM	5	0	0	0	0	0	4	0	3	6	1	0	0	2	0	0	21	0	0	0	1
5:30 PM	0	0	0	0	0	0	8	0	2	2	0	0	0	3	0	0	15	0	0	0	1
5:35 PM	2	0	0	0	0	1	4	0	2	6	1	0	0	3	0	0	19	0	0	0	0
5:40 PM	0	0	0	0	0	0	2	0	1	9	0	0	0	3	0	0	15	0	1	0	0
5:45 PM	1	0	0	0	0	0	3	0	2	2	1	0	0	2	0	0	11	0	0	0	0
5:50 PM	1	0	0	0	0	0	2	0	1	4	1	0	0	3	0	0	12	1	0	1	0
5:55 PM	1	0	0	0	0	0	2	1	0	6	1	0	0	7	0	0	17	0	0	0	0
Total Survey	26	3	1	2	2	4	73	1	31	101	40	0	0	71	0	0	352	1	1	1	4

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval	Pedestrians Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
4:00 PM	2	0	1	0	0	2	7	0	5	17	9	0	0	9	0	0	52	0	0	0	0
4:15 PM	2	1	0	0	1	1	6	0	2	9	6	0	0	8	0	0	36	0	0	0	0
4:30 PM	2	1	0	0	1	0	12	0	4	11	4	0	0	10	0	0	45	0	0	0	1
4:45 PM	4	1	0	0	0	0	8	0	4	13	7	0	0	7	0	0	44	0	0	0	0
5:00 PM	4	0	0	2	0	0	10	0	3	9	6	0	0	9	0	0	41	0	0	0	1
5:15 PM	7	0	0	0	0	0	9	0	5	13	4	0	0	7	0	0	45	0	0	0	1
5:30 PM	2	0	0	0	0	1	14	0	5	17	1	0	0	9	0	0	49	0	1	0	1
5:45 PM	3	0	0	0	0	0	7	1	3	12	3	0	0	12	0	0	40	1	0	1	0
Total Survey	26	3	1	2	2	4	73	1	31	101	40	0	0	71	0	0	352	1	1	1	4

Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	18	19	37	2	42	18	60	0	87	90	177	0	32	52	84	0	179
%HV	0.0%				2.4%				2.3%				3.1%				2.2%
PHF	0.64				0.62				0.91				0.89				0.81

Pedestrians Crosswalk			
North	South	East	West
0	1	0	3

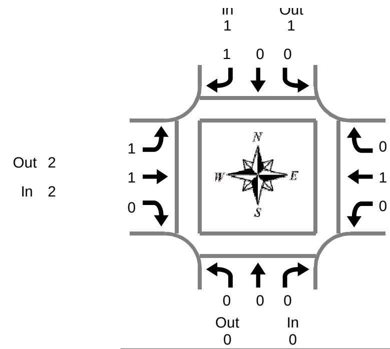
By Movement	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	17	1	0	18	0	1	41	42	17	52	18	87	0	32	0	32	179
%HV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	2.4%	5.9%	1.9%	0.0%	2.3%	0.0%	3.1%	0.0%	3.1%	2.2%
PHF	0.61	0.25	0.00	0.64	0.00	0.25	0.64	0.62	0.61	0.76	0.56	0.91	0.00	0.89	0.00	0.89	0.81

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval	Pedestrians Crosswalk			
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	Total	North	South	East	West
4:00 PM	10	3	1	0	2	3	33	0	15	50	26	0	0	34	0	0	177	0	0	0	1
4:15 PM	12	3	0	2	2	1	36	0	13	42	23	0	0	34	0	0	166	0	0	0	2
4:30 PM	17	2	0	2	1	0	39	0	16	46	21	0	0	33	0	0	175	0	0	0	3
4:45 PM	17	1	0	2	0	1	41	0	17	52	18	0	0	32	0	0	179	0	1	0	3
5:00 PM	16	0	0	2	0	1	40	1	16	51	14	0	0	37	0	0	175	1	1	1	3

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
4:45 PM to 5:45 PM

Old River Rd & Cedar Oak Dr

Tuesday, July 31, 2018
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:20 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
4:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:05 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	1	0	1	0	0	1	1	1	2	1	4	0	1	0	1	7

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Survey	0	1	0	1	0	0	1	1	1	2	1	4	0	1	0	1	7

Heavy Vehicle Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound Old River Rd			Southbound Old River Rd			Eastbound Cedar Oak Dr			Westbound Cedar Oak Dr			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	0	0	1	1	2	2	2	4	1	1	2	4
PHF	0.00			0.25			0.50			0.25			0.50

By Movement	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	0	0	1	1	1	1	0	2	0	1	0	1	4
PHF	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.25	0.00	0.50	0.00	0.25	0.00	0.25	0.50

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

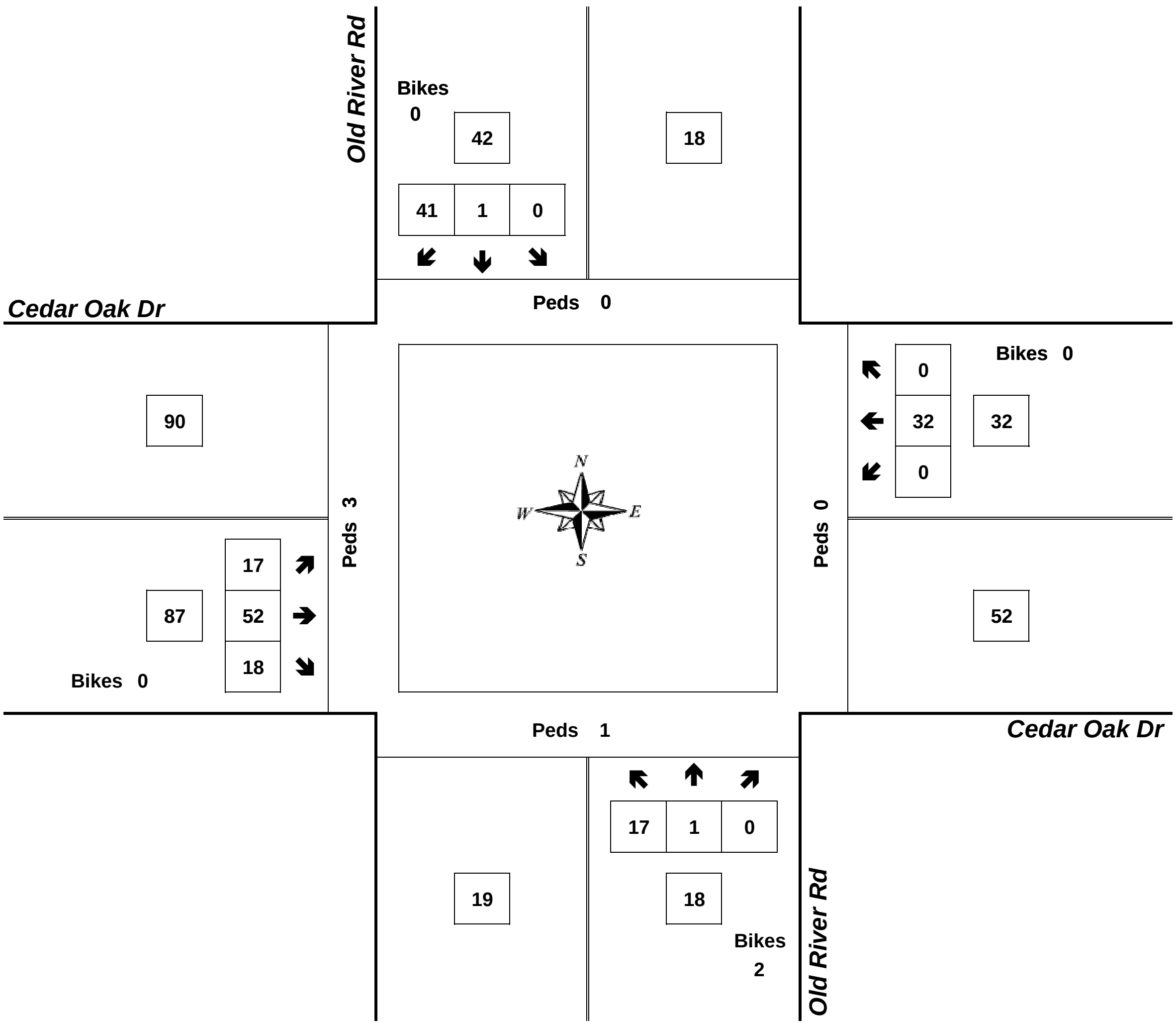
Interval Start Time	Northbound Old River Rd				Southbound Old River Rd				Eastbound Cedar Oak Dr				Westbound Cedar Oak Dr				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	1	0	1	0	0	1	1	0	0	1	1	0	0	0	0	3
4:15 PM	0	1	0	1	0	0	1	1	0	1	1	2	0	0	0	0	4
4:30 PM	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	1	1	1	1	0	2	0	1	0	1	4
5:00 PM	0	0	0	0	0	0	0	0	1	2	0	3	0	1	0	1	4

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Old River Rd & Cedar Oak Dr

4:45 PM to 5:45 PM
Tuesday, July 31, 2018



Approach	PHF	HV%	Volume
EB	0.91	2.3%	87
WB	0.89	3.1%	32
NB	0.64	0.0%	18
SB	0.62	2.4%	42
Intersection	0.81	2.2%	179

Count Period: 4:00 PM to 6:00 PM

SEASONAL TREND TABLE (Updated: 8/1/2018)

TREND	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	1-Jul	15-Jul	1-Aug	15-Aug	1-Sep	15-Sep	1-Oct	15-Oct	1-Nov	15-Nov	1-Dec	15-Dec	Seasonal Trend Peak Period Factor	Seasonal Trend K30 Value
INTERSTATE URBANIZED	1.1818	1.1788	1.0976	1.0164	0.9998	0.9832	0.9657	0.9482	0.9460	0.9439	0.9240	0.9042	0.9115	0.9189	0.9374	0.9558	0.9558	0.9557	0.9535	0.9512	0.9625	0.9738	0.9924	1.0109	0.9042	0.0817
INTERSTATE NONURBANIZED	1.4606	1.6394	1.4676	1.2958	1.1933	1.0909	1.0645	1.0382	1.0025	0.9667	0.9201	0.8735	0.8557	0.8379	0.8295	0.8211	0.9545	1.0880	1.0500	1.0120	1.0458	1.0796	1.1313	1.1830	0.8211	0.1213
COMMUTER	1.1573	1.1317	1.0654	0.9990	0.9841	0.9691	0.9491	0.9292	0.9207	0.9123	0.9016	0.8910	0.9014	0.9119	0.9020	0.8921	0.9074	0.9228	0.9193	0.9158	0.9372	0.9586	0.9845	1.0104	0.8910	0.0974
COASTAL DESTINATION	1.2740	1.3193	1.2641	1.2090	1.1609	1.1128	1.1031	1.0934	1.0569	1.0205	0.9791	0.9377	0.8842	0.8306	0.8299	0.8293	0.8775	0.9257	0.9810	1.0363	1.1041	1.1718	1.1809	1.1900	0.8293	0.1192
COASTAL DESTINATION ROUTE	1.5060	1.6791	1.5657	1.4522	1.3599	1.2675	1.2537	1.2400	1.1531	1.0662	1.0030	0.9399	0.8492	0.7584	0.7570	0.7556	0.8301	0.9045	1.0155	1.1265	1.2128	1.2992	1.3215	1.3438	0.7556	0.1609
AGRICULTURE	1.7076	1.8032	1.6535	1.5038	1.3802	1.2567	1.1986	1.1404	1.1072	1.0740	0.9827	0.8915	0.8529	0.8142	0.7179	0.6215	0.7163	0.8110	0.8614	0.9116	1.0105	1.1093	1.2415	1.3737	0.6215	0.2229
RECREATIONAL SUMMER	1.7585	2.2489	2.0847	1.9205	1.7358	1.5512	1.4576	1.3641	1.1766	0.9892	0.9061	0.8230	0.7650	0.7071	0.7124	0.7177	0.9130	1.1082	1.4413	1.7744	1.6928	1.6112	1.6401	1.6690	0.7071	0.2037
RECREATIONAL SUMMER WINTER	1.2477	1.5073	1.5669	1.6264	1.6218	1.6172	1.7108	1.8044	1.5925	1.3807	1.2325	1.0844	0.9631	0.8419	0.8674	0.8929	0.9274	0.9619	1.3267	1.6914	1.9522	2.2130	1.6835	1.1541	0.8419	0.2052
RECREATIONAL WINTER	0.8268	1.0474	1.1721	1.2968	1.3685	1.4402	1.8693	2.2984	2.2161	2.1339	1.7818	1.4298	1.2481	1.0665	1.0903	1.1142	0.8813	0.6484	1.2488	1.8493	2.5945	3.3398	2.1613	0.9828	0.6484	0.3092
SUMMER	1.3421	1.4546	1.3422	1.2298	1.1680	1.1061	1.0661	1.0261	0.9838	0.9415	0.9095	0.8774	0.8570	0.8366	0.8182	0.7997	0.8529	0.9060	0.9353	0.9645	1.0144	1.0643	1.1024	1.1406	0.7997	0.1216
SUMMER < 2500	1.3861	1.5332	1.4106	1.2881	1.1953	1.1025	1.0553	1.0080	0.9476	0.8871	0.8570	0.8268	0.8134	0.7999	0.7782	0.7565	0.8144	0.8723	0.8868	0.9013	0.9618	1.0223	1.0984	1.1745	0.7565	0.1485

***Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.**
***Grey shading indicates months were seasonal factor is greater than 30%**

HWY	MP	DIR	HS	Location	2014	2015	2016	2036	RSQ
003	0.02	1		0.02 mile south of US26		3000		4100	MODEL
003	0.22	1		0.02 mile west of S.W. Hood Avenue		4100		4800	MODEL
003	0.41	1		0.18 mile south of connection to Pacific Highway (I-5)		12000		15700	MODEL
003	0.43	2	N	0.06 mile south of S.W. Curry Street		27200		33100	MODEL
003	0.63	2	N	0.01 mile south of S.W. Thomas Street		14500		18600	MODEL
003	1.00	1		0.02 mile north of S.W. Julia Street		22300		27300	MODEL
003	2.15	1		0.05 mile north of S.W. Taylors Ferry Road		22400		25600	MODEL
003	2.54	1		0.05 mile north of Sellwood Ferry Road		30000		32300	MODEL
003	3.64	1		South city limits of Portland		17300		21400	MODEL
003	4.02	1		0.02 mile north of S.W. Riverwood Road		17000		21000	MODEL
003	5.69	1		0.02 mile north of Terwilliger Boulevard		16500		20000	MODEL
003	5.80	1		0.06 mile south of Terwilliger Boulevard		21400		26000	MODEL
003	6.11	1		0.02 mile north of S. "A" Avenue		20200		24800	MODEL
003	6.17	1		0.04 mile south of S. "A" Avenue		34100		41500	MODEL
003	6.40	1		0.02 mile south of North Shore Road		28500		34700	MODEL
003	6.65	1		0.05 mile north of S. McVey Avenue		27600		33800	MODEL
003	6.77	1		On Oswego Creek Bridge		17900		20500	MODEL
003	7.54	1		0.04 mile south of S. Glenmorrie Road		16800		19800	MODEL
003	8.04	1		South city limits of Lake Oswego, north city limits of West Linn, 0.03 mile north of S. Arbor Drive		15900		18800	MODEL
003	9.52	1		0.02 mile north of Jolie Pointe Road		17800		21500	MODEL
003	10.27	1		0.02 mile south of W. "A" Street		18500		22300	MODEL
003	11.07	1		0.10 mile north of East Portland Freeway (I-205)		20900		25600	MODEL
003	11.34	1		0.01 mile north of S. Willamette Falls Drive		13600		15600	MODEL
003	11.43	1		On Willamette River Bridge, south city limits of West Linn and north city limits of Oregon City		13100		16600	MODEL

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	37	17	339	971	48
Future Volume (vph)	76	37	17	339	971	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1505	1736	1827	1830	
Flt Permitted	0.75	1.00	0.12	1.00	1.00	
Satd. Flow (perm)	1376	1505	218	1827	1830	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	40	18	368	1055	52
RTOR Reduction (vph)	0	36	0	0	1	0
Lane Group Flow (vph)	83	4	18	368	1106	0
Confl. Peds. (#/hr)		8	4			4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	8	6			
Actuated Green, G (s)	9.3	9.3	72.9	72.9	66.3	
Effective Green, g (s)	9.3	9.3	72.9	72.9	66.3	
Actuated g/C Ratio	0.10	0.10	0.80	0.80	0.73	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	140	153	209	1460	1330	
v/s Ratio Prot			0.00	c0.20	c0.60	
v/s Ratio Perm	c0.06	0.00	0.07			
v/c Ratio	0.59	0.03	0.09	0.25	0.83	
Uniform Delay, d1	39.1	36.9	10.9	2.3	8.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.6	0.1	0.2	0.4	6.2	
Delay (s)	45.7	36.9	11.0	2.7	14.8	
Level of Service	D	D	B	A	B	
Approach Delay (s)	42.9			3.1	14.8	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	91.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	22	8	0	36	0	26	0	0	1	0	22
Future Vol, veh/h	19	22	8	0	36	0	26	0	0	1	0	22
Conflicting Peds, #/hr	1	0	2	2	0	1	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	0	0	0	8	8	8	4	4	4
Mvmt Flow	22	26	9	0	42	0	30	0	0	1	0	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	43	0	0	37	0	0	132	119	33	118	124	44
Stage 1	-	-	-	-	-	-	76	76	-	43	43	-
Stage 2	-	-	-	-	-	-	56	43	-	75	81	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.18	6.58	6.28	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Follow-up Hdwy	2.272	-	-	2.2	-	-	3.572	4.072	3.372	3.536	4.036	3.336
Pot Cap-1 Maneuver	1528	-	-	1587	-	-	826	760	1024	853	763	1020
Stage 1	-	-	-	-	-	-	918	820	-	966	855	-
Stage 2	-	-	-	-	-	-	941	847	-	929	824	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1527	-	-	1585	-	-	794	746	1021	842	749	1018
Mov Cap-2 Maneuver	-	-	-	-	-	-	794	746	-	842	749	-
Stage 1	-	-	-	-	-	-	903	806	-	951	854	-
Stage 2	-	-	-	-	-	-	916	846	-	914	810	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	0	9.7	8.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	794	1527	-	-	1585	-	-	1009
HCM Lane V/C Ratio	0.038	0.014	-	-	-	-	-	0.027
HCM Control Delay (s)	9.7	7.4	0	-	0	-	-	8.7
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	110	31	21	1050	635	91
Future Volume (vph)	110	31	21	1050	635	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1533	1736	1827	1808	
Flt Permitted	0.74	1.00	0.27	1.00	1.00	
Satd. Flow (perm)	1371	1533	486	1827	1808	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	117	33	22	1117	676	97
RTOR Reduction (vph)	0	29	0	0	4	0
Lane Group Flow (vph)	117	4	22	1117	769	0
Confl. Peds. (#/hr)		1	2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	8	6			
Actuated Green, G (s)	11.1	11.1	72.0	72.0	65.5	
Effective Green, g (s)	11.1	11.1	72.0	72.0	65.5	
Actuated g/C Ratio	0.12	0.12	0.78	0.78	0.71	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	165	184	407	1428	1285	
v/s Ratio Prot			0.00	c0.61	0.43	
v/s Ratio Perm	c0.09	0.00	0.04			
v/c Ratio	0.71	0.02	0.05	0.78	0.60	
Uniform Delay, d1	38.9	35.7	4.5	5.6	6.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.1	0.0	0.1	4.3	2.1	
Delay (s)	52.0	35.8	4.5	10.0	8.8	
Level of Service	D	D	A	A	A	
Approach Delay (s)	48.4			9.9	8.8	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	55	21	2	53	0	21	0	0	2	1	27
Future Vol, veh/h	27	55	21	2	53	0	21	0	0	2	1	27
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	2	2	2	0	0	0	0	0	0
Mvmt Flow	31	64	24	2	62	0	24	0	0	2	1	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	62	0	0	89	0	0	224	206	77	205	218	63
Stage 1	-	-	-	-	-	-	140	140	-	66	66	-
Stage 2	-	-	-	-	-	-	84	66	-	139	152	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1554	-	-	1506	-	-	736	694	990	757	684	1007
Stage 1	-	-	-	-	-	-	868	785	-	950	844	-
Stage 2	-	-	-	-	-	-	929	844	-	869	775	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1553	-	-	1506	-	-	699	678	989	744	668	1006
Mov Cap-2 Maneuver	-	-	-	-	-	-	699	678	-	744	668	-
Stage 1	-	-	-	-	-	-	849	768	-	930	843	-
Stage 2	-	-	-	-	-	-	897	843	-	851	758	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	0.3	10.3	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	699	1553	-	-	1506	-	-	967
HCM Lane V/C Ratio	0.035	0.02	-	-	0.002	-	-	0.036
HCM Control Delay (s)	10.3	7.4	0	-	7.4	0	-	8.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	113	20	30	1091	643	65
Future Volume (vph)	113	20	30	1091	643	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1535	1787	1881	1836	
Flt Permitted	0.74	1.00	0.29	1.00	1.00	
Satd. Flow (perm)	1386	1535	550	1881	1836	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	115	20	31	1113	656	66
RTOR Reduction (vph)	0	18	0	0	3	0
Lane Group Flow (vph)	115	2	31	1113	719	0
Confl. Peds. (#/hr)		8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	3	6			
Actuated Green, G (s)	11.0	11.0	72.5	72.5	66.0	
Effective Green, g (s)	11.0	11.0	72.5	72.5	66.0	
Actuated g/C Ratio	0.12	0.12	0.78	0.78	0.71	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	164	182	457	1474	1310	
v/s Ratio Prot			0.00	c0.59	0.39	
v/s Ratio Perm	c0.08	0.00	0.05			
v/c Ratio	0.70	0.01	0.07	0.76	0.55	
Uniform Delay, d1	39.2	36.0	4.0	5.3	6.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.7	0.0	0.1	3.6	1.7	
Delay (s)	51.9	36.0	4.0	8.9	7.9	
Level of Service	D	D	A	A	A	
Approach Delay (s)	49.5			8.8	7.9	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	52	18	0	32	0	17	1	0	0	1	41
Future Vol, veh/h	17	52	18	0	32	0	17	1	0	0	1	41
Conflicting Peds, #/hr	0	0	1	1	0	0	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	3	3	3	0	0	0	2	2	2
Mvmt Flow	21	64	22	0	40	0	21	1	0	0	1	51

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	40	0	0	87	0	0	186	158	76	158	169	43
Stage 1	-	-	-	-	-	-	118	118	-	40	40	-
Stage 2	-	-	-	-	-	-	68	40	-	118	129	-
Critical Hdwy	4.12	-	-	4.13	-	-	7.1	6.5	6.2	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.227	-	-	3.5	4	3.3	3.518	4.018	3.318
Pot Cap-1 Maneuver	1570	-	-	1503	-	-	779	738	991	808	724	1027
Stage 1	-	-	-	-	-	-	891	802	-	975	862	-
Stage 2	-	-	-	-	-	-	947	866	-	887	789	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1566	-	-	1503	-	-	729	727	990	798	713	1024
Mov Cap-2 Maneuver	-	-	-	-	-	-	729	727	-	798	713	-
Stage 1	-	-	-	-	-	-	878	790	-	961	862	-
Stage 2	-	-	-	-	-	-	896	866	-	873	777	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0	10.1	8.7
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	729	1566	-	-	1503	-	-	1013
HCM Lane V/C Ratio	0.03	0.013	-	-	-	-	-	0.051
HCM Control Delay (s)	10.1	7.3	0	-	0	-	-	8.7
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	111	50	31	346	992	90
Future Volume (vph)	111	50	31	346	992	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1506	1736	1827	1819	
Flt Permitted	0.73	1.00	0.06	1.00	1.00	
Satd. Flow (perm)	1356	1506	110	1827	1819	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	54	34	376	1078	98
RTOR Reduction (vph)	0	47	0	0	3	0
Lane Group Flow (vph)	121	7	34	376	1173	0
Confl. Peds. (#/hr)		8	4			4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	8	6			
Actuated Green, G (s)	11.3	11.3	69.5	69.5	61.9	
Effective Green, g (s)	11.3	11.3	69.5	69.5	61.9	
Actuated g/C Ratio	0.13	0.13	0.77	0.77	0.69	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	170	189	141	1413	1253	
v/s Ratio Prot			0.01	c0.21	c0.64	
v/s Ratio Perm	c0.09	0.00	0.18			
v/c Ratio	0.71	0.04	0.24	0.27	0.94	
Uniform Delay, d1	37.7	34.5	18.8	2.9	12.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.2	0.1	0.9	0.5	14.1	
Delay (s)	50.8	34.5	19.7	3.4	26.4	
Level of Service	D	C	B	A	C	
Approach Delay (s)	45.8			4.7	26.4	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	74	22	8	0	37	0	27	0	0	1	0	67
Future Vol, veh/h	74	22	8	0	37	0	27	0	0	1	0	67
Conflicting Peds, #/hr	1	0	2	2	0	1	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	0	0	0	8	8	8	4	4	4
Mvmt Flow	86	26	9	0	43	0	31	0	0	1	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	44	0	0	37	0	0	287	248	33	247	253	45
Stage 1	-	-	-	-	-	-	204	204	-	44	44	-
Stage 2	-	-	-	-	-	-	83	44	-	203	209	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.18	6.58	6.28	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Follow-up Hdwy	2.272	-	-	2.2	-	-	3.572	4.072	3.372	3.536	4.036	3.336
Pot Cap-1 Maneuver	1527	-	-	1587	-	-	653	644	1024	703	647	1019
Stage 1	-	-	-	-	-	-	784	722	-	965	854	-
Stage 2	-	-	-	-	-	-	910	847	-	794	725	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1526	-	-	1585	-	-	575	605	1021	671	608	1017
Mov Cap-2 Maneuver	-	-	-	-	-	-	575	605	-	671	608	-
Stage 1	-	-	-	-	-	-	737	679	-	908	853	-
Stage 2	-	-	-	-	-	-	839	846	-	747	682	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.3	0	11.6	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	575	1526	-	-	1585	-	-	1009
HCM Lane V/C Ratio	0.055	0.056	-	-	-	-	-	0.078
HCM Control Delay (s)	11.6	7.5	0	-	0	-	-	8.9
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	45	55	19	23	3
Future Vol, veh/h	2	45	55	19	23	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	49	60	21	25	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	167	27	28	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	140	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	823	1048	1585	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	887	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	792	1048	1585	-	-	-
Mov Cap-2 Maneuver	792	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	5.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1585	-	1034	-	-
HCM Lane V/C Ratio	0.038	-	0.049	-	-
HCM Control Delay (s)	7.4	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	138	42	29	1073	649	116
Future Volume (vph)	138	42	29	1073	649	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1568	1736	1827	1800	
Flt Permitted	0.74	1.00	0.21	1.00	1.00	
Satd. Flow (perm)	1359	1568	383	1827	1800	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	147	45	31	1141	690	123
RTOR Reduction (vph)	0	43	0	0	6	0
Lane Group Flow (vph)	147	2	31	1141	807	0
Confl. Peds. (#/hr)		1	2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Over	pm+pt	NA	NA	
Protected Phases		1	1	6	2	
Permitted Phases	8		6			
Actuated Green, G (s)	14.1	4.1	66.8	66.8	58.2	
Effective Green, g (s)	14.1	4.1	66.8	66.8	58.2	
Actuated g/C Ratio	0.16	0.05	0.74	0.74	0.65	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	213	71	346	1357	1165	
v/s Ratio Prot		0.00	0.00	c0.62	0.45	
v/s Ratio Perm	c0.11		0.06			
v/c Ratio	0.69	0.03	0.09	0.84	0.69	
Uniform Delay, d1	35.8	41.0	7.0	7.9	10.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.2	0.2	0.1	6.4	3.4	
Delay (s)	45.1	41.2	7.1	14.3	13.5	
Level of Service	D	D	A	B	B	
Approach Delay (s)	44.2			14.1	13.5	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	56	21	2	54	0	21	0	0	2	1	64
Future Vol, veh/h	59	56	21	2	54	0	21	0	0	2	1	64
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	2	2	2	0	0	0	0	0	0
Mvmt Flow	69	65	24	2	63	0	24	0	0	2	1	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	63	0	0	91	0	0	322	283	78	282	295	64
Stage 1	-	-	-	-	-	-	216	216	-	67	67	-
Stage 2	-	-	-	-	-	-	106	67	-	215	228	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1553	-	-	1504	-	-	635	629	988	674	620	1006
Stage 1	-	-	-	-	-	-	791	728	-	948	843	-
Stage 2	-	-	-	-	-	-	905	843	-	792	719	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1552	-	-	1504	-	-	565	598	987	649	590	1005
Mov Cap-2 Maneuver	-	-	-	-	-	-	565	598	-	649	590	-
Stage 1	-	-	-	-	-	-	753	693	-	903	842	-
Stage 2	-	-	-	-	-	-	835	842	-	755	685	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.2	0.3	11.7	9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	565	1552	-	-	1504	-	-	979
HCM Lane V/C Ratio	0.043	0.044	-	-	0.002	-	-	0.08
HCM Control Delay (s)	11.7	7.4	0	-	7.4	0	-	9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	36	31	28	31	2
Future Vol, veh/h	2	36	31	28	31	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	39	34	30	34	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	133	35	36	0	-	0
Stage 1	35	-	-	-	-	-
Stage 2	98	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	861	1038	1575	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	842	1038	1575	-	-	-
Mov Cap-2 Maneuver	842	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	906	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.7	3.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1575	-	1025	-	-
HCM Lane V/C Ratio	0.021	-	0.04	-	-
HCM Control Delay (s)	7.3	0	8.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	126	24	34	1114	657	76
Future Volume (vph)	126	24	34	1114	657	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1535	1787	1881	1832	
Flt Permitted	0.73	1.00	0.26	1.00	1.00	
Satd. Flow (perm)	1381	1535	489	1881	1832	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	129	24	35	1137	670	78
RTOR Reduction (vph)	0	21	0	0	4	0
Lane Group Flow (vph)	129	3	35	1137	744	0
Confl. Peds. (#/hr)		8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	3	6			
Actuated Green, G (s)	13.3	13.3	69.7	69.7	62.1	
Effective Green, g (s)	13.3	13.3	69.7	69.7	62.1	
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.68	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	199	221	414	1425	1236	
v/s Ratio Prot			0.00	c0.60	0.41	
v/s Ratio Perm	c0.09	0.00	0.06			
v/c Ratio	0.65	0.02	0.08	0.80	0.60	
Uniform Delay, d1	37.1	33.7	5.3	6.8	8.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.1	0.0	0.1	4.7	2.2	
Delay (s)	44.2	33.8	5.4	11.6	10.4	
Level of Service	D	C	A	B	B	
Approach Delay (s)	42.6			11.4	10.4	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	92.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	53	18	0	33	0	17	1	0	0	1	57
Future Vol, veh/h	30	53	18	0	33	0	17	1	0	0	1	57
Conflicting Peds, #/hr	0	0	1	1	0	0	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	3	3	3	0	0	0	2	2	2
Mvmt Flow	37	65	22	0	41	0	21	1	0	0	1	70

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	41	0	0	89	0	0	232	193	78	192	204	44
Stage 1	-	-	-	-	-	-	152	152	-	41	41	-
Stage 2	-	-	-	-	-	-	80	41	-	151	163	-
Critical Hdwy	4.12	-	-	4.13	-	-	7.1	6.5	6.2	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.227	-	-	3.5	4	3.3	3.518	4.018	3.318
Pot Cap-1 Maneuver	1568	-	-	1500	-	-	727	706	988	768	692	1026
Stage 1	-	-	-	-	-	-	855	775	-	974	861	-
Stage 2	-	-	-	-	-	-	934	865	-	851	763	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1564	-	-	1500	-	-	661	688	987	752	674	1023
Mov Cap-2 Maneuver	-	-	-	-	-	-	661	688	-	752	674	-
Stage 1	-	-	-	-	-	-	833	755	-	950	861	-
Stage 2	-	-	-	-	-	-	866	865	-	828	743	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	0	10.6	8.8
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	662	1564	-	-	1500	-	-	1014
HCM Lane V/C Ratio	0.034	0.024	-	-	-	-	-	0.071
HCM Control Delay (s)	10.6	7.4	0	-	0	-	-	8.8
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	15	13	18	43	1
Future Vol, veh/h	1	15	13	18	43	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	16	14	20	47	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	95	47	48	0	-	0
Stage 1	47	-	-	-	-	-
Stage 2	48	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	905	1022	1559	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	974	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	897	1022	1559	-	-	-
Mov Cap-2 Maneuver	897	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	965	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	3.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	1013	-	-
HCM Lane V/C Ratio	0.009	-	0.017	-	-
HCM Control Delay (s)	7.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	81	39	18	353	1010	51
Future Volume (vph)	81	39	18	353	1010	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1505	1736	1827	1830	
Flt Permitted	0.74	1.00	0.09	1.00	1.00	
Satd. Flow (perm)	1373	1505	173	1827	1830	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	42	20	384	1098	55
RTOR Reduction (vph)	0	38	0	0	1	0
Lane Group Flow (vph)	88	4	20	384	1152	0
Confl. Peds. (#/hr)		8	4			4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	8	6			
Actuated Green, G (s)	9.6	9.6	72.7	72.7	66.1	
Effective Green, g (s)	9.6	9.6	72.7	72.7	66.1	
Actuated g/C Ratio	0.11	0.11	0.80	0.80	0.72	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	144	158	173	1454	1324	
v/s Ratio Prot			0.00	c0.21	c0.63	
v/s Ratio Perm	c0.06	0.00	0.09			
v/c Ratio	0.61	0.03	0.12	0.26	0.87	
Uniform Delay, d1	39.1	36.7	13.4	2.4	9.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.5	0.1	0.3	0.4	8.0	
Delay (s)	46.5	36.7	13.7	2.8	17.4	
Level of Service	D	D	B	A	B	
Approach Delay (s)	43.4			3.4	17.4	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	23	8	0	38	0	28	0	0	1	0	23
Future Vol, veh/h	20	23	8	0	38	0	28	0	0	1	0	23
Conflicting Peds, #/hr	1	0	2	2	0	1	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	0	0	0	8	8	8	4	4	4
Mvmt Flow	23	27	9	0	44	0	33	0	0	1	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	45	0	0	38	0	0	139	125	34	124	130	46
Stage 1	-	-	-	-	-	-	80	80	-	45	45	-
Stage 2	-	-	-	-	-	-	59	45	-	79	85	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.18	6.58	6.28	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Follow-up Hdwy	2.272	-	-	2.2	-	-	3.572	4.072	3.372	3.536	4.036	3.336
Pot Cap-1 Maneuver	1525	-	-	1585	-	-	818	754	1022	846	757	1018
Stage 1	-	-	-	-	-	-	914	817	-	964	853	-
Stage 2	-	-	-	-	-	-	938	846	-	925	820	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1524	-	-	1583	-	-	785	741	1019	835	744	1016
Mov Cap-2 Maneuver	-	-	-	-	-	-	785	741	-	835	744	-
Stage 1	-	-	-	-	-	-	899	803	-	949	852	-
Stage 2	-	-	-	-	-	-	912	845	-	910	806	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	0	9.8	8.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	785	1524	-	-	1583	-	-	1007
HCM Lane V/C Ratio	0.041	0.015	-	-	-	-	-	0.028
HCM Control Delay (s)	9.8	7.4	0	-	0	-	-	8.7
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	117	33	22	1093	661	97
Future Volume (vph)	117	33	22	1093	661	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1533	1736	1827	1807	
Flt Permitted	0.74	1.00	0.24	1.00	1.00	
Satd. Flow (perm)	1369	1533	439	1827	1807	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	124	35	23	1163	703	103
RTOR Reduction (vph)	0	30	0	0	4	0
Lane Group Flow (vph)	124	5	23	1163	802	0
Confl. Peds. (#/hr)		1	2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	8	6			
Actuated Green, G (s)	13.1	13.1	71.1	71.1	64.6	
Effective Green, g (s)	13.1	13.1	71.1	71.1	64.6	
Actuated g/C Ratio	0.14	0.14	0.76	0.76	0.69	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	192	215	362	1393	1252	
v/s Ratio Prot			0.00	c0.64	0.44	
v/s Ratio Perm	c0.09	0.00	0.05			
v/c Ratio	0.65	0.02	0.06	0.83	0.64	
Uniform Delay, d1	37.9	34.5	5.6	7.2	7.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.3	0.0	0.1	6.0	2.5	
Delay (s)	45.1	34.6	5.7	13.3	10.4	
Level of Service	D	C	A	B	B	
Approach Delay (s)	42.8			13.1	10.4	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection												
Int Delay, s/veh	3.4											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	29	58	22	2	56	0	22	0	0	2	1	29
Future Vol, veh/h	29	58	22	2	56	0	22	0	0	2	1	29
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	2	2	2	0	0	0	0	0	0
Mvmt Flow	34	67	26	2	65	0	26	0	0	2	1	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	65	0	0	94	0	0	237	219	81	218	231	66
Stage 1	-	-	-	-	-	-	149	149	-	70	70	-
Stage 2	-	-	-	-	-	-	88	70	-	148	161	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1550	-	-	1500	-	-	722	683	985	743	672	1003
Stage 1	-	-	-	-	-	-	858	778	-	945	841	-
Stage 2	-	-	-	-	-	-	925	841	-	859	769	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1549	-	-	1500	-	-	683	666	984	729	655	1002
Mov Cap-2 Maneuver	-	-	-	-	-	-	683	666	-	729	655	-
Stage 1	-	-	-	-	-	-	837	759	-	923	840	-
Stage 2	-	-	-	-	-	-	891	840	-	839	751	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0.3	10.5	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	683	1549	-	-	1500	-	-	963
HCM Lane V/C Ratio	0.037	0.022	-	-	0.002	-	-	0.039
HCM Control Delay (s)	10.5	7.4	0	-	7.4	0	-	8.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	120	21	32	1135	669	69
Future Volume (vph)	120	21	32	1135	669	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1535	1787	1881	1836	
Flt Permitted	0.74	1.00	0.27	1.00	1.00	
Satd. Flow (perm)	1384	1535	503	1881	1836	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	122	21	33	1158	683	70
RTOR Reduction (vph)	0	18	0	0	3	0
Lane Group Flow (vph)	122	3	33	1158	750	0
Confl. Peds. (#/hr)		8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	3	6			
Actuated Green, G (s)	11.2	11.2	70.4	70.4	62.9	
Effective Green, g (s)	11.2	11.2	70.4	70.4	62.9	
Actuated g/C Ratio	0.12	0.12	0.78	0.78	0.69	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	171	189	433	1461	1274	
v/s Ratio Prot			0.00	c0.62	0.41	
v/s Ratio Perm	c0.09	0.00	0.06			
v/c Ratio	0.71	0.01	0.08	0.79	0.59	
Uniform Delay, d1	38.2	34.9	4.6	5.9	7.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.2	0.0	0.1	4.5	2.0	
Delay (s)	51.3	34.9	4.7	10.4	9.2	
Level of Service	D	C	A	B	A	
Approach Delay (s)	48.9			10.2	9.2	
Approach LOS	D			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	53	18	0	33	0	17	1	0	0	1	42
Future Vol, veh/h	17	53	18	0	33	0	17	1	0	0	1	42
Conflicting Peds, #/hr	0	0	1	1	0	0	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	3	3	3	0	0	0	2	2	2
Mvmt Flow	21	65	22	0	41	0	21	1	0	0	1	52

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	41	0	0	89	0	0	190	161	78	160	172	44
Stage 1	-	-	-	-	-	-	120	120	-	41	41	-
Stage 2	-	-	-	-	-	-	70	41	-	119	131	-
Critical Hdwy	4.12	-	-	4.13	-	-	7.1	6.5	6.2	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.227	-	-	3.5	4	3.3	3.518	4.018	3.318
Pot Cap-1 Maneuver	1568	-	-	1500	-	-	774	735	988	806	721	1026
Stage 1	-	-	-	-	-	-	889	800	-	974	861	-
Stage 2	-	-	-	-	-	-	945	865	-	885	788	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1564	-	-	1500	-	-	723	724	987	796	710	1023
Mov Cap-2 Maneuver	-	-	-	-	-	-	723	724	-	796	710	-
Stage 1	-	-	-	-	-	-	876	788	-	960	861	-
Stage 2	-	-	-	-	-	-	893	865	-	871	776	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0	10.1	8.8
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	723	1564	-	-	1500	-	-	1013
HCM Lane V/C Ratio	0.031	0.013	-	-	-	-	-	0.052
HCM Control Delay (s)	10.1	7.3	0	-	0	-	-	8.8
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	137	59	42	353	1010	119
Future Volume (vph)	137	59	42	353	1010	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1505	1736	1827	1813	
Flt Permitted	0.73	1.00	0.06	1.00	1.00	
Satd. Flow (perm)	1341	1505	112	1827	1813	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	64	46	384	1098	129
RTOR Reduction (vph)	0	54	0	0	4	0
Lane Group Flow (vph)	149	10	46	384	1223	0
Confl. Peds. (#/hr)		8	4			4
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	8	6			
Actuated Green, G (s)	14.4	14.4	68.3	68.3	60.7	
Effective Green, g (s)	14.4	14.4	68.3	68.3	60.7	
Actuated g/C Ratio	0.16	0.16	0.74	0.74	0.66	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	210	236	138	1360	1200	
v/s Ratio Prot			0.01	c0.21	c0.67	
v/s Ratio Perm	c0.11	0.01	0.24			
v/c Ratio	0.71	0.04	0.33	0.28	1.02	
Uniform Delay, d1	36.7	32.8	24.0	3.8	15.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.5	0.1	1.4	0.5	30.9	
Delay (s)	47.1	32.9	25.4	4.3	46.4	
Level of Service	D	C	C	A	D	
Approach Delay (s)	42.8			6.6	46.4	
Approach LOS	D			A	D	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	91.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	102	23	8	0	38	0	28	0	0	1	0	99
Future Vol, veh/h	102	23	8	0	38	0	28	0	0	1	0	99
Conflicting Peds, #/hr	1	0	2	2	0	1	1	0	1	1	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	0	0	0	8	8	8	4	4	4
Mvmt Flow	119	27	9	0	44	0	33	0	0	1	0	115

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	45	0	0	38	0	0	374	316	34	315	320	46
Stage 1	-	-	-	-	-	-	271	271	-	45	45	-
Stage 2	-	-	-	-	-	-	103	45	-	270	275	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.18	6.58	6.28	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.14	5.54	-
Follow-up Hdwy	2.272	-	-	2.2	-	-	3.572	4.072	3.372	3.536	4.036	3.336
Pot Cap-1 Maneuver	1525	-	-	1585	-	-	572	590	1022	634	594	1018
Stage 1	-	-	-	-	-	-	722	674	-	964	853	-
Stage 2	-	-	-	-	-	-	888	846	-	731	679	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1524	-	-	1583	-	-	475	541	1019	594	545	1016
Mov Cap-2 Maneuver	-	-	-	-	-	-	475	541	-	594	545	-
Stage 1	-	-	-	-	-	-	663	619	-	886	852	-
Stage 2	-	-	-	-	-	-	787	845	-	672	623	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.8	0	13.1	9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	475	1524	-	-	1583	-	-	1009
HCM Lane V/C Ratio	0.069	0.078	-	-	-	-	-	0.115
HCM Control Delay (s)	13.1	7.6	0	-	0	-	-	9
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0.3	-	-	0	-	-	0.4

Intersection						
Int Delay, s/veh	3.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	76	5	97	24	0
Future Vol, veh/h	4	76	5	97	24	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	83	5	105	26	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	142	26	26	0	-	0
Stage 1	26	-	-	-	-	-
Stage 2	116	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	851	1050	1588	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	848	1050	1588	-	-	-
Mov Cap-2 Maneuver	848	-	-	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	906	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1588	-	1038	-	-
HCM Lane V/C Ratio	0.003	-	0.084	-	-
HCM Control Delay (s)	7.3	0	8.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection						
Int Delay, s/veh	4.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	77	24	24	5
Future Vol, veh/h	0	0	77	24	24	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	84	26	26	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	222	29	32	0	-	0
Stage 1	29	-	-	-	-	-
Stage 2	193	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	766	1046	1580	-	-	-
Stage 1	994	-	-	-	-	-
Stage 2	840	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	725	1046	1580	-	-	-
Mov Cap-2 Maneuver	725	-	-	-	-	-
Stage 1	994	-	-	-	-	-
Stage 2	795	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	5.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1580	-	-	-	-
HCM Lane V/C Ratio	0.053	-	-	-	-
HCM Control Delay (s)	7.4	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-	-

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	162	49	36	1093	661	136
Future Volume (vph)	162	49	36	1093	661	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1752	1568	1736	1827	1794	
Flt Permitted	0.73	1.00	0.18	1.00	1.00	
Satd. Flow (perm)	1351	1568	338	1827	1794	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	172	52	38	1163	703	145
RTOR Reduction (vph)	0	50	0	0	7	0
Lane Group Flow (vph)	172	2	38	1163	841	0
Confl. Peds. (#/hr)		1	2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	4%	4%	3%	3%
Turn Type	Perm	Over	pm+pt	NA	NA	
Protected Phases		1	1	6	2	
Permitted Phases	8		6			
Actuated Green, G (s)	15.3	4.1	66.7	66.7	58.1	
Effective Green, g (s)	15.3	4.1	66.7	66.7	58.1	
Actuated g/C Ratio	0.17	0.05	0.73	0.73	0.64	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	227	70	310	1339	1145	
v/s Ratio Prot		0.00	0.01	c0.64	0.47	
v/s Ratio Perm	c0.13		0.08			
v/c Ratio	0.76	0.03	0.12	0.87	0.73	
Uniform Delay, d1	36.1	41.6	8.3	8.9	11.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.5	0.2	0.2	7.8	4.2	
Delay (s)	49.5	41.8	8.5	16.8	15.4	
Level of Service	D	D	A	B	B	
Approach Delay (s)	47.7			16.5	15.4	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	91.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	58	22	2	56	0	22	0	0	2	1	90
Future Vol, veh/h	82	58	22	2	56	0	22	0	0	2	1	90
Conflicting Peds, #/hr	0	0	1	1	0	0	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	2	2	2	0	0	0	0	0	0
Mvmt Flow	95	67	26	2	65	0	26	0	0	2	1	105

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	65	0	0	94	0	0	396	342	81	341	355	66
Stage 1	-	-	-	-	-	-	272	272	-	70	70	-
Stage 2	-	-	-	-	-	-	124	70	-	271	285	-
Critical Hdwy	4.1	-	-	4.12	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1550	-	-	1500	-	-	568	583	985	617	574	1003
Stage 1	-	-	-	-	-	-	738	688	-	945	841	-
Stage 2	-	-	-	-	-	-	885	841	-	739	679	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1549	-	-	1500	-	-	481	544	984	586	536	1002
Mov Cap-2 Maneuver	-	-	-	-	-	-	481	544	-	586	536	-
Stage 1	-	-	-	-	-	-	689	643	-	884	840	-
Stage 2	-	-	-	-	-	-	790	840	-	691	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.8	0.3	12.9	9.1
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	481	1549	-	-	1500	-	-	978
HCM Lane V/C Ratio	0.053	0.062	-	-	0.002	-	-	0.111
HCM Control Delay (s)	12.9	7.5	0	-	7.4	0	-	9.1
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	61	3	79	32	0
Future Vol, veh/h	3	61	3	79	32	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	66	3	86	35	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	127	35	35	0	-	0
Stage 1	35	-	-	-	-	-
Stage 2	92	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	868	1038	1576	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	932	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	866	1038	1576	-	-	-
Mov Cap-2 Maneuver	866	-	-	-	-	-
Stage 1	987	-	-	-	-	-
Stage 2	930	-	-	-	-	-

Approach	EB		NB		SB	
HCM Control Delay, s	8.8		0.3		0	
HCM LOS	A					

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1576	-	1028	-	-
HCM Lane V/C Ratio	0.002	-	0.068	-	-
HCM Control Delay (s)	7.3	0	8.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	50	32	32	3
Future Vol, veh/h	0	0	50	32	32	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	54	35	35	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	179	36	38	0	-	0
Stage 1	36	-	-	-	-	-
Stage 2	143	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	811	1037	1572	-	-	-
Stage 1	986	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	783	1037	1572	-	-	-
Mov Cap-2 Maneuver	783	-	-	-	-	-
Stage 1	986	-	-	-	-	-
Stage 2	853	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	4.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1572	-	-	-	-
HCM Lane V/C Ratio	0.035	-	-	-	-
HCM Control Delay (s)	7.4	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	139	28	38	1135	669	85
Future Volume (vph)	139	28	38	1135	669	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.96	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1787	1535	1787	1881	1830	
Flt Permitted	0.73	1.00	0.24	1.00	1.00	
Satd. Flow (perm)	1376	1535	460	1881	1830	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	29	39	1158	683	87
RTOR Reduction (vph)	0	25	0	0	4	0
Lane Group Flow (vph)	142	4	39	1158	766	0
Confl. Peds. (#/hr)		8				
Confl. Bikes (#/hr)						2
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Turn Type	Perm	Perm	pm+pt	NA	NA	
Protected Phases			1	6	2	
Permitted Phases	8	3	6			
Actuated Green, G (s)	14.0	14.0	69.2	69.2	61.6	
Effective Green, g (s)	14.0	14.0	69.2	69.2	61.6	
Actuated g/C Ratio	0.15	0.15	0.75	0.75	0.67	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	208	233	389	1411	1222	
v/s Ratio Prot			0.00	c0.62	0.42	
v/s Ratio Perm	c0.10	0.00	0.07			
v/c Ratio	0.68	0.02	0.10	0.82	0.63	
Uniform Delay, d1	37.0	33.3	5.9	7.5	8.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.9	0.0	0.1	5.5	2.4	
Delay (s)	45.9	33.3	6.1	12.9	11.2	
Level of Service	D	C	A	B	B	
Approach Delay (s)	43.8			12.7	11.2	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	92.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	55	19	0	34	0	18	1	0	0	1	70
Future Vol, veh/h	40	55	19	0	34	0	18	1	0	0	1	70
Conflicting Peds, #/hr	0	0	1	1	0	0	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	2	2	2	3	3	3	0	0	0	2	2	2
Mvmt Flow	49	68	23	0	42	0	22	1	0	0	1	86

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	42	0	0	92	0	0	268	221	81	221	233	45
Stage 1	-	-	-	-	-	-	179	179	-	42	42	-
Stage 2	-	-	-	-	-	-	89	42	-	179	191	-
Critical Hdwy	4.12	-	-	4.13	-	-	7.1	6.5	6.2	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.227	-	-	3.5	4	3.3	3.518	4.018	3.318
Pot Cap-1 Maneuver	1567	-	-	1496	-	-	689	681	985	735	667	1025
Stage 1	-	-	-	-	-	-	827	755	-	972	860	-
Stage 2	-	-	-	-	-	-	923	864	-	823	742	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1563	-	-	1496	-	-	612	658	984	715	644	1022
Mov Cap-2 Maneuver	-	-	-	-	-	-	612	658	-	715	644	-
Stage 1	-	-	-	-	-	-	799	729	-	940	860	-
Stage 2	-	-	-	-	-	-	841	864	-	794	717	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0	11.1	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	614	1563	-	-	1496	-	-	1014
HCM Lane V/C Ratio	0.038	0.032	-	-	-	-	-	0.086
HCM Control Delay (s)	11.1	7.4	0	-	0	-	-	8.9
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	26	1	40	44	0
Future Vol, veh/h	1	26	1	40	44	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	28	1	43	48	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	94	48	48	0	-	0
Stage 1	48	-	-	-	-	-
Stage 2	46	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	906	1021	1559	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	976	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	905	1021	1559	-	-	-
Mov Cap-2 Maneuver	905	-	-	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	975	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	0.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1559	-	1016	-	-
HCM Lane V/C Ratio	0.001	-	0.029	-	-
HCM Control Delay (s)	7.3	0	8.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection						
Int Delay, s/veh	1.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	21	20	44	1
Future Vol, veh/h	0	0	21	20	44	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	23	22	48	1

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	115	48	49	0	-	0
Stage 1	48	-	-	-	-	-
Stage 2	67	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	881	1021	1558	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	956	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	868	1021	1558	-	-	-
Mov Cap-2 Maneuver	868	-	-	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	942	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	3.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1558	-	-	-	-
HCM Lane V/C Ratio	0.015	-	-	-	-
HCM Control Delay (s)	7.3	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection: 1: Willamette Drive & Cedar Oak Drive

Movement	WB	WB	SE	SE	NW
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	153	74	92	118	720
Average Queue (ft)	70	17	32	44	612
95th Queue (ft)	131	50	73	95	870
Link Distance (ft)		390		541	666
Upstream Blk Time (%)					32
Queuing Penalty (veh)					0
Storage Bay Dist (ft)	170		110		
Storage Blk Time (%)	0		0	0	
Queuing Penalty (veh)	0		1	0	

Intersection: 2: Old River Road & Cedar Oak Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	37	4	60	70
Average Queue (ft)	3	0	21	34
95th Queue (ft)	19	3	50	55
Link Distance (ft)	390	573	293	213
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Old River Road & Southern Site Access

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	61	5
Average Queue (ft)	33	0
95th Queue (ft)	53	4
Link Distance (ft)	161	213
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Old River Road & Northern Site Access

Movement	NB
Directions Served	LT
Maximum Queue (ft)	24
Average Queue (ft)	2
95th Queue (ft)	15
Link Distance (ft)	185
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1

CITY OF WEST LINN, CLACKAMAS COUNTY

CEDAROAK DR at OLD RIVER RD, City of West Linn, Clackamas County, 01/01/2012 to 12/31/2016

SER# / INVEST / RD DPT / UNLOC?	S P E E D	D R A L C	U G S	S C H L	W O R K	DATE / DAY / TIME / LAT	CLASS / DIST / FROM / LONG	CITY STREET / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	P#	PRTC / TYPE	INJ / SVRTY	A G E	S E X	LICNS / RES	PED / LOC	ERROR	ACT	EVENT	CAUSE

CITY OF WEST LINN, CLACKAMAS COUNTY

CEDAROAK DR at WILLAMETTE DR, City of West Linn, Clackamas County, 01/01/2012 to 12/31/2016

1 - 3 of 9 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D P R S W E A U C O E L G H R D C S L K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	V#	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	PRTC P# TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT EVENT	CAUSE
02508	N N N N N	06/30/2014	14	CEDAROAK DR	INTER	3-LEG	N	N	CLR	ANGL-STP	01	NONE 0	TURN-R									08
CITY		MO		WILLAMETTE DR	E		TRF SIGNAL	N	DRY	TURN		PRVTE	SE-E								000	00
N		12P			06	0		N	DAY	INJ		MOTRHOME		01 DRVR	NONE	84	M	OR-Y		001	000	08
N		45 23 13.73	-122 38 28.91	000300100S00														OR<25				
											02	NONE 0	STOP									
												PRVTE	E -W								011	00
												PSNGR CAR		01 DRVR	INJC	52	F	OR-Y		000	000	00
																		OR<25				
00264	Y N N N Y	01/22/2015	14	CEDAROAK DR	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT								013,116,002	27,07,01
CITY		TH		WILLAMETTE DR	SE		TRF SIGNAL	N	DRY	REAR		PRVTE	SE-NW								000	00
N		7P			06	0		N	DLIT	INJ		PSNGR CAR		01 DRVR	NONE	26	M	OR-Y		016,026,047	038 116,002	27,07,01
N		45 23 13.73	-122 38 28.91	000300100S00														OR>25				
											02	NONE 0	STRGHT									
												PRVTE	SE-NW								006 013	00
												PSNGR CAR		01 DRVR	NONE	22	M	OR-Y		000	000	00
																		OR<25				
											03	NONE 0	STOP									
												PRVTE	SE-NW								011 013	00
												PSNGR CAR		01 DRVR	NONE	66	F	OR-Y		000	000	00
																		OR<25				
											04	NONE 0	STOP									
												PRVTE	SE-NW								022 013	00
												PSNGR CAR		01 DRVR	NONE	29	F	OR-Y		000	000	00
																		OR<25				
											05	NONE 0	STOP									
												PRVTE	SE-NW								022	00
												PSNGR CAR		01 DRVR	INJC	56	F	OTH-Y		000	000	00
																		N-RES				
04287	N N N	10/18/2015	14	CEDAROAK DR	INTER	3-LEG	N	N	UNK	S-1STOP	01	NONE 0	STRGHT									29
NONE		SU		WILLAMETTE DR	SE		TRF SIGNAL	N	WET	REAR		PRVTE	SE-NW								000	00
N		2A			06	0		N	DLIT	INJ		PSNGR CAR		01 DRVR	NONE	29	M	OR-Y		026	000	29
N		45 23 13.73	-122 38 28.91	000300100S00														OR<25				
											02	NONE 0	STOP									
												PRVTE	SE-NW								011	00
												PSNGR CAR		01 DRVR	INJB	38	M	OTH-Y		000	000	00
																		N-RES				
											02	NONE 0	STOP									
												PRVTE	SE-NW								011	00
												PSNGR CAR		02 PSNG	INJB	34	F			000	000	00

CITY OF WEST LINN, CLACKAMAS COUNTY

CEDAROAK DR at WILLAMETTE DR, City of West Linn, Clackamas County, 01/01/2012 to 12/31/2016

4 - 6 of 9 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D P R S W E A U C O E L G H R D C S L K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	V#	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT	EVENT	CAUSE
00558	N N N	02/12/2015	14	CEDAROAK DR	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE		TH		WILLAMETTE DR	SE		TRF SIGNAL	N	DRY	REAR		PRVTE	SE-NW									000		00
N		4P			06	0		N	DAY	PDO		PSNGR CAR		01	DRVR	NONE	65	M	OR-Y		026	000		29
N		45 23 13.73	-122 38 28.91	000300100S00															OR<25					
											02	NONE 0	STOP											
												PRVTE	SE-NW									011		00
												PSNGR CAR		01	DRVR	NONE	63	M	OR-Y		000	000		00
																			OR<25					
03610	N N N N N	08/08/2016	14	CEDAROAK DR	INTER	3-LEG	N	N	CLR	S-STRGHT	01	NONE 0	STRGHT										013	29
CITY		MO		WILLAMETTE DR	SE		TRF SIGNAL	N	DRY	REAR		UNKN	SE-NW									000		00
N		6P			06	0		N	DAY	INJ		UNKNOWN		01	DRVR	NONE	00	Unk	UNK		042	000		29
N		45 23 13.73	-122 38 28.91	000300100S00															UNK					
											02	NONE 0	STRGHT											
												PRVTE	SE-NW									006	013	00
												PSNGR CAR		01	DRVR	NONE	65	F	OR-Y		000	000		00
																			OR<25					
											03	NONE 0	STRGHT											
												PRVTE	SE-NW									022	013	00
												PSNGR CAR		01	DRVR	INJC	33	M	OR-Y		000	000		00
																			OR<25					
											04	NONE 0	STRGHT											
												PRVTE	SE-NW									022		00
												PSNGR CAR		01	DRVR	NONE	50	F	OR-Y		000	000		00
																			OR<25					
02068	N N N	06/11/2013	14	CEDAROAK DR	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT											07
NONE		TU		WILLAMETTE DR	NW		TRF SIGNAL	N	DRY	REAR		PRVTE	NW-SE									000		00
N		4P			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	INJC	32	F	OR-Y		026	000		07
N		45 23 13.732404	-122 38 28.9122719	000300100S00															OR<25					
											02	NONE 0	STOP											
												PRVTE	NW-SE									011		00
												PSNGR CAR		01	DRVR	NONE	35	F	OR-Y		000	000		00
																			OR<25					
02665	N N N	07/02/2015	14	CEDAROAK DR	INTER	3-LEG	N	N	CLR	S-1STOP	01	NONE 0	STRGHT										013	29
NONE		TH		WILLAMETTE DR	NW		TRF SIGNAL	N	DRY	REAR		PRVTE	NW-SE									000		00
N		11A			06	0		N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	36	M	OTH-Y		026	000		29
N		45 23 13.73	-122 38 28.91	000300100S00															N-RES					
											02	NONE 0	STOP											
												PRVTE	NW-SE									011	013	00
												PSNGR CAR		01	DRVR	INJC	44	F	OR-Y		000	000		00
																			OR<25					

CITY OF WEST LINN, CLACKAMAS COUNTY

CEDAROAK DR at WILLAMETTE DR, City of West Linn, Clackamas County, 01/01/2012 to 12/31/2016

7 - 9 of 9 Crash records shown.

SER# INVEST RD DPT UNLOC?	S P E E D	 A L C	D R U G S	 S C H L	 W O R K	DATE DAY TIME LAT	CLASS DIST FROM LONG	CITY STREET FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	SPCL USE TRLR QTY OWNER V# TYPE	MOVE FROM TO	PRTC P# TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT EVENT	CAUSE
															03 NONE 0	STOP									
															PRVTE	NW-SE								022	00
															PSNGR CAR		01 DRVR	NONE	34	M	OR-Y		000	000	00
																					OR>25				
01488	N	N	N	N	N	04/21/2015	14	CEDAROAK DR	INTER	3-LEG	N	N	CLD	S-1STOP	01 NONE 0	STRGHT									29
CITY						TU		WILLAMETTE DR	NW		TRF SIGNAL	N	DRY	REAR	PRVTE	NW-SE								000	00
N						1P			06	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	63	M	OR-Y		026	000	29
N						45 23 13.73	-122 38 28.91	000300100S00													OR<25				
															02 NONE 0	STOP									
															PRVTE	NW-SE								011	00
															PSNGR CAR		01 DRVR	NONE	52	F	OR-Y		000	000	00
																					OR<25				
02883	N	N	N	N	N	07/17/2015	14	CEDAROAK DR	INTER	3-LEG	N	N	CLD	S-1STOP	01 NONE 0	STRGHT									29
CITY						FR		WILLAMETTE DR	NW		TRF SIGNAL	N	DRY	REAR	PRVTE	NW-SE								000	00
N						4P			06	0		N	DAY	PDO	PSNGR CAR		01 DRVR	NONE	20	M	OR-Y		026	000	29
N						45 23 13.73	-122 38 28.91	000300100S00													OR<25				
															02 NONE 0	STOP									
															PRVTE	NW-SE								011	00
															PSNGR CAR		01 DRVR	NONE	22	M	OR-Y		000	000	00
																					OR<25				

Carlson Geotechnical
A Division of Carlson Testing, Inc.
Phone: (503) 601-8250
Fax: (503) 601-8254

Bend Office	**(541) 330-9155**
Eugene Office	**(541) 345-0289**
Salem Office	**(503) 589-1252**
Tigard Office	**(503) 684-3460**

Report of
Geotechnical Investigation
Marylhurst School New Life Church Site Expansion
19915 Old River Drive
West Linn, Oregon

CGT Project Number G1804863

Prepared for

Ms. Sheila Walker
The Marylhurst School
1232 Linn Avenue
Oregon City, Oregon 97045

July 19, 2018

Carlson Geotechnical
A Division of Carlson Testing, Inc.
Phone: (503) 601-8250
Fax: (503) 601-8254

Bend Office	**(541) 330-9155**
Eugene Office	**(541) 345-0289**
Salem Office	**(503) 589-1252**
Tigard Office	**(503) 684-3460**

CARLSON CGT GEOTECHNICAL

July 19, 2018

Ms. Sheila Walker
The Marylhurst School
1232 Linn Avenue
Oregon City, Oregon 97045

Report of
Geotechnical Investigation
Marylhurst School New Life Church Site Expansion
19915 Old River Drive
West Linn, Oregon

CGT Project Number G1804863

Dear Ms. Walker

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our geotechnical investigation and infiltration testing services for the proposed Marylhurst School New Life Church Site Expansion project. The site is located at 19915 Old River Drive in West Linn, Oregon. We performed our work in general accordance with CGT Proposal GP7920, dated February 13, 2018. Written authorization for our services was received on May 23, 2018.

We appreciate the opportunity to work with you on this project. Please contact us at 503.601.8250 if you have any questions regarding this report.

Respectfully Submitted,
CARLSON GEOTECHNICAL

CERTIFIED
OREGON
JEFFREY A. JONES
E2235
ENGINEERING GEOLOGIST
EXPIRES
1-01-19

REGISTERED PROFESSIONAL
ENGINEER
15764
OREGON
7.19.2018
January 21, 1992
WILLIAM M. WEYRAUCH
EXPIRES: 6.30.2020

Jeff Jones, CEG
Project Engineering Geologist
jjones@carlsontesting.com

William M. Weyrauch, P.E., G.E.
Senior Geotechnical Engineer
bweyrauch@carlsontesting.com

Doc ID: G:\GEOTECH\PROJECTS\2018 Projects\G1804863 - Marylhurst School New Life Church Site Expansion\G1804863-GEO\008 - Deliverables\Report Files\G1804863 - Geotechnical Report.docx

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our geotechnical investigation and infiltration testing services for the proposed Marylhurst School New Life Church Site Expansion project. The site is located at 19915 Old River Drive in West Linn, Oregon, as shown on the attached Site Location map, Figure 1.

1.1 Project Information

CGT developed an understanding of the proposed project based information provided by Ms. Debra Pierson, AIA and Mr. Mark Wharry, P.E., of KPFF. Based on the information provided, we understand the project will include:

- Construction of a two-story, 12,000 square foot, classroom building north of the existing buildings at the site. We understand the building will be constructed out of shipping containers and will be supported on conventional shallow strip footings. No below-grade levels (basements) are anticipated. No structural loading has been provided; however, we anticipate maximum structural loading for the strip footing foundations will be on the order of 4 kips per lineal foot (klf). Per our correspondence, we understand the building occupant load will be less than 250, and therefore will not be classified as Risk Category III or IV per Table 1604.5 of the current Oregon Structural Specialty Code (OSSC).
- Rehabilitation and reconfiguration of the existing asphalt-paved parking lot and drive lanes to the south of the existing buildings. Subject to geotechnical and civil engineering review, the pavement rehabilitation may include complete removal and replacement (R&R), installation of an overlay, and/or surface treatments. Geotechnical assessment of the existing pavements has been requested to help develop plans for pavement rehabilitation.
- Although no grading plans were provided, we anticipate permanent grade changes at the site will include maximum cuts and fills on the order of 3 feet in depth.
- We understand that stormwater from new impervious areas of the site will be collected and diverted to an on-site stormwater facility located along Old River Road. Design of the stormwater facilities will rest with others.

1.2 Scope of Services

Our scope of work included the following:

- Contact the Oregon Utilities Notification Center to mark the locations of public utilities within a 20-foot radius of our explorations at the site. CGT also subcontracted a private utility locator service to mark the locations of detectable private utilities within the same radius.
- Conduct subsurface exploration of the site, as detailed in Appendix A.
- Conduct infiltration testing in two locations, as detailed in Appendix B.
- Perform a structural capacity evaluation for onsite pavements, as detailed in Appendix C.
- Perform a liquefaction analysis as detailed in Appendix D.
- Provide a technical narrative describing surface and subsurface materials, based on the results of our explorations, previous experience, and published geologic mapping.
- Provide recommendations for the Seismic Site Class, mapped maximum considered earthquake spectral response accelerations, and site seismic coefficients.

- Provide a qualitative evaluation of seismic hazards at the site, including earthquake-induced liquefaction, landsliding, and surface rupture due to faulting or lateral spread.
- Provide geotechnical recommendations for site preparation and earthwork.
- Provide geotechnical engineering recommendations for use in design and construction of shallow foundations, floor slabs, and pavements.
- Provide this written report summarizing the results of our geotechnical investigation and recommendations for the project.

2.0 SITE DESCRIPTION

2.1 Site Geology

Based on available geologic mapping of the area, the site is underlain by Pleistocene catastrophic flood deposits[1,2,3] originating from glacial outburst floods of Lake Missoula. The flood deposits were produced by the periodic failure of glacial ice dams that impounded Lake Missoula in present day Montana between 21,000 and 12,000 years ago. Floodwaters raged through Idaho, eastern Washington, and through the Columbia River Gorge. Near Rainier, Oregon, the river channel was restricted, causing floodwaters to back up the Willamette Valley as far south as Eugene. Floodwaters in the Portland area were as much as 400 feet deep, leaving only the tops of the tallest hills dry. The flood deposits are typically split into three different facies: the coarse-grained facies, the fine-grained facies, and the channel facies. Fine-grained Missoula flood deposits (Mff) are mapped in the vicinity of the site, which typically consist of silt, clay, and fine-grained sand. Beds are generally poorly defined and thin (less than 3 feet thick).

2.2 Site Surface Conditions

The site was bordered by an existing single family residence to the north, apartment complexes to the west and south, and Old River Road to the east. The site was occupied by two existing buildings (to remain), the existing parking lot, grass lawns, and a children's play area. The area of the proposed building was gently descending to the north, vegetated with a grass lawn and several deciduous trees. Site layout and surface conditions at the time of our field investigation are shown on the attached Site Plan (Figure 2) and Site Photographs (Figure 3).

2.3 Subsurface Conditions

2.3.1 <u>Subsurface Investigation & Laboratory Testing</u>

Our subsurface investigation consisted of three deep borings in the building area, two shallower borings for infiltration testing, and four shallow hand auger borings for the pavement investigation, completed in June 2018. The approximate exploration locations are shown on the Site Plan, attached as Figure 2. Details regarding the subsurface investigation, logs of the explorations, and results of laboratory testing

---

1 Ma, Madin, Duplantis, and Williams, 2012, Lidar-based Surficial Geologic Map and Database of the Greater Portland, Oregon, Area, Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill Counties, Oregon, and Clark County, Washington Oregon Department of Geology and Mineral Industries Open-File Report O-12-02.

2 Madin, I.P., 2004. Geologic mapping and database for the Portland area fault studies: Final report, Clackamas, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries, Open-File Report O-04-02, scale 1:100,000.

3 Beeson, M.H., Tolan, T.L., and Madin, I.P., 1991. Geologic map of the Portland quadrangle, Multnomah and Washington counties, Oregon, and Clark County, Washington: Oregon Department of Geology and Mineral Industries, Geological Map Series 75, scale 1:24,000.

are presented in Appendix A. Subsurface conditions encountered during our investigation are summarized below.

2.3.2 <u>Subsurface Materials</u>

We encountered the following subsurface materials within our explorations at the site.

2.3.2.1 <u>Building Area</u>

Borings B-1 through B-3 and IT-1 and IT-2 were advanced in the area of the proposed building and are detailed below.

<u>Silt Fill (ML Fill)</u>: At the surface if IT-1 we encountered brown, dry to moist, low plasticity, silt fill with varying amounts of angular gravel. The fill extended to a depth of approximately 3 feet bgs.

<u>Silt (ML)</u>: At the surface of B-1 through B-3, IT-2, and below the fill in IT-1, we encountered native, medium stiff to stiff, mottled brown, low plasticity silt. The silt generally became sandier with depth and included very soft to soft zones in B-1 (between 7 and 12 feet bgs), B-2 (between 12 and 20 feet bgs), and B-3 (between 7 and 15 feet bgs). The silt extended the full depth explored in B-1, 21½ feet bgs, and to depths of approximately 10 and 17 feet bgs in B-2 and B-3, respectively.

<u>Poorly Graded Sand, Silty Sand, and Sandy Silt (SP, SM, ML)</u>: Beneath the silt in B-2 we encountered very loose to loose, brown, fine grained, poorly graded sand to silty sand with an intermediate layer of medium stiff, brown, low plasticity, sandy silt. These soils extended to a depth of approximately 20 feet bgs.

<u>Fat Clay (CH)</u>: Beneath the sandy soils in B-2 and beneath the sandy silt in B-1, we encountered stiff to very stiff, gray, medium to high plasticity, fat clay. The fat clay extended the full depth explored in B-2, approximately 21½ feet bgs. The fat clay extended to a depth of approximately 35 feet bgs in B-3, below which depth it continued but was interbedded with dense to very dense, fine to medium grained, silty sand and clayey sand. These soils extended the full depth explored in B-3, approximately 61½ feet bgs.

2.3.2.2 <u>Pavement Areas</u>

Explorations C-1 through C-4 were advanced within the existing pavement areas and are detailed below.

<u>Asphalt Concrete Pavement</u>

Asphalt concrete (AC) was encountered at the surface of explorations C-1 through C-4 and was approximately 3 to 4 inches thick.

<u>Poorly Graded Gravel Fill (GP Fill)</u>

Beneath the AC we encountered poorly graded gravel fill (base rock) that was approximately 9 to 14 inches thick. The gravel fill was generally dense, gray, angular to subangular, up to approximately 1 inch in size, and became silty in the lower few inches.

<u>Silt (ML)</u>: Beneath the gravel fill in C-1 through C-3, we encountered native, mottled brown, moist, low plasticity silt that extended the full depth explored, approximately 2 to 2¼ feet bgs.

Fat Clay (CH): Beneath the gravel fill in C-4, we encountered mottled gray and brown, moist, medium to high plasticity, fat clay that extended the full depth explored, approximately 2½ feet bgs.

2.3.3 Groundwater

Groundwater was encountered at depths of 11½ and 19 feet bgs in B-1 and B-2, respectively, on June 14, 2018. Boring B-3 was advanced using the mud rotary (wet) drilling method, which precluded direct observation of groundwater during drilling, but groundwater was inferred at a depth of approximately 15 feet bgs based on examination of the soil samples.

We researched well logs available on the Oregon Water Resources Department (OWRD)[4] website for wells located nearby. Our review indicated that groundwater levels reported in the area generally ranged from about 13 to 25 feet bgs. It should be noted groundwater levels vary with local topography. In addition, the groundwater levels reported on the OWRD logs often reflect the purpose of the well, so water well logs may only report deeper, confined groundwater, while geotechnical or environmental borings will often report any groundwater encountered, including shallow, unconfined groundwater. Therefore, the levels reported on the OWRD well logs referenced above are considered generally indicative of local water levels and may not reflect actual groundwater levels at the project site.

The depth to groundwater map for the Portland area[5] indicates groundwater is present at depths of 60 to 70 feet bgs in the vicinity of the site. It should be noted that the levels reported by the referenced map are average values for a given location and incorporate a degree of uncertainty. For this location the uncertainty is described as "moderate."

Recognizing the wide variability in observed and reported groundwater levels at and in the vicinity of the site, we conclude the groundwater observed within our borings is likely perched and reflects the variable permeability of the site soils. Perched groundwater is often discontinuous, both laterally and vertically, and can vary significantly through time (e.g. seasonally and annually). In general, we anticipate that groundwater levels will fluctuate due to seasonal and annual variations in precipitation, changes in site utilization, or other factors.

3.0 SEISMIC CONSIDERATIONS

3.1 Seismic Design

Section 1613.3.2 of the 2014 OSSC requires that the determination of the seismic site class be based on subsurface data in accordance with Chapter 20 of the ASCE 7-10. Recognizing the presence of liquefiable soils (discussed below), the site was initially assigned as Site Class F based on Section 1613.3.2 of the 2014 OSSC and Table 20.3-1 of ASCE 07-10. Designation as Site Class F typically requires a site-specific evaluation of ground response and spectral accelerations. However, ASCE 07-10 includes an exception to this in Section 20.3.1 of that manual. When the sole reason for classifying a site as Site Class F is due to the presence of liquefiable soils and the proposed structure(s) have a fundamental period of vibration equal to or less than 0.5 seconds (as anticipated for this project), a site

4 Oregon Water Resources Department, 2018. Well Log Records, *accessed July 2018*, from OWRD web site: http://apps.wrd.state.or.us/apps/gw/well_log/.

5 Snyder, D.T., 2008, Estimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey, Scientific Investigations Report SIR-2008-5059, scale 1:60,000.

class is permitted to be determined based on standard penetration resistance, undrained shear strength, or shear wave velocity, in accordance with Section 20.3 of that manual.

Based on the results of the explorations, SPTs performed as part of our investigations, and review of geologic mapping, we have assigned the site as Site Class E for the subsurface conditions encountered. Earthquake ground motion parameters for the site were obtained based on the United States Geological Survey (USGS) Seismic Design Values for Buildings - Ground Motion Parameter Web Application[6]. The site Latitude 45.35547° North and Longitude 122.64021° West were input as the site location. The following table shows the recommended seismic design parameters for the site.

Table 1 Seismic Ground Motion Values

Parameter		Value
Mapped Acceleration Parameters	Spectral Acceleration, 0.2 second (S_s)	0.965g
	Spectral Acceleration, 1.0 second (S_1)	0.413g
Coefficients (Site Class E)	Site Coefficient, 0.2 sec. (F_A)	0.942
	Site Coefficient, 1.0 sec. (F_V)	2.400
Adjusted MCE Spectral Response Parameters	MCE Spectral Acceleration, 0.2 sec. (S_{MS})	0.909g
	MCE Spectral Acceleration, 1.0 sec. (S_{M1})	0.992g
Design Spectral Response Accelerations	Design Spectral Acceleration, 0.2 seconds (S_{DS})	0.606g
	Design Spectral Acceleration, 1.0 second (S_{D1})	0.661g
Seismic Design Category		D

3.2 Seismic Hazards

3.2.1 Liquefaction

In general, liquefaction occurs when deposits of loose/soft, saturated, cohesionless soils, generally sands and silts, are subjected to strong earthquake shaking. If these deposits cannot drain quickly enough, pore water pressures can increase, approaching the value of the overburden pressure. The shear strength of a cohesionless soil is directly proportional to the effective stress, which is equal to the difference between the overburden pressure and the pore water pressure. When the pore water pressure increases to the value of the overburden pressure, the shear strength of the soil approaches zero, and the soil can liquefy. The liquefied soils can undergo rapid consolidation or, if unconfined, can flow as a liquid. Structures supported by the liquefied soils can experience rapid, excessive settlement, shearing, or even catastrophic failure. The Oregon Department of Geology and Mineral Industries' Oregon Statewide Geohazards Viewer[7] shows a high hazard for liquefaction for the site and immediate vicinity.

As discussed in Appendix D, the near-surface silt (ML), sandy silt (ML), silty sand (SM), and poorly graded sand (SP) are judged susceptible to liquefaction when adequately saturated and subjected to

---

6 United States Geological Survey, 2018. Seismic Design Parameters determined using:, "U.S. Seismic Design Maps Web Application," *accessed July 2018*, from the USGS website *http://earthquake.usgs.gov*.

7 Oregon Department of Geology and Mineral Industries, 2018. Oregon Statewide Geohazards Viewer, accessed July 2018, from DOGAMI web site: http://www.oregongeology.org/sub/hazvu/index.htm.

design level earthquake shaking. These soils extended to depths of approximately 16 to 20 feet below ground surface (bgs) in the borings advanced in the location of the proposed building. Below these depths, the soils are considered non-liquefiable.

We performed quantitative liquefaction triggering and settlement analyses, the results of which are detailed in Appendix D. To reflect variable groundwater levels at the site, we modeled two groundwater scenarios; one reflecting the depth to groundwater observed in B-3 (15 feet bgs) and one reflecting a hypothetical, seasonal high (10 feet bgs). Our analyses predicted total, liquefaction-induced settlements of ½ to 1½ inches, increasing with shallower groundwater. In our opinion, these estimates effectively bracket the anticipated, liquefaction-induced settlements, which vary as a function of groundwater level. Shallow subsurface conditions encountered in the other borings advanced at the site were relatively uniform and we anticipate similarly liquefiable soil conditions. With regard to differential settlements, we recommend liquefaction-induced differential settlement be considered as one half of total settlement, or up to about ¾ inch. We recommend the differential settlement be assumed across the short axis of the structure.

3.2.2 Slope Instability

Due to the relatively minimal planned changes in site grade and relatively level topography at the site, the risk of slope instability at the site is considered low.

3.2.3 Surface Rupture

3.2.3.1 Faulting

Although the site is situated in a region of the country with known active faults and historic seismic activity, no known faults exist on or immediately adjacent to the site. Therefore, the risk of surface rupture at the site due to faulting is considered low.

3.2.3.2 Lateral Spread

Surface rupture due to lateral spread can occur on sites underlain by liquefiable soils that are located on or immediately adjacent to slopes steeper than about 3 degrees (20H:1V), and/or adjacent to a free face, such as a stream bank or the shore of an open body of water. During lateral spread, the materials overlying the liquefied soils are subject to lateral movement downslope or toward the free face. The topography across and immediately surrounding the site descends to the northeast at gradients of approximately 16H:1V. Considering the gently sloping topography, lack of local free faces, depth of 10 feet or more to perched groundwater (and therefore to liquefiable soils), and the anticipated discontinuous nature of saturated (and therefore liquefiable) soils, we conclude the risk of surface rupture due to lateral spread is considered very low.

4.0 CONCLUSIONS

Based on the results of our field explorations and analyses, the site may be developed as described in Section 1.1 , provided the recommendations presented in this report are incorporated into the design and development. The principal geotechnical considerations for this project include:

- The presence of near-surface, moisture-sensitive soils that are susceptible to disturbance during wet weather.

- The presence of liquefiable soils in the site subsurface. As discussed above, our analyses indicate up to 1½ inches of total, liquefaction-induced settlement, with up to ¾ inch of associated differential settlement. We anticipate these settlements will be manageable using conventional shallow foundations (i.e. no mitigation will be required). We recommend the project structural engineer review these settlements and evaluate whether mitigation is warranted.
- The presence of very soft to soft and very loose to loose, compressible soils in the subsurface. These soils were encountered between depths of approximately 5 and 15 feet bgs in our borings. Soils above these depths were generally medium stiff to stiff. We recommend shallow foundations be established within 2 feet of existing site grades and be founded on medium stiff to stiff, native silt to sandy silt (ML). If foundations are to be established at lower elevations, remedial measures may be warranted. CGT should review finalized foundation and grading plans to determine if further analysis and supplemental recommendations are warranted.

5.0 RECOMMENDATIONS

The recommendations presented in this report are based on the information provided to us, results of our field investigation and analyses, laboratory data, and professional judgment. CGT has observed only a small portion of the pertinent subsurface conditions. The recommendations are based on the assumptions that the subsurface conditions do not deviate appreciably from those found during the field investigation. CGT should be consulted for further recommendations if the design of the proposed development changes or variations or undesirable geotechnical conditions are encountered during site development.

5.1 Site Preparation

5.1.1 Stripping

Existing vegetation, rooted soils, and undocumented fill soils (if encountered) should be removed from within, and for a minimum 5-foot margin around, proposed building pad and exterior hardscaping areas. Based on the results of our field explorations, topsoil stripping depths are anticipated to be less than ½ foot bgs. Undocumented fill was encountered only in IT-1 to a depth of approximately 3 feet bgs, on the eastern margin of the building area, and was not encountered in borings B-1 through B-3, located within the proposed footprint of the building. These materials may be deeper or shallower at locations away from the completed explorations. The geotechnical engineer or his representative should provide recommendations for actual stripping depths based on observations during site stripping. Stripped surface vegetation and rooted soils should be transported off-site for disposal, or stockpiled for later use in landscaped areas. Stripped, inorganic fill materials should be transported off-site for disposal, or may be stockpiled for later use as structural fill as described in Section 5.4.1 of this report.

5.1.2 Grubbing

Grubbing of trees should include the removal of the root mass and roots greater than ½-inch in diameter. Grubbed materials should be transported off-site for disposal. Root masses from larger trees may extend several feet bgs. Where root masses are removed, the resulting excavation should be properly backfilled with structural fill in conformance with Section 5.4.2 of this report.

5.1.3 Existing Utilities & Below-Grade Structures

All existing utilities at the site should be identified prior to excavation. Abandoned utility lines beneath the new building, pavements, and hardscaping features should be completely removed or grouted full. Soft, loose, or otherwise unsuitable soils encountered in utility trench excavations should be removed and replaced with structural fill in conformance with Section 5.4 this report. Buried structures (i.e. footings, foundation walls, retaining walls, slabs-on-grade, tanks, etc.), if encountered during site development, should be completely removed and replaced with structural fill in conformance with Section 5.4 of this report.

5.1.4 Subgrade Preparation

After site preparation as recommended above, but prior to placement of structural fill and/or aggregate base, the geotechnical engineer or their representative should observe the exposed subgrade soils in order to identify areas of excessive yielding through either proof rolling or probing. Proof rolling of subgrade soils is typically conducted during dry weather using a fully-loaded, 10- to 12-cubic-yard, tandem-axle, tire-mounted, dump truck or equivalent weighted water truck. Areas of limited access or that appear too soft or wet to support proof rolling equipment should be evaluated by probing. During wet weather, subgrade preparation should be performed in general accordance with the recommendations presented in Section 5.3 of this report. If areas of soft soil or excessive yielding are identified, the affected material should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill in conformance with Section 5.4.2 of this report.

5.1.5 Erosion Control

Erosion and sedimentation control measures should be employed in accordance with applicable City, County, and State regulations.

5.2 Temporary Excavations

5.2.1 Overview

Conventional earthmoving equipment in proper working condition should be capable of making necessary excavations for the anticipated site cuts as described earlier in this report. All excavations should be in accordance with applicable OSHA and state regulations. It is the contractor's responsibility to select the excavation methods, to monitor site excavations for safety, and to provide any shoring required to protect personnel and adjacent improvements. A “competent person”, as defined by OR-OSHA, should be on-site during construction in accordance with regulations presented by OR-OSHA. CGT’s current role on the project does <u>not</u> include review or oversight of excavation safety.

5.2.2 OSHA Soil Type

For use in the planning and construction of temporary excavations up to 10 feet in depth, an OSHA soil type “C” should be used for the silt and sandy silt (ML) soils encountered near the surface of the site.

5.2.3 Utility Trenches

Temporary trench cuts should stand near vertical to depths of approximately 4 feet in the native, silt and sandy silt (ML) soils encountered near the surface of the site. If groundwater seepage undermines the stability of the trench, or if sidewall caving is observed during excavation, the sidewalls should be flattened or shored. Depending on the time of year trench excavations occur, trench dewatering may be required in order to maintain dry working conditions. Pumping from sumps located within the trench will likely be effective in removing water resulting from seepage. If groundwater is encountered which can not be removed by dewatering, we recommend placing trench stabilization material at the base of the excavations. Trench stabilization material should be in conformance with Section 5.4.4.

5.2.4 Excavations Near Foundations

Excavations near footings should not extend within a 1½H:1V (horizontal:vertical) plane projected out and down from the outside, bottom edge of the footings. In the event excavation needs to extend below the referenced plane, temporary shoring of the excavation and/or underpinning of the subject footing may be required. The geotechnical engineer should be consulted to review proposed excavation plans for this design case to provide specific recommendations.

5.3 Wet Weather Considerations

For planning purposes, the wet season should be considered to extend from late September to late June. It is our experience that dry weather working conditions should prevail between early July and mid-September. Notwithstanding the above, soil conditions should be evaluated in the field by the geotechnical engineer or their representative at the initial stage of site preparation to determine whether the recommendations within this section should be incorporated into construction.

5.3.1 Overview

The near-surface silt and sandy silt (ML) soils are susceptible to disturbance during wet weather. Trafficability of these soils may be difficult, and significant damage to subgrade soils could occur, if earthwork is undertaken without proper precautions at times when the exposed soils are more than a few percentage points above optimum moisture content. For wet weather construction, site preparation activities may need to be accomplished using track-mounted equipment, loading removed material onto trucks supported on granular haul roads, or other methods to limit soil disturbance. The geotechnical engineer or their representative should evaluate the subgrade during excavation by probing rather than proof rolling. Soils that have been disturbed during site preparation activities, or soft or loose areas identified during probing, should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill in conformance with Section 5.4.2.

5.3.2 Geotextile Separation Fabric

We recommend a geotextile separation fabric be placed to serve as a barrier between the prepared subgrade and granular fill/base rock in areas of repeated or heavy construction traffic. The geotextile fabric should meet the requirements presented in the current Oregon Department of Transportation (ODOT) Standard Specification for Construction, Section 02320.

5.3.3 Granular Working Surfaces (Haul Roads & Staging Areas)

Haul roads subjected to repeated heavy, tire-mounted, construction traffic (e.g. dump trucks, concrete trucks, etc.) will require a minimum of 18 inches of imported granular material. For light staging areas, 12 inches of imported granular material is typically sufficient. Additional granular material or geo-grid reinforcement may be recommended based on site conditions and/or loading at the time of construction. The imported granular material should be in conformance with Section 5.4.2 and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. The prepared subgrade should be covered with geotextile fabric (Section 5.3.2) prior to placement of the imported granular material. The imported granular material should be placed in a single lift (up to 24 inches deep) and compacted using a smooth-drum, non-vibratory roller until well-keyed.

5.3.4 Footing Subgrade Protection

We recommend a minimum of 3 inches of imported granular material to protect fine-grained foundation subgrades from foot traffic during inclement weather. The imported granular material should be in conformance with Section 5.4.2. The maximum particle size should be limited to 1 inch. The imported granular material should be placed in one lift over the prepared, undisturbed subgrade, and compacted using non-vibratory equipment until well keyed.

5.4 Structural Fill

The geotechnical engineer should be provided the opportunity to review all materials considered for use as structural fill (prior to placement). Samples of the proposed fill materials should be submitted to the geotechnical engineer a minimum of 5 business days prior their use on site[8]. The geotechnical engineer or their representative should be contacted to evaluate compaction of structural fill as the material is being placed. Evaluation of compaction may take the form of in-place density tests and/or proof roll tests with suitable equipment. Structural fill should be evaluated at intervals not exceeding every 2 vertical feet as the fill is being placed.

5.4.1 On-Site Soils – General Use

5.4.1.1 Silt and Sandy Silt (ML)
Re-use of these soils as structural fill may be difficult because these soils are sensitive to small changes in moisture content and are difficult, if not impossible, to adequately compact during wet weather. We anticipate the moisture content of these soils will be higher than the optimum moisture content for satisfactory compaction. Therefore, moisture conditioning (drying) should be expected in order to achieve adequate compaction. If used as structural fill, these soils should be free of organic matter, debris, and particles larger than 4 inches. When used as structural fill, these soils should be placed in lifts with a maximum pre-compaction thickness of about 8 inches at moisture contents within –1 and +3 percent of optimum, and compacted to not less than 92 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor).

If the on-site materials cannot be properly moisture-conditioned and/or processed, we recommend using imported granular material for structural fill.

5.4.2 Imported Granular Structural Fill – General Use

Imported granular structural fill should consist of angular pit or quarry run rock, crushed rock, or crushed gravel that is fairly well graded between coarse and fine particle sizes. The granular fill should contain no organic matter, debris, or particles larger than 4 inches, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. For fine-grading purposes, the maximum particle size should be limited to 1½ inches. The percentage of fines can be increased to 12 percent of the material passing the U.S. Standard No. 200 Sieve if placed during dry weather, and provided the fill material is moisture-conditioned, as necessary, for proper compaction. Imported granular fill material should be compacted to

[8] Laboratory testing for moisture density relationship (Proctor) is required. Tests for gradation may be required.

not less than 95 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor). Proper moisture conditioning and the use of vibratory equipment will facilitate compaction of these materials.

Granular fill materials with high percentages of particle sizes in excess of 1½ inches are considered non-moisture-density testable materials. As an alternative to conventional density testing, compaction of these materials should be evaluated by proof roll test observation (deflection tests), where accepted by the geotechnical engineer.

5.4.3 Floor Slab Base Rock

Floor slab base rock should consist of well-graded granular material (crushed rock) containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. Floor slab base rock should be placed in one lift and compacted to not less than 95 percent of the material's maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor). We recommend "choking" the surface of the base rock with sand just prior to concrete placement. Choking means the voids between the largest aggregate particles are filled with sand, but does not provide a layer of sand above the base rock. Choking the base rock surface reduces the lateral restraint on the bottom of the concrete during curing.

5.4.4 Trench Base Stabilization Material

If groundwater is present at the base of utility excavations, trench base stabilization material should be placed. Trench base stabilization material should consist of a minimum of 1 foot of well-graded granular material with a maximum particle size of 4 inches and less than 5 percent material passing the U.S. Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material, placed in one lift (up to 24 inches thick), and compacted until well-keyed.

5.4.5 Trench Backfill Material

Trench backfill for the utility pipe base and pipe zone should consist of granular material as recommended by the utility pipe manufacturer. Trench backfill above the pipe zone should consist of well-graded granular material containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 8 percent material passing the U.S. Standard No. 200 Sieve. As a guideline, trench backfill should be placed in maximum 12-inch-thick lifts. The earthwork contractor may elect to use alternative lift thicknesses based on their experience with specific equipment and fill material conditions during construction in order to achieve the required compaction. The following table presents recommended relative compaction percentages for utility trench backfill.

Table 2 Utility Trench Backfill Compaction Recommendations

Backfill Zone	Recommended Minimum Relative Compaction	
	Structural Areas[1]	Landscaping Areas
Pipe Base and Within Pipe Zone	90% ASTM D1557 or pipe manufacturer's recommendation	88% ASTM D1557 or pipe manufacturer's recommendation
Above Pipe Zone	92% ASTM D1557	90% ASTM D1557
Within 3 Feet of Design Subgrade	95% ASTM D1557	90% ASTM D1557

[1]Includes proposed building, pavement areas, structural fill areas, exterior hardscaping, etc.

5.4.6 Controlled Low-Strength Material (CLSM)

CLSM is a self-compacting, cementitious material that is typically considered when backfilling localized areas. CLSM is sometimes referred to as "controlled density fill" or CDF. Due to its flowable characteristics, CLSM typically can be placed in restricted-access excavations where placing and compacting fill is difficult. If chosen for use at this site, we recommend the CLSM be in conformance with Section 00442 of the most recent, State of Oregon, Standard Specifications for Highway Construction. The geotechnical engineer's representative should observe placement of the CLSM and obtain samples for compression testing in accordance with ASTM D4832. As a guideline, for each day's placement, two compressive strength specimens from the same CLSM sample should be tested. The results of the two individual compressive strength tests should be averaged to obtain the reported 28-day compressive strength. If CLSM is considered for use on this site, please contact the geotechnical engineer for site-specific and application-specific recommendations.

5.5 Shallow Foundations

The recommendations presented in this section assume new foundations are established within 2 feet of existing (at the time of our investigation) site grades, as discussed in Section 4.0 above. For foundations established at depths greater than 2 feet, CGT should be consulted for further evaluation and supplemental recommendations, if warranted.

5.5.1 Subgrade Preparation

Satisfactory subgrade support for shallow foundations can be obtained from the native, medium stiff to stiff silt (ML) anticipated at these depths, or on structural fill placed on these soils. The geotechnical engineer or their representative should be contacted to observe subgrade conditions prior to placement of forms, reinforcement steel, or structural fill (if required). If soft, loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by the geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill in conformance with Section 5.4.2. The maximum particle size of over-excavation backfill should be limited to 1½ inches. All granular pads for footings should be constructed a minimum of 6 inches wider on each side of the footing for every vertical foot of over-excavation.

5.5.2 Minimum Footing Width & Embedment

Minimum footing widths should be in conformance with the current OSSC. As a guideline, CGT recommends individual spread footings have a minimum width of 24 inches. We recommend continuous wall footings have a minimum width of 18 inches. All footings should be founded at least 18 inches below the lowest, permanent adjacent grade to develop lateral capacity and for frost protection.

5.5.3 Bearing Pressure & Settlement

Footings founded as recommended above should be proportioned for a maximum allowable soil bearing pressure of 2,000 pounds per square foot (psf). This bearing pressure is a net bearing pressure, applies to the total of dead and long-term live loads, and may be increased by one-third when considering seismic or wind loads. For foundations founded as recommended above, total settlement of foundations is anticipated to be less than 1 inch. Differential settlements between adjacent columns and/or bearing walls should not exceed ½-inch. If an increased allowable soil bearing pressure is desired, the geotechnical engineer should be consulted.

5.5.4 Lateral Capacity

A maximum passive (equivalent fluid) earth pressure of 150 pounds per cubic foot (pcf) is recommended for design of footings cast neat into excavations in suitable native soil or confined by the recommended imported granular structural fill that is properly placed and compacted during construction. The recommended earth pressure was computed using a factor of safety of 1½, which is appropriate due to the amount of movement required to develop full passive resistance. In order to develop the above capacity, the following should be understood:

1. Concrete must be poured neat in excavations or the foundations must be backfilled with imported granular structural fill,
2. The adjacent grade must be level,
3. The static ground water level must remain below the base of the footings throughout the year.
4. Adjacent floor slabs, pavements, or the upper 12-inch depth of adjacent, unpaved areas should not be considered when calculating passive resistance.

An ultimate coefficient of friction equal to 0.35 may be used when calculating resistance to sliding for footings founded on the native soils described above. An ultimate coefficient of friction equal to 0.45 may be used when calculating resistance to sliding for footings founded on a minimum of 6 inches of imported granular structural fill (crushed rock) that is properly placed and compacted during construction.

5.5.5 Subsurface Drainage

We recommend placing foundation drains at the exterior, base elevations of perimeter continuous wall footings. Foundation drains should consist of a minimum 4-inch diameter, perforated, PVC drainpipe wrapped with a non-woven geotextile filter fabric. The drains should be backfilled with a minimum of 2 cubic feet of open graded drain rock per lineal foot of pipe. The drain rock should also be encased in a geotextile fabric in order to provide separation from the surrounding fine-grained soils. Foundation drains should be positively sloped and should outlet to a suitable discharge point. The geotechnical engineer or their representative should observe the drains prior to backfilling. Roof drains should not be tied into foundation drains.

5.6 Floor Slabs

5.6.1 Subgrade Preparation

Satisfactory subgrade support for slabs constructed on grade, supporting up to 150 psf area loading, can be obtained from the native, medium stiff to stiff silt (ML) or new structural fill that is properly placed and compacted on this soil during construction. The geotechnical engineer or their representative should observe floor slab subgrade soils to evaluate surface consistencies. If soft, loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by the CGT geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill as described in Section 5.4.2.

5.6.2 Crushed Rock Base

Concrete floor slabs should be supported on a minimum 6-inch-thick layer of crushed rock (base rock) in conformance with Section 5.4.3. The surface of the base rock should be choked with sand just prior to vapor barrier membrane or concrete placement. Choking means the voids between the largest aggregate particles are filled with sand, but does not provide a layer of sand above the base rock. Choking the base rock surface reduces the lateral restraint on the bottom of the concrete during curing and helps reduce punctures in vapor barrier membranes[9] due to foot traffic.

5.6.3 Design Considerations

For floor slabs constructed with a 6-inch base rock layer as recommended, an effective modulus of subgrade reaction of 75 pounds per cubic inch (pci) is recommended for the design of the floor slab. A higher effective modulus of subgrade reaction can be obtained by increasing the base rock thickness. Please contact the geotechnical engineer for additional recommendations if a higher modulus is desired. Floor slabs constructed as recommended will likely settle less than ½-inch. For general floor slab construction, slabs should be jointed around columns and walls to permit slabs and foundations to settle differentially.

5.6.4 Subgrade Moisture Considerations

Liquid moisture and moisture vapor should be expected at the subgrade surface. The recommended crushed rock base is anticipated to provide protection against liquid moisture. Where moisture vapor emission through the slab must be minimized, e.g. impervious floor coverings, storage of moisture sensitive materials directly on the slab surface, etc., a vapor retarding membrane or vapor barrier below the slab should be considered. Factors such as cost, special considerations for construction, floor coverings, and end use suggest that the decision regarding a vapor retarding membrane or vapor barrier be made by the architect and owner.

If a vapor retarder or vapor barrier is placed below the slab, its location should be based on current American Concrete Institute (ACI) guidelines, ACI 302 Guide for Concrete Floor and Slab Construction. In some cases, this indicates placement of concrete directly on the vapor retarder or barrier. Please note that the placement of concrete directly on impervious membranes increases the risk of plastic shrinkage cracking and slab curling in the concrete. Construction practices to reduce or eliminate such risk, as described in ACI 302, should be employed during concrete placement.

[9] Not typically required for polyolefin membranes due to their puncture resistance.

5.7 Pavements

CGT performed a quantitative structural capacity evaluation of the existing pavements at the site, the results of which are presented in Appendix C.

5.8 Additional Considerations

5.8.1 Drainage

Subsurface drains should be connected to the nearest storm drain, on-site infiltration system (to be designed by others) or other suitable discharge point. Paved surfaces and grading near or adjacent to the building should be sloped to drain away from the building. Surface water from paved surfaces and open spaces should be collected and routed to a suitable discharge point. Surface water should not be directed into foundation drains.

5.8.2 Expansive Potential

The near surface native soils consist of low plasticity silts (ML). These soils are not considered to be susceptible to appreciable movements from changes in moisture content. Accordingly, no special considerations are required to mitigate expansive potential of the near surface soils at the site.

6.0 RECOMMENDED ADDITIONAL SERVICES

6.1 Design Review

Geotechnical design review is of paramount importance. We recommend the geotechnical design review take place prior to releasing bid packets to contractors.

6.2 Observation of Construction

Satisfactory earthwork, foundation, floor slab, and pavement performance depends to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during subsurface explorations, and recognition of changed conditions often requires experience. We recommend that qualified personnel visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those observed to date and anticipated in this report. We recommend the geotechnical engineer or their representative attend a pre-construction meeting coordinated by the contractor and/or developer. The project geotechnical engineer or their representative should provide observations and/or testing of at least the following earthwork elements during construction:

- Site Stripping & Grubbing
- Subgrade Preparation for Shallow Foundations, Structural Fills, Floor Slabs, and Pavements
- Compaction of Structural Fill and Utility Trench Backfill
- Compaction of Base Rock for Floor Slabs & Pavements
- Compaction of HMAC for Pavements

It is imperative that the owner and/or contractor request earthwork observations and testing at a frequency sufficient to allow the geotechnical engineer to provide a final letter of compliance for the earthwork activities.

7.0 LIMITATIONS

We have prepared this report for use by the owner/developer and other members of the design and construction team for the proposed development. The opinions and recommendations contained within this report are forwarded to assist in the planning and design process and are not intended to be, nor should they be construed as, a warranty of subsurface conditions.

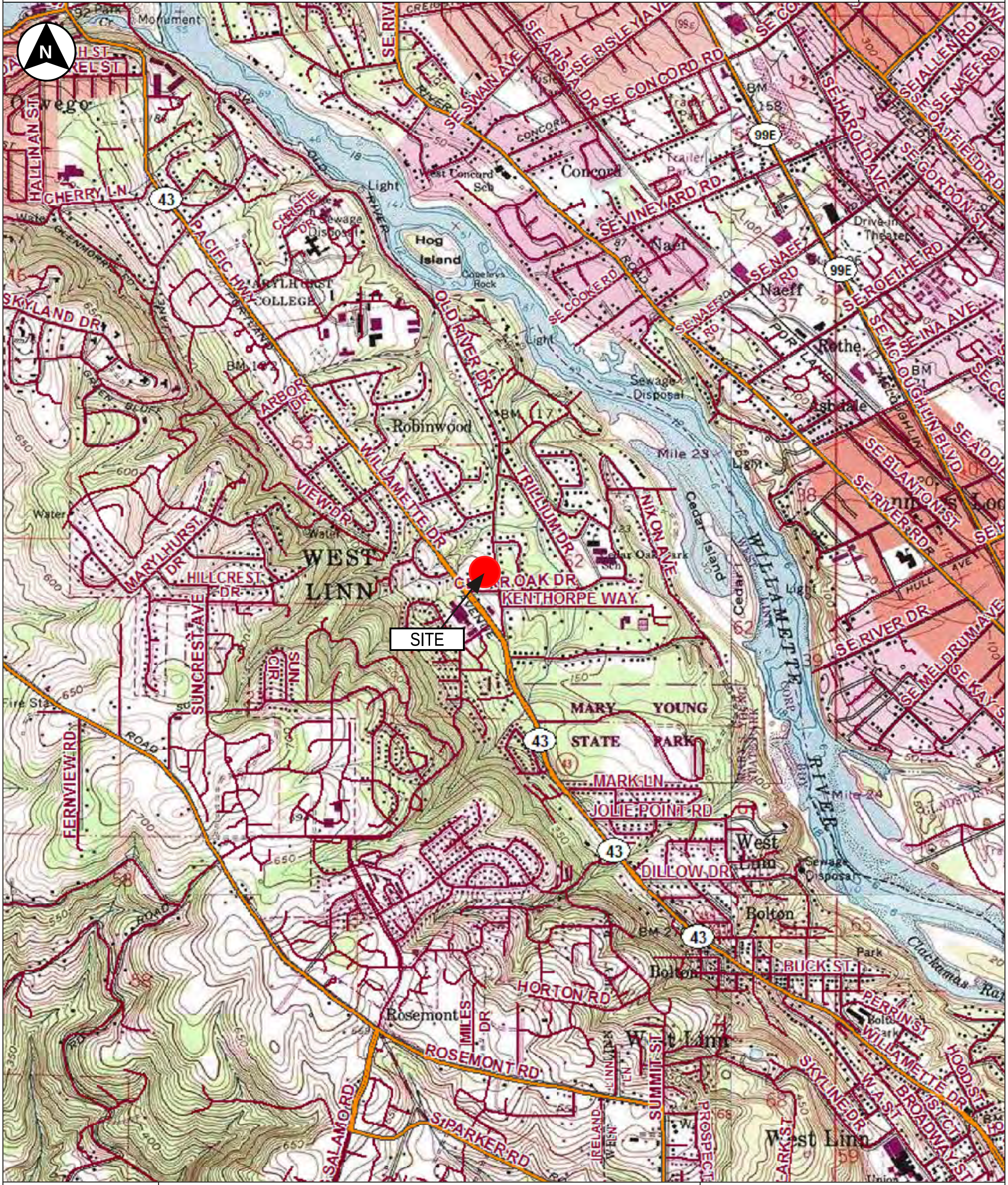
We have made observations based on our explorations that indicate the soil conditions at only those specific locations and only to the depths penetrated. These observations do not necessarily reflect soil types, strata thickness, or water level variations that may exist between or away from our explorations. If subsurface conditions vary from those encountered in our site explorations, CGT should be alerted to the change in conditions so that we may provide additional geotechnical recommendations, if necessary. Observation by experienced geotechnical personnel should be considered an integral part of the construction process.

The owner/developer is responsible for ensuring that the project designers and contractors implement our recommendations. When the design has been finalized, prior to releasing bid packets to contractors, we recommend that the design drawings and specifications be reviewed by our firm to see that our recommendations have been interpreted and implemented as intended. If design changes are made, we request that we be retained to review our conclusions and recommendations and to provide a written modification or verification. Design review and construction phase testing and observation services are beyond the scope of our current assignment, but will be provided for an additional fee.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

Geotechnical engineering and the geologic sciences are characterized by a degree of uncertainty. Professional judgments presented in this report are based on our understanding of the proposed construction, familiarity with similar projects in the area, and on general experience. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared; no warranty, expressed or implied, is made. This report is subject to review and should not be relied upon after a period of three years.

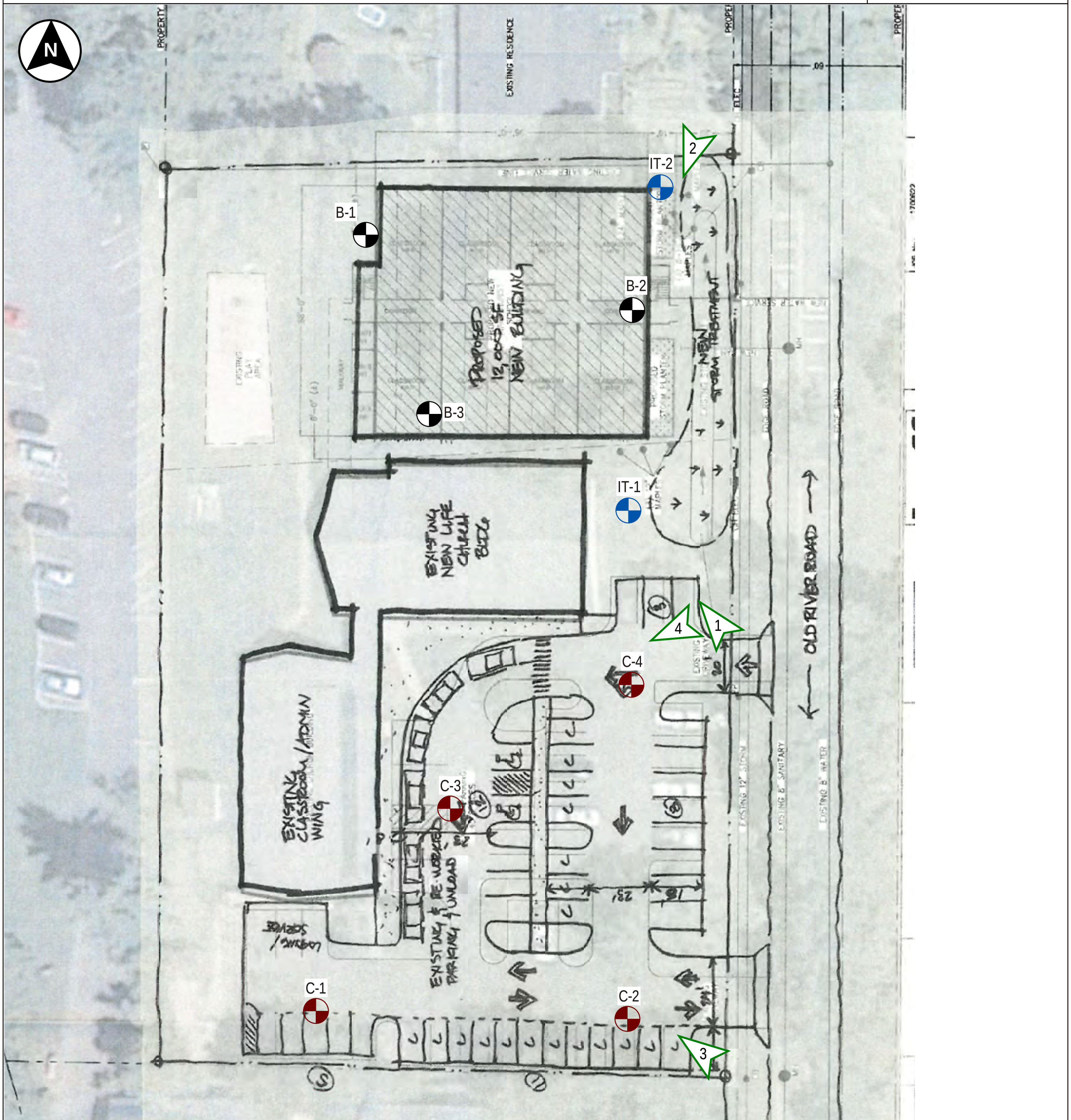
MARYLHURST SCHOOL NEW LIFE CHURCH SITE EXPANSION - WEST LINN, OREGON ***Project Number G1804863***	**FIGURE 1** **Site Location**



CARLSON CGT GEOTECHNICAL 503-601-8250 Drafted by: CRH	Map created with TOPO!™, © 2006 National Geographic Holdings USGS 7.5 Minute Topographic Map Series, Lake Oswego, Oregon Quadrangle, 1984. Township 2 South, Range 1 East, Section 24 Willamette Meridian	Latitude: 45.388012° North Longitude: 122.640171° West 1 Inch = 2,000 feet 0 2000 4000

MARYLHURST SCHOOL NEW LIFE CHURCH SITE EXPANSION - WEST LINN, OREGON
Project Number G1804863

Figure 2
Site Plan



LEGEND

B-1	Hollow-stem auger or mud rotary boring	C-1	Pavement core, DCP test, and hand auger boring
IT-1	Infiltration test boring	1	Site photograph shown on Figure 3

CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by: CRH

NOTES: Drawing based on Preliminary Site Plan (Sheet C-1.0, dated January 3, 2018) prepared by KPFF, modified by CGT. Locations noted are approximate.

1 Inch = 50 Feet

0 50 100

Photograph 1: Photograph taken in the central northeastern section of the site. Shows the locations of IT-1 and IT-2.

Photograph 2: Photograph of the northeastern portion of the site. Shows the locations of IT-1 and IT-2.

Photograph 3: Photograph taken in southeastern portion of the site. Shows the location of C-2.

Photograph 4: Photograph taken in the central northeastern section of the site. Shows the location of C-4.

See Figure 2 for approximate photograph locations and directions. Photographs were taken at the time of our fieldwork.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
Phone: (503) 601-8250
Fax: (503) 601-8254

Bend Office **(541) 330-9155**
Eugene Office **(541) 345-0289**
Salem Office **(503) 589-1252**
Tigard Office **(503) 684-3460**

Appendix A: Subsurface Investigation and Laboratory Testing

Marylhurst School New Life Church Site Expansion
19915 Old River Drive
West Linn, Oregon

CGT Project Number G1804863

July 19, 2018

Prepared For:

Ms. Sheila Walker
The Marylhurst School
1232 Linn Avenue
Oregon City, Oregon 97045

Prepared by
Carlson Geotechnical

A.1.0 SUBSURFACE INVESTIGATION

Our field investigation consisted of nine borings completed in June 2018. The approximate exploration locations are shown on the Site Plan, attached to the geotechnical report as Figure 2. The exploration locations shown therein were determined based on measurements from existing site features (buildings, etc.) and are approximate. Surface elevations indicated on the logs were estimated based on 2-foot topographic contours available from Metro's Regional Land Information System (RLIS)[1] and are approximate.

A.1.1 Drilled Borings

Three borings (B-1 through B-3) were advanced at the site on June 14, 2018, to depths ranging from about 21½ to 61½ feet bgs, using a CME 75 track-mounted drill rig provided and operated by our subcontractor, Western States Soil Conservation of Hubbard, Oregon. The borings were advanced using the hollow-stem auger and mud rotary drilling techniques. Upon completion, the borings were backfilled with granular bentonite. Drilling wastes (cuttings and drilling fluids) were left onsite.

Standard Penetration Tests (SPTs) were conducted within the borings using a split-spoon sampler in general accordance with American Society for Testing and Materials (ASTM) D1586. The SPTs were conducted at 2½- to 5-foot intervals to the termination depths of the borings. The SPT is described on the attached Exploration Key, Figure A1.

CGT also advanced two borings (IT-1 and IT-2) for the purposes of infiltration testing. The borings were advanced to depths of approximately 3½ to 4 feet bgs using a solid-stem auger powered by a walk-behind, Toro track-mounted rig provided and operated by CGT.

A.1.2 Pavement Cores and Hand Auger Borings

CGT advanced four pavement cores (C-1 through C-4) within the onsite parking lot on June 29, 2018. Three-inch diameter hand auger borings were advanced through the core holes to depths of 2 to 2½ feet bgs in order to characterize pavement subgrade soils. The hand auger borings were loosely backfilled with the excavated materials and the pavement surface patched with cold mix asphalt upon completion.

A.1.3 Dynamic Cone Penetrometer Tests

In conjunction with the hand auger borings, we performed dynamic cone penetrometer tests to depths of up to 3 feet bgs. The DCP tests were performed using a Dynamic Cone Penetrometer (DCP) provided and operated by CGT. The DCP test is described on the attached Exploration Key, Figure A1, and the results are shown on the respective exploration log.

A.1.4 Material Classification & Sampling

Soil samples were obtained at selected intervals in the borings using the referenced split-spoon (SPT) sampler and thin-walled, steel (Shelby) tube samplers, detailed on Figure A1. Representative grab samples were obtained at select intervals within the solid stem auger and hand auger borings. A qualified member of CGT's staff collected the samples and logged the soils in general accordance with the Visual-Manual Procedure (ASTM 2488). An explanation of this classification system is attached as Figure A2. The SPT and grab samples were stored in sealable plastic bags and the Shelby tube samples were sealed with caps

---

[1] Metro Regional Government, 2018. MetroMap Regional Land Information System (RLIS) data, *accessed July 2018,* from Metro website: http://gis.oregonmetro.gov/metromap/.

and tape and transported to our soils laboratory for further examination and testing. Our geotechnical staff visually examined all samples in order to refine the initial field classifications.

A.1.5 Subsurface Conditions

Subsurface conditions are summarized in Section 2.3 of the geotechnical report. Detailed logs of the explorations are attached as Figures A3 through A11. A key for symbols and in-situ test methods shown on the logs is attached as Figure A1.

A.2.0 LABORATORY TESTING

Laboratory testing was performed on samples collected in the field to refine our initial field classifications and determine in-situ parameters. Laboratory testing included the following:

- Twenty-two moisture content determinations (ASTM D2216).
- Three Atterberg limits (plasticity) tests (ASTM D4318).
- Two percentage passing the U.S. Standard No. 200 Sieve tests (ASTM D1140).
- One shelby tube unit weight test (weight-volume measurement).

Results of the laboratory tests are shown on the exploration logs.

MARYLHURST SCHOOL NEW LIFE CHURCH SITE EXPANSION - WEST LINN, OREGON ***Project Number G1804863***	**FIGURE A1** **Exploration Key**

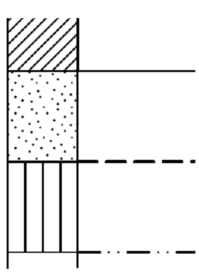
GEOTECHNICAL LABORATORY TESTING

PL — MC — LL	Atterberg limits (plasticity) test results (ASTM D4318): PL = Plastic Limit, LL = Liquid Limit, and MC= Moisture Content (ASTM D2216)
□ FINES CONTENT (%)	Percentage passing the U.S. Standard No. 200 Sieve (ASTM D1140)

SAMPLING

GRAB	Grab sample
SPT	**Standard Penetration Test** (SPT) consists of driving a 2-inch, outside-diameter, split-spoon sampler into the undisturbed formation with repeated blows of a 140-pound, hammer falling a vertical distance of 30 inches (ASTM D1586). The number of blows (N-value) required to drive the sampler the last 12 inches of an 18-inch sample interval is used to characterize the soil consistency or relative density. The drill rig was equipped with an cat-head or automatic hammer to conduct the SPTs. The observed N-values, hammer efficiency, and N_{60} are noted on the boring logs.
MC	**Modified California** sampling consists of 3-inch, outside-diameter, split-spoon sampler (ASTM G3550) driven similarly to the SPT sampling method described above. A sampler diameter correction factor of 0.44 is applied to calculate the equivalent SPT N_{60} value per Lacroix and Horn, 1973.
CORE	**Rock Coring** interval
SH	**Shelby Tube** is a 3-inch, inner-diameter, thin-walled, steel tube push sampler (ASTM D1587) used to collect relatively undisturbed samples of fine-grained soils.
WDCP	**Wildcat Dynamic Cone Penetrometer** (WDCP) test consists of driving 1.1-inch diameter, steel rods with a 1.4-inch diameter, cone tip into the ground using a 35-pound drop hammer with a 15-inch free-fall height. The number of blows required to drive the steel rods is recorded for each 10 centimeters (3.94 inches) of penetration. The blow count for each interval is then converted to the corresponding SPT N_{60} values.
DCP	**Dynamic Cone Penetrometer** (DCP) test consists of driving a 20-millimeter diameter, hardened steel cone on 16-millimeter diameter steel rods into the ground using a 10-kilogram drop hammer with a 460-millimeter free-fall height. The depth of penetration in millimeters is recorded for each drop of the hammer.
POCKET PEN. (tsf)	**Pocket Penetrometer** test is a hand-held instrument that provides an approximation of the unconfined compressive strength in tons per square foot (tsf) of cohesive, fine-grained soils.

CONTACTS



Observed (measured) contact between soil or rock units.

Inferred (approximate) contact between soil or rock units.

Transitional (gradational) contact between soil or rock units.

ADDITIONAL NOTATIONS

Italics	Notes drilling action or digging effort
{ Braces }	Interpretation of material origin/geologic formation (e.g. { Base Rock } or { Columbia River Basalt })

All measurements are approximate.

Classification of Terms and Content

NAME: Group Name and Symbol
Relative Density or Consistency
Color
Moisture Content
Plasticity
Other Constituents
Other: Grain Shape, Approximate Gradation
Organics, Cement, Structure, Odor, etc.
Geologic Name or Formation

USCS Grain Size

Fines		<#200 (0.075 mm)
Sand	Fine Medium Coarse	#200 - #40 (0.425 mm) #40 - #10 (2 mm) #10 - #4 (4.75)
Gravel	Fine Coarse	#4 - 0.75 inch 0.75 inch - 3 inches
Cobbles		3 to 12 inches; scattered <15% estimated numerous >15% estimated
Boulders		> 12 inches

Relative Density or Consistency

Granular Material		Fine-Grained (cohesive) Materials				
SPT N-Value	Density	SPT N-Value	Torvane tsf Shear Strength	Pocket Pen tsf Unconfined	Consistency	Manual Penetration Test
		<2	<0.13	<0.25	Very Soft	Thumb penetrates more than 1 inch
0 - 4	Very Loose	2 - 4	0.13 - 0.25	0.25 - 0.50	Soft	Thumb penetrates about 1 inch
4 - 10	Loose	4 - 8	0.25 - 0.50	0.50 - 1.00	Medium Stiff	Thumb penetrates about ¼ inch
10 - 30	Medium Dense	8 - 15	0.50 - 1.00	1.00 - 2.00	Stiff	Thumb penetrates less than ¼ inch
30 - 50	Dense	15 - 30	1.00 - 2.00	2.00 - 4.00	Very Stiff	Readily indented by thumbnail
>50	Very Dense	>30	>2.00	>4.00	Hard	Difficult to indent by thumbnail

Moisture Content

Dry: Absence of moisture, dusty, dry to the touch
Damp: Some moisture but leaves no moisture on hand
Moist: Leaves moisture on hand
Wet: Visible free water, likely from below water table

	Plasticity	Dry Strength	Dilatancy	Toughness
ML	Non to Low	Non to Low	Slow to Rapid	Low, can't roll
CL	Low to Medium	Medium to High	None to Slow	Medium
MH	Medium to High	Low to Medium	None to Slow	Low to Medium
CH	Medium to High	High to Very High	None	High

Structure

Stratified: Alternating layers of material or color >6 mm thick
Laminated: Alternating layers < 6 mm thick
Fissured: Breaks along definite fracture planes
Slickensided: Striated, polished, or glossy fracture planes
Blocky: Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lenses: Has small pockets of different soils, note thickness
Homogeneous: Same color and appearance throughout

Visual-Manual Classification

Major Divisions			Group Symbols	Typical Names
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: 50% or more *retained* on the No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel/sand mixtures, little or no fines
			GP	Poorly-graded gravels and gravel/sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel/sand/silt mixtures
			GC	Clayey gravels, gravel/sand/clay mixtures
	Sands: More than 50% *passing* the No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly-graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
Fine-Grained Soils: 50% or more Passes No. 200 Sieve	Silt and Clays Low Plasticity Fines		ML	Inorganic silts, rock flour, clayey silts
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silt and organic silty clays of low plasticity
	Silt and Clays High Plasticity Fines		MH	Inorganic silts, clayey silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

FIGURE A3

Boring B-1

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR
DATE STARTED 6/14/18 **GROUND ELEVATION** 151 ft
ELEVATION DATUM Feet MSL
WEATHER Cloudy ~65 degrees **SURFACE** Grass
LOGGED BY MLL **REVIEWED BY** JAJ
DRILLING CONTRACTOR Western States Soil Conservation
SEEPAGE 11.5 ft / El. 139.5 ft
EQUIPMENT CME 75 Truck
GROUNDWATER AT END ---
DRILLING METHOD 6-inch (OD) Hollow Stem Auger
GROUNDWATER 0.5 HOURS AFTER DRILLING 13.5 ft / El. 137.5 ft

ELEVATION (ft)	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 75.1%	DRY UNIT WT. (pcf)	MC (%)
	OL	**SOD:** Upper 4 inches		0						
150	ML	**SILT:** Stiff, brown to gray-brown, moist, low plasticity.								
					SPT 1	78	4-4-6 (10)	9		26
145	ML	**SANDY SILT:** Soft, brown, moist, low to no plasticity, fine grained sand.		5	SPT 2	100	1-2-1 (3)	3		36
					SPT 3	100	0-1-1 (2)	2		
140		Very soft at 10 feet bgs.		10	SPT 4	100	0-0-0 (0)			38
		Wet below 11½ feet bgs.	Seepage							
		Driller notes stiffer soil based on pushing Shelby tube.	Groundwater 0.5 hr		SH 5	17				
135		Stiff, blue-gray below 15 feet bgs.		15	SPT 6	100	2-3-5 (8)	9		32
130		Very stiff at 20 feet bgs.		20	SPT 7	100	2-6-8 (14)	17		

▲ SPT N_{60} VALUE ▲ — PL ● MC LL — □ FINES CONTENT (%) □ — 0 20 40 60 80 100

- Boring terminated at 21½ feet bgs.
- No caving observed.
- Groundwater encountered at 11½ feet bgs.
- Boring backfilled with bentonite.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

FIGURE A4

Boring B-2

CLIENT	The Marylhurst School - Ms. Sheila Walker	**PROJECT NAME**	Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER	G1804863	**PROJECT LOCATION**	19915 Old River Drive, West Linn, OR
DATE STARTED	6/14/18	**GROUND ELEVATION**	146 ft
ELEVATION DATUM	Feet MSL		
WEATHER	Cloudy ~65 degrees	**SURFACE**	Grass
LOGGED BY	MLL	**REVIEWED BY**	JAJ
DRILLING CONTRACTOR	Western States Soil Conservation	**SEEPAGE**	19.0 ft / El. 127.0 ft
EQUIPMENT	CME 55 Track	**GROUNDWATER AT END**	---
DRILLING METHOD	6-inch (OD) Hollow Stem Auger	**GROUNDWATER AFTER DRILLING**	---

ELEVATION (ft)	GROUP SYMBOL	MATERIAL DESCRIPTION
146	OL	**SOD:** Upper 4 inches
145 – 142	ML	**SILT:** Stiff, brown, moist, medium plasticity, trace orange and tan mottling, trace roots up to ¼ inches diameter.
141 – 138.5	ML	Medium stiff, low to medium plasticity, trace fine grained sand below 5 feet bgs.
138.5 – 136	ML	**SANDY SILT:** Medium stiff, brown, moist, low plasticity, fine grained sand.
136 – 135	SP	**POORLY GRADED SAND:** Loose, brown, moist, fine grained.
135 – 133.5	ML	**SANDY SILT:** Medium stiff, brown, moist, low plasticity.
133.5 – 126	SM	**SILTY SAND:** Very loose, brown, moist, fine grained. Orange and tan mottling below 15 feet bgs.
126 – 124.5	CH	**FAT CLAY:** Stiff, gray, moist to wet, medium to high plasticity, some tannish mottling.

SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 81.2%	DRY UNIT WT. (pcf)	MC (%)
SPT 1	44	3-5-7 (12)	12		27
SPT 2	100	2-3-4 (7)	7		34
SPT 3	100	2-2-3 (5)	5		
SPT 4	100	0-2-2 (4)	4		35
SPT 5	100	0-1-2 (3)	3		
SPT 6	100	0-0-1 (1)	1		31
SPT 7	100	2-4-4 (8)	10		

▲ SPT N_{60} VALUE ▲ — PL, MC, LL — ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)

- Boring terminated at 21½ feet bgs.
- No caving observed.
- Groundwater encountered at 20 feet bgs.
- Boring backfilled with bentonite.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

FIGURE A5

Boring B-3

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR
DATE STARTED 6/14/18 **GROUND ELEVATION** 154 ft
ELEVATION DATUM Feet MSL
WEATHER Cloudy ~65 degrees **SURFACE** Grass
LOGGED BY MLL **REVIEWED BY** JAJ
DRILLING CONTRACTOR Western States Soil Conservation
SEEPAGE ---
EQUIPMENT CME 75 Truck
GROUNDWATER AT END ---
DRILLING METHOD Mud Rotary
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GROUP SYMBOL	MATERIAL DESCRIPTION
154	OL	**SOD:** Upper 4 inches
	ML	**SILT:** Medium stiff to stiff, dark brown to gray-brown, moist, low plasticity. Some tan mottling below 5 feet bgs. Soft and sandy at 7½ feet bgs. Gray below 12 feet bgs. Saturated at 15 feet bgs.
	CH	**FAT CLAY:** Stiff to very stiff, gray, moist, medium to high plasticity. Moist to wet, high plasticity between 20 and 25 feet bgs. Moist, medium to high plasticity, some orange staining between 25 and 30 feet bgs. Mottled gray between 30 and 35 feet bgs.
	SP	**POORLY GRADED SAND:** Dense, brown, moist, fine grained.
	CH	**FAT CLAY:** Hard, gray, moist, high plasticity, some orange, yellow, and red mottling.
	SM	**SILTY SAND:** Dense to very dense, brown, moist, fine to medium grained.
	CH	**FAT CLAY:** Hard, brown and gray, moist, high plasticity.
	SC	**CLAYEY SAND:** Very dense, brown and gray, medium to coarse grained, medium plasticity fines.
	CH	**FAT CLAY:** Hard, yellow-brown, moist, high plasticity.

- Boring terminated at 61½ feet bgs.
- No caving observed.
- Groundwater inferred at 15 feet bgs.
- Boring loosely backfilled with bentonite.

SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 75.1%	DRY UNIT WT. (pcf)	PL	MC	LL	FINES CONTENT (%)
SPT 1	67	2-1-3 (4)	4			25		
SPT 2	100	2-4-5 (9)	8			37		
SPT 3	100	1-1-2 (3)	3			36		
SH 4	83			85		38		
SPT 5	100	0-2-1 (3)	3		27	39	36	86
SPT 6	100	1-1-6 (7)	7			33		
SPT 7	100	5-7-9 (16)	19		23	28	56	
SPT 8	100	5-7-10 (17)	20			33		
SPT 9	100	2-3-5 (8)	10		26	33	57	
SPT 10	100	8-14-17 (31)	39					
SPT 11	100	18-20-26 (46)	58			29		18
SPT 12	100	16-17-17 (34)	43			26		
SPT 13	100	9-12-12 (24)	30			28		
SPT 14	100	22-31-26 (57)	71			27		
SPT 15	100	12-16-26 (42)	53			37		

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

FIGURE A6

Boring IT-1

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR
DATE STARTED 6/13/18
GROUND ELEVATION 146 ft
ELEVATION DATUM Feet MSL
WEATHER Cloudy ~55 degrees
SURFACE Grass
LOGGED BY CRH
REVIEWED BY JAJ
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Toro Dual Tracked Auger
GROUNDWATER AT END ---
DRILLING METHOD Test Pit & Infiltration Test
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE	DRY UNIT WT. (pcf)	▲ SPT N_{SPT} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
					0						
		ML	**SILT FILL:** Brown, dry, low plasticity, some angular gravel up to ½ inches in diameter, some gray mottling, some rootlets and trace roots up to ¼ inch in diameter.								
145					1						
			Gray-brown, increased gravel between 1 and 3 feet bgs.								
			Some roots ½ inches in diameter between 1½ and 2 feet bgs.								
144					2						
143					3						
		ML	**SILT:** Brown with gray and orange mottling, moist, low plasticity.								
						GRAB 1	100				
142					4						
141											

• Boring terminated at 4 feet bgs.
• No caving observed.
• No groundwater encountered.
• Boring loosely backfilled with excavated materials.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

FIGURE A7

Boring IT-2

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR
DATE STARTED 6/13/18
GROUND ELEVATION 144 ft
ELEVATION DATUM Feet MSL
WEATHER Cloudy ~55 degrees
SURFACE Dirt
LOGGED BY CRH
REVIEWED BY JAJ
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Toro Dual Tracked Auger
GROUNDWATER AT END ---
DRILLING METHOD Test Pit & Infiltration Test
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE	DRY UNIT WT. (pcf)	▲ SPT N_{SPT} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
					0						
		ML	**SILT:** Brown to gray-brown, moist, low plasticity, rootlets in upper 6 inches, some roots up to ½ inch in diameter, and trace subrounded gravel up to ¾ inch in diameter.								
143					1						
142					2						
			Some gray and orange mottling below 2 feet bgs.								
			Orange-brown below 2½ feet bgs.								
141					3						
			Brown below 3 feet bgs.			GRAB 1	100				
140											
139											

• Boring terminated at 3½ feet bgs.
• No caving observed.
• No groundwater encountered.
• Boring loosely backfilled with excavated materials.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

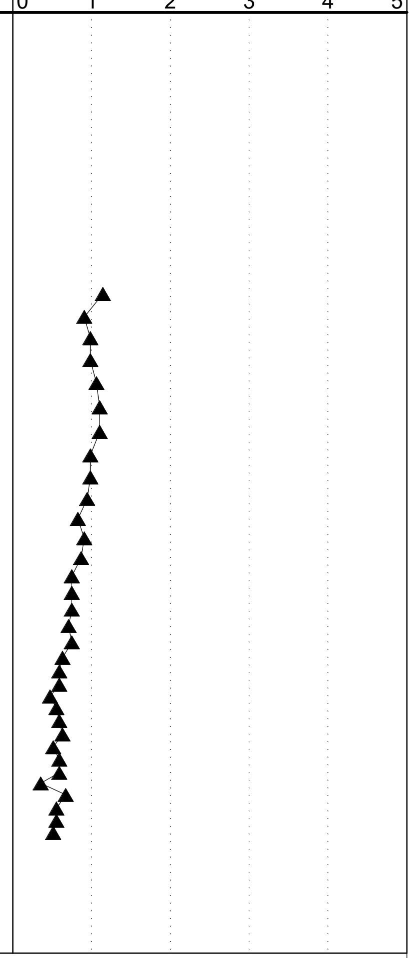
FIGURE A8

Boring C-1

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR
DATE STARTED 6/29/18
GROUND ELEVATION 164 ft
ELEVATION DATUM Feet MSL
WEATHER Sunny~68 degrees
SURFACE Asphalt Concrete
LOGGED BY CRH
REVIEWED BY JAJ
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Asphalt Core, Hand Auger, & DCP
GROUNDWATER AT END ---
DRILLING METHOD Asphalt Core, Hand Auger, & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	FINES CONTENT (%)
			ASPHALT CONCRETE: 1 lift, 3 inches thick.	0				
163		GP	**POORLY GRADED GRAVEL FILL:** Dense, gray, wet (water added during coring), angular to subangular, up to 1 inch in size, silty in lower few inches.	1				
162		ML	**SILT:** Brown with some gray-brown and orange-brown, moist, medium plasticity.	2	GRAB 1			
161				3				
160								
159								

▲ DCP (Inches Per Blow) ▲



• Boring terminated at 2 feet bgs.
• No caving observed.
• No groundwater encountered.
• Boring loosely backfilled with excavated materials and surface patched cold patch asphalt.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

FIGURE A9

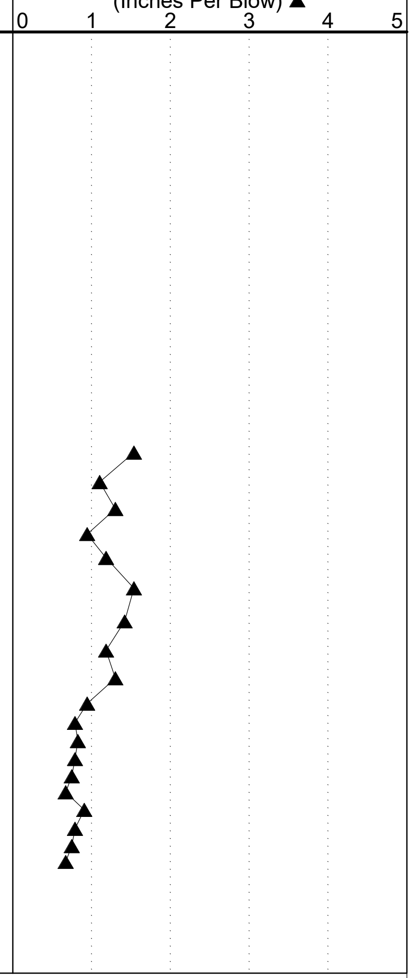
Boring C-2

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR

DATE STARTED 6/29/18 **GROUND ELEVATION** 157 ft **ELEVATION DATUM** Feet MSL
WEATHER Sunny~68 degrees **SURFACE** Asphalt Concrete **LOGGED BY** CRH **REVIEWED BY** JAJ
DRILLING CONTRACTOR CGT **SEEPAGE** ---
EQUIPMENT Asphalt Core, Hand Auger, & DCP **GROUNDWATER AT END** ---
DRILLING METHOD Asphalt Core, Hand Auger, & DCP **GROUNDWATER AFTER DRILLING** ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	FINES CONTENT (%)
			ASPHALT CONCRETE: 1 lift, 4 inches thick.	0				
156		GP	**POORLY GRADED GRAVEL FILL:** Dense, gray, wet (water added during coring), angular to subangular, up to 1 inch in size, silty in lower few inches.	1				
155		ML	**SILT:** Gray with orange-red mottling, moist, medium plasticity, trace rootlets, trace black concretions, and some tan concretions.	2	GRAB 1			
154				3				
153								
152								

▲ DCP (Inches Per Blow) ▲



- Boring terminated at 2¼ feet bgs.
- No caving observed.
- No groundwater encountered.
- Boring loosely backfilled with excavated materials and surface patched cold patch asphalt.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

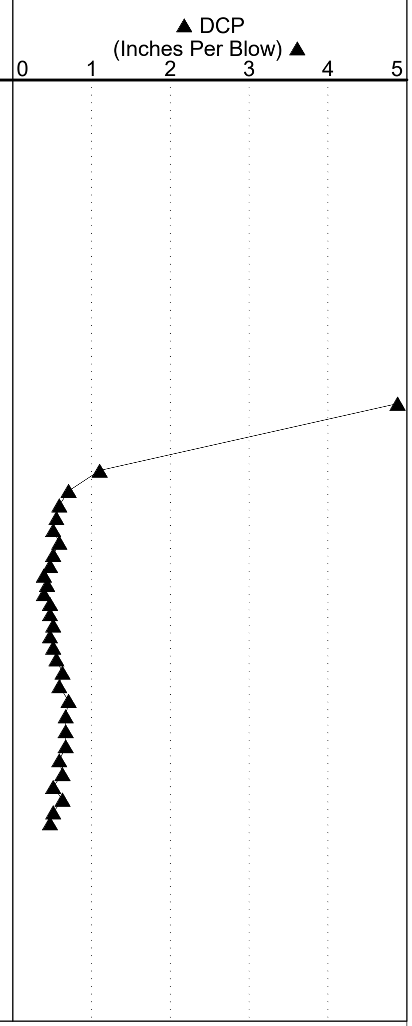
FIGURE A10

Boring C-3

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR

DATE STARTED 6/29/18
GROUND ELEVATION 157 ft
ELEVATION DATUM Feet MSL
WEATHER Sunny~68 degrees
SURFACE Asphalt Concrete
LOGGED BY CRH
REVIEWED BY JAJ
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Asphalt Core, Hand Auger, & DCP
GROUNDWATER AT END ---
DRILLING METHOD Asphalt Core, Hand Auger, & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	FINES CONTENT (%)
157			**ASPHALT CONCRETE:** 1 lift, 3½ inches thick.	0				
156		GP	**POORLY GRADED GRAVEL FILL:** Dense, gray, wet (water added during coring), angular to subangular, up to 1 inch in size, silty in lower few inches.	1				
155		ML	**SILT:** Gray and brown, moist, medium plasticity, some red-orange mottling, trace fine grained, micaceous sand. Brown below 1½ feet bgs.	2	GRAB 1			
154				3				
153								
152								



• Boring terminated at 2 feet bgs.
• No caving observed.
• No groundwater encountered.
• Boring loosely backfilled with excavated materials and surface patched cold patch asphalt.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97281
(503) 601-8250
www.carlsontesting.com

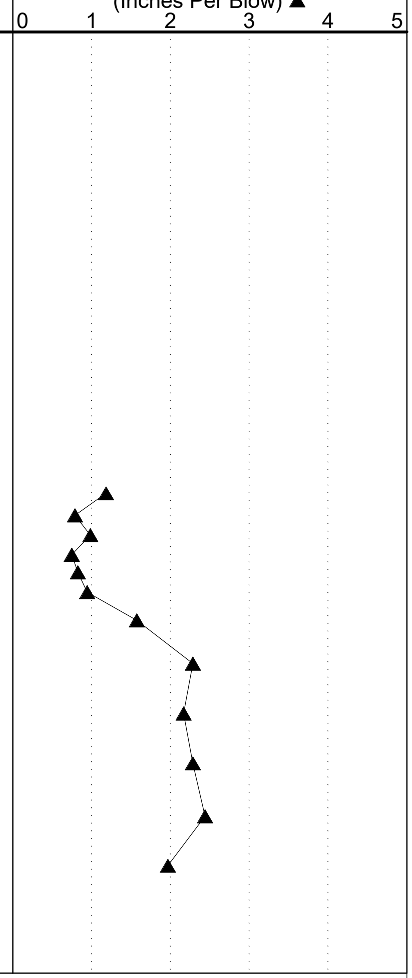
FIGURE A11

Boring C-4

CLIENT The Marylhurst School - Ms. Sheila Walker
PROJECT NAME Marylhurst School - New Life Church Site Expansion
PROJECT NUMBER G1804863
PROJECT LOCATION 19915 Old River Drive, West Linn, OR
DATE STARTED 6/29/18
GROUND ELEVATION 153 ft
ELEVATION DATUM Feet MSL
WEATHER Sunny~68 degrees
SURFACE Asphalt Concrete
LOGGED BY CRH
REVIEWED BY JAJ
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Asphalt Core, Hand Auger, & DCP
GROUNDWATER AT END ---
DRILLING METHOD Asphalt Core, Hand Auger, & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	FINES CONTENT (%)
153			**ASPHALT CONCRETE:** 1 lift, upper 3½ inches.	0				
152		GP	**POORLY GRADED GRAVEL FILL:** Dense, gray, wet (water added during coring), angular to subangular, up to 1 inch in size, silty in lower few inches.	1	GRAB 1			
151		CH	**FAT CLAY:** Gray and brown, moist, high plasticity, some orange-red mottling, trace fine grained micaceous sand.	2	GRAB 2			
150				3				
149								
148								

▲ DCP (Inches Per Blow) ▲



• Boring terminated at 2½ feet bgs.
• No caving observed.
• No groundwater encountered.
• Boring loosely backfilled with excavated materials and surface patched cold patch asphalt.

Appendix B: Results of Infiltration Testing

Marylhurst School New Life Church Site Expansion
19915 Old River Drive
West Linn, Oregon

CGT Project Number G1804863

July 19, 2018

Prepared For:

Ms. Sheila Walker
The Marylhurst School
1232 Linn Avenue
Oregon City, Oregon 97045

Prepared by
Carlson Geotechnical

B.1.0 INTRODUCTION

CGT performed two infiltration tests at the project site on June 14, 2018. The tests were performed adjacent to the existing ditch along Old River Drive, as shown on the site plan attached to the geotechnical report. The test locations are shown on the Site Plan (Figure 2) attached to the geotechnical report. The testing is detailed in the following sections.

B.2.0 TEST PROCEDURE

CGT advanced two borings (IT-1 and IT-2) for the purposes of infiltration testing. The borings were advanced to depths of approximately 3½ to 4 feet bgs using a solid-stem auger powered by a walk-behind, Toro track-mounted rig provided and operated by CGT.

The infiltration tests were performed in general accordance with the Encased Falling Head test method described in Appendix E of the Stormwater Standards, Clackamas County Service District No. 1, dated July 1, 2013. The borings were advanced to the test depths and a 6-inch-inner-diameter PVC pipe was inserted into each of the auger holes. The subsurface soils at the base of the pipes were soaked for at least four hours, in accordance with the referenced test method by pouring about 12 inches of water (measured vertically) into the test pipes. After the soaking period, testing was initiated by recording the drop in water level of an approximate 12-inch column of water at 10- minute intervals.

B.3.0 TEST RESULTS

The following tables present the details, raw data, and calculated infiltration rates observed during testing. Please note that the calculated infiltration rates do <u>not</u> include any safety or correction factors.

Table B1 Results of Infiltration Test IT-1

Test Depth: 4 feet bgs	Soil Type: Silt (ML)	
Time Interval (minutes)	Drop in Water Level (inches)*	Raw Infiltration Rate (inches per hour)
10	0	--
10	1	
10	0.25	
10	0.25	
10	0.5	
10	0.5	
10	0.25	
10	0.25	
10	0.25	
10	0.25	1.50

* Water level measurements taken in inches, measured to the nearest one-sixteenth inch, reported in decimal equivalents.
**Unfactored rate – does not include any safety or correction factors.

Table B2 Results of Infiltration Test TP-3

Test Depth: 3½ feet bgs	Soil Type: Silt (ML)	
Time Interval (minutes)	**Drop in Water Level (inches)***	**Raw Infiltration Rate (inches per hour)****
10	0	--
10	0	
10	0	
10	0	
10	0	
10	0	
10	0	
10	0	
10	0	
10	0	0

* Water level measurements taken in inches, measured to the nearest one-sixteenth inch, reported in decimal equivalents.
**Unfactored rate – does not include any safety or correction factors.

B.4.0 DISCUSSION

As detailed above, stabilized, raw infiltration rates varied between zero and 1½ inches per hour. Note that these infiltration rates do <u>not</u> include any safety or correction factors. We recommend the stormwater infiltration system designer consult the appropriate design manual in order to assign appropriate safety/correction factors to calculate the design infiltration rate for the proposed infiltration system(s). Once the design is completed, we recommend the infiltration system design (provided by others) and location be reviewed by the geotechnical engineer. If the location and/or depth of the system(s) change from what was indicated at the time of our fieldwork, additional testing may be recommended.

Carlson Geotechnical
A division of Carlson Testing, Inc.
Phone: (503) 601-8250
Fax: (503) 601-8254

Bend Office (541) 330-9155
Eugene Office (541) 345-0289
Salem Office (503) 589-1252
Tigard Office (503) 684-3460

Appendix C: Pavement Structural Capacity Evaluation
Marylhurst School New Life Church Site Expansion

Marylhurst School New Life Church Site Expansion
19915 Old River Drive
West Linn, Oregon

CGT Project Number G1804863

July 19, 2018

Prepared For:
Ms. Sheila Walker
The Marylhurst School
1232 Linn Avenue
Oregon City, Oregon 97045

Prepared by
Carlson Geotechnical

C.1.0 BACKGROUND

CGT performed a quantitative evaluation of the structural capacity of the existing pavements for the Marylhurst School New Life Church Site Expansion project. The purpose of our evaluation was to estimate if the existing pavement met the structural requirements for an assumed pavement life and determine if structural enhancements are required to help maintain serviceability. We performed the structural capacity evaluation based on visual survey and materials investigation/testing in general accordance with Sections 5.3 and 5.4 of the AASHTO Guide for Design of Pavement Structures, 1993 (AASHTO), and Section 2 of ODOT's 2018 Pavement Data Collection Manual. The following sections summarize the results of the visual condition survey, the results of our structural capacity analyses, and conclusions for the pavement structure.

C.2.0 PAVEMENT MATERIALS INVESTIGATION

As indicated in the geotechnical report, CGT advanced four shallow subsurface explorations (pavement cores C-1 through C-4) within the existing pavement on June 29, 2018. The Pavement Site Plan, Figure C1, shows the approximate locations of the pavement cores and subsurface explorations. The overall results of our completed field investigation for the entire project are detailed in Section 2.3 of the report. The results of the pavement cores are briefly summarized below.

- The asphaltic concrete (AC) section observed in the pavement cores was 3 to 4 inches thick.
- The aggregate base section below the AC pavement varied from about 9 to 14 inches thick.
- The subgrade underlying the aggregate base consisted of native, medium plasticity silt or medium to high plasticity, fat clay.

C.3.0 STRUCTURAL CAPACITY EVALUATION

C.3.1 Visual Survey

C.3.1.1 Overview

CGT engineering staff observed surface conditions within the subject pavements during coring on June 29, 2018. The pavements were also observed by a Senior Geotechnical Engineer on July 17, 2018. The purpose of our observations was to identify the type, amount, severity, and location of observed surface distress (deficiencies) in the existing pavement in accordance with AASHTO procedures and ODOT's 2018 Pavement Data Collection Manual[1]. Representative photographs taken during our site visits are shown on the attached Figure C2. The photograph locations are shown on Figure C1.

The following table presents a checklist of typical surface deficiencies in flexible (asphalt) pavement. This table also includes our observations of the presence (or absence) of the surface deficiencies within the parking lot and drive lanes.

[1] Previously known as the 2010 Oregon Department of Transportation Distress Survey Manual (ODOT DSM)

Table C1 Typical Asphalt Pavement Surface Deficiencies

Distress Type	Typical Cause(s)	Observed at Site?
Rutting in the wheel paths	Ruts typically develop from consolidation or lateral movement under traffic.	None observed
Fatigue (alligator) cracking	Typically caused by excessive deflection of the surface over unstable subgrade or lower courses of pavement. The unstable support usually is often the result of saturated granular base or subgrade but may be attributed to thin asphalt sections or other factors.	Yes, see Section C.3.1.2 for discussion
Longitudinal/transverse cracking	Typically due to poorly constructed paving joints, shrinkage of asphalt layer, daily temperature cycling, etc.	Yes, see Section C.3.1.3 for discussion
Patching	Typically used where the original pavement surface is removed and replaced, or additional material is applied to the pavement surface after original construction.	One patch observed, see Photograph 2, Figure C2
Disintegration (potholes)	Typically caused by weakness in the pavement resulting from insufficient asphalt, failure of base, and/or poor drainage.	None observed
Disintegration (raveling)	Typically caused by lack of compaction and/or improper mix proportions.	Yes, see Section C.3.1.4 for discussion
Localized Subsidence	Typically caused by poor quality subgrade materials susceptible to consolidation	None observed
Edge cracking	Typically due to lack of lateral (shoulder) support. Another cause of edge cracking can be settlement or yielding of subgrade or granular base.	None observed
Edge joint (seam) cracking	Typically due to poor drainage due to a shoulder being higher than the main pavement.	None observed
Corrugations (washboarding)	This form of distress typically occurs in asphalt layers that lack stability due to less than favorable mix proportions.	None observed
Upheaval	Typically caused by expansive soils and/or tree roots.	None observed

C.3.1.2 <u>Fatigue (alligator) Cracking and Recommended Mitigation</u>

We observed only two locations where limited fatigue cracking was present. In both cases, the cracks were interconnected. The cracks were generally ¼-inch to ½-inch in width and exhibited little to no spalling. The most severe example of fatigue cracking is shown in Photograph 4, on the attached Figure C2. The severity of fatigue cracking was characterized as “low” in accordance with guidelines presented in the ODOT DSM. In general, the recommended treatment for this distress is full depth replacement of the asphalt pavement and underlying base rock. Limited subgrade correction may also be required in such locations.

Where fatigue cracking is repaired by removal and replacement, we recommend that the new pavement section in the repair area consist of at least 3½ inches of asphalt concrete over 14 inches of compacted base rock. The asphalt concrete should be compacted to a minimum of 91 percent of the Rice Density (ASTM D 2041). Base rock should be compacted to a minimum of 95 percent of the modified proctor density (ASTM D 1557).

C.3.1.3 <u>Longitudinal/Transverse Cracking and Recommended Mitigation</u>

We observed several longitudinal and transverse cracks within the parking lot and drive lanes. An example of longitudinal and transverse cracking is shown as Photograph 1 on the attached Figure C2. The cracks were generally ¼-inch to ½-inch in width. In general, the most substantial longitudinal cracks appeared to follow what would have been seams or laydown patterns associated with the original placement of the pavement.

The degree of longitudinal and transverse cracking was characterized as “low” in accordance with guidelines presented in the ODOT DSM.

Cracks should be cleaned and filled in order to limit intrusion of water and fines which lead to further deterioration. Crack filling is recommended as a standard maintenance practice and prior to any overlay, if place.

C.3.1.4 Disintegration (Raveling) and Recommended Mitigation

We observed negligible to low severity raveling within the parking areas and drive lanes. The most evident raveling was noted along what was likely a laydown pattern associated with the original pavement installation and is shown as Photograph 3 on the attached Figure C2. The raveling observed at this location appears to be a result low laydown temperature or lack of compaction when installed. The vast majority of the parking areas and drive lanes did not show raveling and where observed would be characterized as negligible to “low” in accordance with guidelines presented in the ODOT DSM.

Measures to address raveling vary from surface coating to asphalt overlay. Surface treatments, such as seal coating or chip sealing, can extend the service life of raveled surfaces.

C.3.2 Structural Capacity Evaluation

C.3.2.1 Methodology

We evaluated the structural capacity of the existing pavement structure using the results of the pavement materials investigation and visual survey in general accordance with Section 5.4.5 of AASHTO. The purpose of this evaluation was to determine whether structural enhancement (such as an overlay) was required to help manage anticipated design vehicular traffic. The methodology presented by AASHTO incorporates the use of structural numbers (SN) as follows:

- SN_{eff} = Effective structural number of the existing pavement structure, determined from the visual condition survey and investigation of the existing pavement.
- SN_f = Required structural number for future traffic.
- SN_{ol} = Required overlay structural number. This value is equal to SN_f - SN_{eff}. The methodology indicates that, in the event that SN_{eff} is greater than S_f, and no functional deficiencies are observed in the existing pavement, an overlay is not required. Similarly, in the event that SN_{eff} is less than SN_f, an overlay is required to maintain the desired level of serviceability over the indicated design period.

C.3.2.2 Design Input Parameters

For the purposes of calculating the structural numbers, a number of parameters were estimated based on the results of the visual survey and pavement investigation. Input parameters related to future traffic and level of serviceability were based on guidelines presented in the Asphalt Pavement Association of Oregon (APAO) Asphalt Pavement Design Guide (APDG). The estimated single-axle loads (ESALs) are based on the APAO APDG Table 3.1 Level II. Other pavement design input parameters are based on AASHTO and APAO guidelines. The parameters used in the evaluation are shown in the following table.

Table C2 Design Input Parameters

Structural Number	Required Input Parameter	Value Used in Evaluation
SN_{eff}	a_1 = Structural layer coefficient, AC layer	0.35
	a_2 = Structural layer coefficient, base layer	0.10
	a_3 = Structural layer coefficient, subbase layer	N/A
	D_1 = Thickness of existing pavement, surface layer	Varied[1]
	D_2 = Thickness of existing pavement, base layer	Varied[1]
	D_3 = Thickness of existing pavement, subbase layer	N/A
	M_2 = Drainage coefficient for granular base	0.8
	M_3 = Drainage coefficient for granular subbase	N/A
SN_f[2]	N_f = Design period[2]	20 years
	$ESAL_f$ = Design 18-kip ESAL over design period[3]	50,000
	M_R = Design resilient modulus[4]	4,000 psi
	Design Serviceability (PSI) Loss (Initial = 4.2, Terminal = 2.5)[2]	1.7
	R = Design Reliability[2]	75 percent
	S_o = Design Standard Deviation	0.49

[1]Layer thicknesses were evaluated on a case-by-case basis based on the results of the explorations. See Section C.3.2.3 for details.
[2]Values based on AASHTO and APAO guidelines for most pavements of this type.
[3]ESAL value based on APAO APDG Table 3.1 Level II.
[4]Value based on silt and clay subgrade soils encountered in the explorations and correlated to Figure 3.11 of APAO APDG.

The following summarizes additional comments on the values presented in Table C2:

- Layer coefficients (a_1, a_2, and a_3) were determined based on results of visual condition survey discussed in Section C.3.1 above and Table 5.2 of AASHTO.
- Layer thicknesses (D_1, D_2, and D_3) were based on results of our pavement materials investigation.
- A design period of 20 years and design serviceability values of 4.2 (initial) and 2.5 (terminal) were assigned in accordance AASHTO and APAO guidelines.
- The value used for drainage coefficients (m_n) was selected in accordance with Table 2.4 of the referenced AASHTO manual, based on “good” drainage characteristics of the base and subgrade materials. This quality of drainage was selected based on the unsaturated nature of the pavement materials during our investigation in June 2018.
- The value used for standard deviation (S_o) was selected in accordance with Section 5.3 of the referenced ODOT Pavement Design Guide (August 2011).

C.3.2.3 <u>Results of Analyses</u>

Using the above inputs and procedures presented by AASHTO, we calculated the structural numbers for the parking areas and drive lanes as illustrated by the core results and design analysis. The following table summarizes the results of our analyses:

Table C3 Calculated Structural Numbers

Area of Interest[1]	Pavement Exploration	Existing Pavement Section (inches)		Calculated Structural Number		
		AC Thickness	Aggregate Base Thickness	SN_{eff}	SN_f	SN_{ol}
Parking Areas and Drive Lanes	C-1	3	9	1.95	2.60	0.65
	C-2	4	14	2.80	2.60	NA
	C-3	3½	9	2.13	2.60	0.47
	C-4	3½	14	2.63	2.60	NA

C.4.0 REVIEW & DISCUSSION

We completed a pavement condition survey and structural capacity evaluation of the existing pavement within the parking areas and drive lanes for the Marylhurst School New Life Church Site Expansion project to determine whether structural enhancement was required to help manage anticipated future vehicular traffic. Although some longitudinal and transverse cracks, limited raveling, and isolated fatigue cracks were observed, we found the pavements to be in good overall condition.

As indicated above, we observed limited fatigue cracking of low severity at a couple of locations. Fatigue cracking is typically attributed to inadequate structural support of the pavement section, and once the "alligator" pattern has developed on the pavement surface, surficial repairs (i.e., crack sealants, etc.) are no longer effective. We recommend that removal and replacement of the existing AC section in these areas is warranted.

As the results in Table C3 indicate, two of the four core locations indicate a sufficient structural number to meet the long term needs of the assumed traffic loading. However, results for two core locations suggest that additional structural capacity in the pavement section will be needed. We offer the following principal recommendations for your consideration in order to extend the service life of the existing pavements on the order of 20 years.

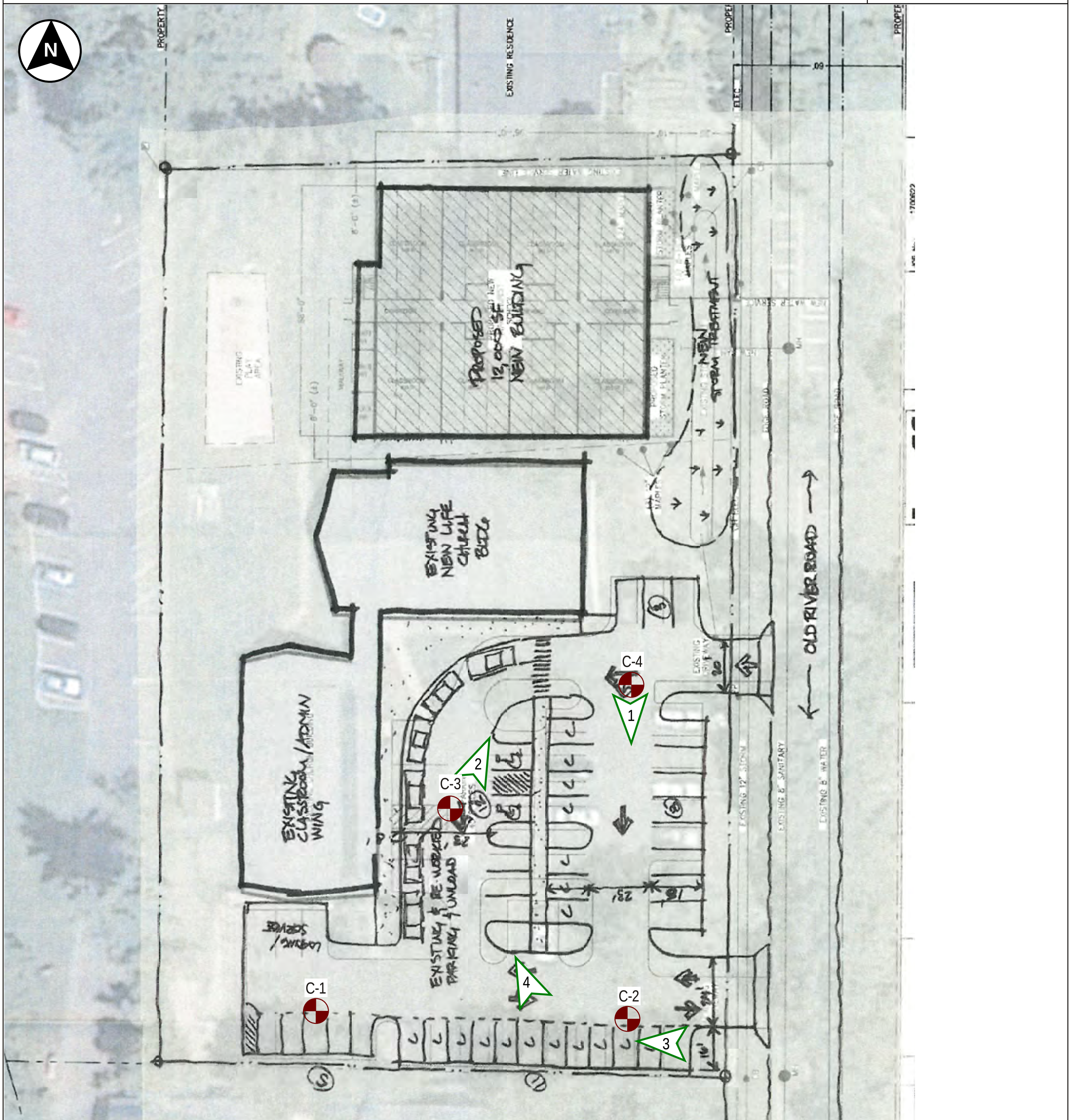
- Repair the fatigue cracked locations.
- Clean and fill all transverse and longitudinal cracks.
- Sealcoat or preferably chip seal the pavement surface to address raveling and provide a new "wearing surface", particularly important above repaired areas.
- Monitor the pavement performance annually.
- Make minor repairs and perform minor maintenance as needed.
- Anticipate and budget for a minimum 1½-inch overlay within 5 years.

▼

Attachments: Pavement Site Plan, Figure C1
Site Photographs, Figure C2

MARYLHURST SCHOOL NEW LIFE CHURCH SITE EXPANSION - WEST LINN, OREGON
Project Number G1804863

Figure C1
Pavement Site Plan



LEGEND

C-1 Pavement core, DCP test, and hand auger boring

1 Site photograph shown on Figure C2

CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by: AS

NOTES: Drawing based on Preliminary Site Plan (Sheet C-1.0, dated January 3, 2018) prepared by KPFF, modified by CGT. Locations noted are approximate.

1 Inch = 50 Feet

0 50 100

Photograph 1: Longitudinal and Transverse Cracking

Photograph 2: Patch in Drive Lane

Photograph 3: Surface Raveling

Photograph 4: Fatigue Cracking

See Figure C2 for approximate photograph locations and directions. Photographs were taken at the time of our fieldwork.

Appendix D: Liquefaction Analyses

Marylhurst School New Life Church Site Expansion
19915 Old River Drive
West Linn, Oregon

CGT Project Number G1804863

July 19, 2018

Prepared For:

Ms. Sheila Walker
The Marylhurst School
1232 Linn Avenue
Oregon City, Oregon 97045

Prepared by
Carlson Geotechnical

Table of Contents

Doc ID: G:\GEOTECH\PROJECTS\2018 Projects\G1804863 - Marylhurst School New Life Church Site Expansion\G1804863-GEO\008 - Deliverables\Report Files\Appendix D - Liquefaction Analysis.docx

D.1.0 INTRODUCTION

In general, liquefaction occurs when deposits of loose/soft, saturated, cohesionless soils, generally sands and silts, are subjected to strong earthquake shaking. If these deposits cannot drain quickly enough, pore water pressures can increase, approaching the value of the overburden pressure. The shear strength of a cohesionless soil is directly proportional to the effective stress, which is equal to the difference between the overburden pressure and the pore water pressure. When the pore water pressure increases to the value of the overburden pressure, the shear strength of the soil reduces to zero, and the soil deposit can liquefy. The liquefied soils can undergo rapid consolidation or, if unconfined, can flow as a liquid. Structures supported by the liquefied soils can experience rapid, excessive settlement, shearing, or even catastrophic failure. The Oregon Department of Geology and Mineral Industries' Oregon Statewide Geohazards Viewer[1] shows a high hazard for liquefaction for the site and immediate vicinity.

D.2.0 QUALITATIVE ASSESSMENT

For fine-grained soils, susceptibility to liquefaction is evaluated based on penetration resistance and plasticity, among other characteristics. Criteria for identifying non-liquefiable, fine-grained soils are constantly evolving. Current practice to identify non-liquefiable, fine-grained soils is based on moisture content and plasticity characteristics of the soils[2,3]. The susceptibility of sands, gravels, and sand-gravel mixtures to liquefaction is typically assessed based on penetration resistance, as measured using SPTs, CPTs, or Becker Hammer Penetration tests (BPTs).

Subsurface conditions encountered at the site are described in Section 2.3 of the geotechnical report. We assessed the liquefaction susceptibility of the soils encountered using the criteria referenced above for fine-grained soils. Based on their low plasticity, very soft to medium stiff consistency, and very loose to loose relative density, the near-surface silt (ML), sandy silt (ML), silty sand (SM), and poorly graded sand (SP) are judged susceptible to liquefaction when adequately saturated and subjected to design level earthquake shaking. These soils extended to depths of approximately 16 to 20 feet below ground surface (bgs) in the borings advanced in the location of the proposed building. Below these depths, the soils consisted of high plasticity, stiff to hard, fat clays (CH) with layers of sand (SP), silty sand (SM), and clayey sand (SC) that were generally dense to very dense and are therefore considered non-liquefiable.

D.3.0 QUANTITATIVE ANALYSIS

We performed quantitative liquefaction triggering and settlement analysis for the site using industry standard procedures detailed in the following sections.

D.3.1 Soil and Groundwater

Soil and groundwater parameters were based on the results of the geotechnical investigation performed as part of this assignment, summarized in Section 2.3 of the geotechnical report. Our analyses relied on

---

1 Oregon Department of Geology and Mineral Industries, 2018. Oregon Statewide Geohazards Viewer, accessed July 2018, from DOGAMI web site: http://www.oregongeology.org/sub/hazvu/index.htm.

2 Seed, R.B. et al., 2003. Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework. Earthquake Engineering Research Center Report No. EERC 2003-06.

3 Bray, Jonathan D., Sancio, Rodolfo B., et al., 2006. Liquefaction Susceptibility of Fine-Grained Soils, Journal of Geotechnical and Geoenvironmental Engineering, Volume 132, Issue 9, September 2006.

soil type and SPT data obtained from boring B-3, which was advanced to a depth of approximately 61½ feet bgs.

As discussed in Section 2.3.3 of the geotechnical report, the depth to groundwater was variable between the borings, ranging from approximately 11½ to 19 feet bgs in June of 2018. Our research of groundwater levels in the vicinity of the site indicated similarly variable groundwater levels. We conclude the groundwater observed within our borings is likely perched and reflects the variable permeability of the site soils. Perched groundwater is often discontinuous, both laterally and vertically, and can vary significantly through time (e.g. seasonally and annually). Accordingly, we modeled two groundwater scenarios, one reflecting the depth to groundwater observed in B-3 (15 feet bgs) and one reflecting a hypothetical, seasonal high (10 feet bgs).

D.3.2 Seismic Scaling Factors

Seismic scaling factors required for quantitative liquefaction analysis include earthquake magnitude (M) and ground surface peak ground acceleration (PGA). In accordance with the 2014 Oregon Structural Specialty Code (OSSC) and ASCE 7-10, we evaluated liquefaction potential for the "aggregate" seismic event, which is a design-level event that is calculated considering the cumulative effect from all seismic sources in the region for the indicated probability of exceedance (2 percent in 50 years).

Section 11.8.3 of ASCE 7-10 provides guidance for selecting the aggregate "bedrock" (Site Class B) PGA, site coefficient to account for site soil effects, and ground surface PGA for use in liquefaction analysis. No guidance is provided for selection of a corresponding earthquake magnitude (M). Recognizing the ground surface PGA was derived using aggregated (composite) probabilistic data for design-level earthquakes, we assigned the earthquake magnitude for use in our analyses by taking the mean value from the de-aggregated seismic hazard data available at the USGS Unified Hazard Tool website[4]. The parameters for the aggregate seismic source are presented in Table D1.

Table D1 PGA & Earthquake Magnitude Used in Liquefaction Analyses

Parameter	Value	Source
Site Classification	E	Section 3.1 of main report
Mapped MCE_G "Bedrock" Peak Ground Acceleration, PGA	0.417g	Figure 22-7 of ASCE 7-10
Site Coefficient, F_{PGA}	0.900	Table 11.8-1 of ASCE 7-10
MCE_G Peak Ground Acceleration Adjusted for Site Class Effects, PGA_M	0.38g	Equation 11.8-1 of ASCE 7-10
Aggregate Earthquake Magnitude	M7.3	Mean value from de-aggregation data
Note: MCE = Maximum Considered Earthquake		

4 United States Geological Survey, 2018. NSHMP PSHA Unified Hazard Tool, accessed July 2018, from the USGS website https://earthquake.usgs.gov/hazards/interactive/index.php.

D.3.3 Liquefaction Triggering and Settlement Analysis

Our liquefaction triggering and settlement analyses were performed using methods detailed in Idriss and Boulanger (2014)[5]. We utilized the commercially available software program LiqSVs (version 1.2.1.1) produced by Geologismiki to perform the SPT-based liquefaction analysis. With the exception of the non-liquefiable zones referenced above, all soil types were considered in the evaluation of liquefaction potential. The triggering analysis showed the near-surface, silt (ML), sandy silt (ML), silty sand (SM), and poorly graded sand (SP) are liquefiable to a depth of approximately 16 feet bgs. Below those depths, the factors of safety against liquefaction were generally greater than 2.0 and the soils are considered non-liquefiable. Detailed results of the triggering and settlement analyses are attached.

We took the incremental settlement estimates produced by the software and applied depth weighting factors, as outlined in Cetin, *et al.* (2009)[6]. The results of our calculations are presented in the following tables.

Table D2 Factored Settlement using Cetin Depth Factor Approach, B-3, Groundwater at 10 feet bgs

Mid-Layer Depth	Layer Thickness	Unfactored Incremental Settlement	Unfactored Accumulated Settlement	Cetin Depth Factor	Factored Incremental Settlement	Factored Accumulated Settlement
feet	feet	inches	inches	dimensionless	inches	inches
2.50	5.00	0	1.66	0.96	0.00	1.35
6.25	2.50	0	1.66	0.90	0.00	1.35
10.00	5.00	1.12	1.66	0.83	0.93	1.35
13.75	2.50	0.54	0.54	0.77	0.42	0.42
15.75	1.50	0	0.00	0.74	0.00	0.00
20.75	8.50	0	0.00	0.65	0.00	0.00
27.50	5.00	0	0.00	0.54	0.00	0.00
32.50	5.00	0	0.00	0.46	0.00	0.00
35.50	1.00	0	0.00	0.41	0.00	0.00
38.00	4.00	0	0.00	0.37	0.00	0.00
44.00	8.00	0	0.00	0.27	0.00	0.00
50.50	5.00	0	0.00	0.16	0.00	0.00
56.50	7.00	0	0.00	0.06	0.00	0.00
60.75	1.50	0	0.00	0.00	0.00	0.00

5 Idriss, I.M., Boulanger, R.W., 2014. CPT and SPT Based Liquefaction Triggering Procedures, Center for Geotechnical Modeling Report No. UCD/CGM-14/01.

6 Cetin, K.O., Bilge, H.T., Wu, J., Kammerer, A.M., and Seed, R.B., 2009. Probabilistic Model for the Assessment of Cyclically Induced Reconsolidation (Volumetric) Settlements, Journal of Geotechnical and Geoenvironmental Engineering, ASCE 135(3), 387-398.

Table D3 Factored Settlement using Cetin Depth Factor Approach, B-3, Groundwater at 15 feet bgs

Mid-Layer Depth	Layer Thickness	Unfactored Incremental Settlement	Unfactored Accumulated Settlement	Cetin Depth Factor	Factored Incremental Settlement	Factored Accumulated Settlement
feet	feet	inches	inches	dimensionless	inches	inches
2.50	5.00	0	0.54	0.96	0.00	0.42
6.25	2.50	0	0.54	0.90	0.00	0.42
10.00	5.00	0	0.54	0.83	0.00	0.42
13.75	2.50	0.54	0.54	0.77	0.42	0.42
15.75	1.50	0	0.00	0.74	0.00	0.00
20.75	8.50	0	0.00	0.65	0.00	0.00
27.50	5.00	0	0.00	0.54	0.00	0.00
32.50	5.00	0	0.00	0.46	0.00	0.00
35.50	1.00	0	0.00	0.41	0.00	0.00
38.00	4.00	0	0.00	0.37	0.00	0.00
44.00	8.00	0	0.00	0.27	0.00	0.00
50.50	5.00	0	0.00	0.16	0.00	0.00
56.50	7.00	0	0.00	0.06	0.00	0.00
60.75	1.50	0	0.00	0.00	0.00	0.00

D.4.0 REVIEW OF ESTIMATED SETTLEMENTS

Based on the factored, incremental settlements detailed above, our analyses indicate approximately ½ and 1½ inches of total, liquefaction-induced settlement for the groundwater conditions modeled. In our opinion, these estimates effectively bracket the anticipated, liquefaction-induced settlements, which vary as a function of groundwater level. Shallow subsurface conditions encountered in the other borings advanced at the site were relatively uniform and we anticipate similarly liquefiable soil conditions. With regard to differential settlements, we recommend that differential settlement be taken as one half of total settlement, or up to about ¾ inch. We recommend the differential settlement be assumed across the short axis of the structure.

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97223

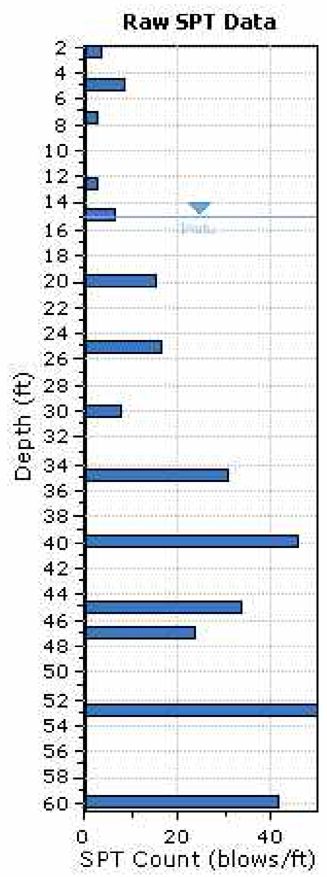
SPT BASED LIQUEFACTION ANALYSIS REPORT

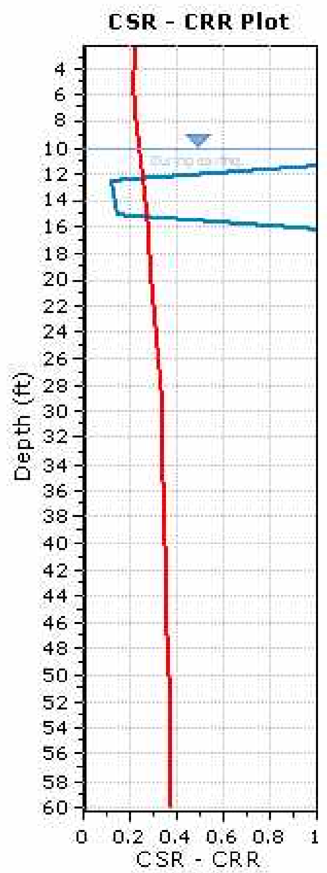
Project title : Marylhurst School New Life Church Site Expansion **SPT Name: B-3**

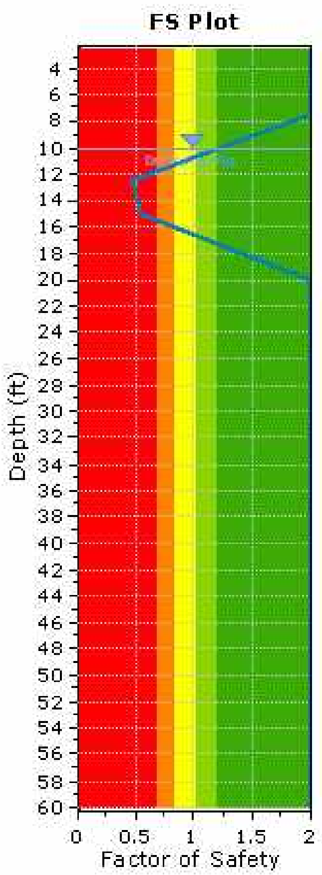
Location : 19915 Old River Drive, West Linn, OR

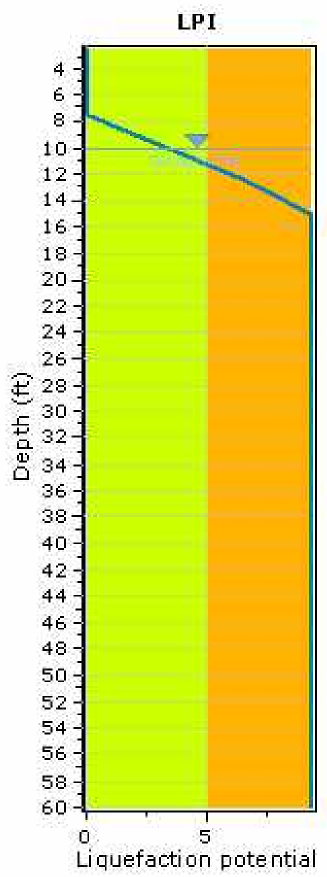
:: Input parameters and analysis properties ::

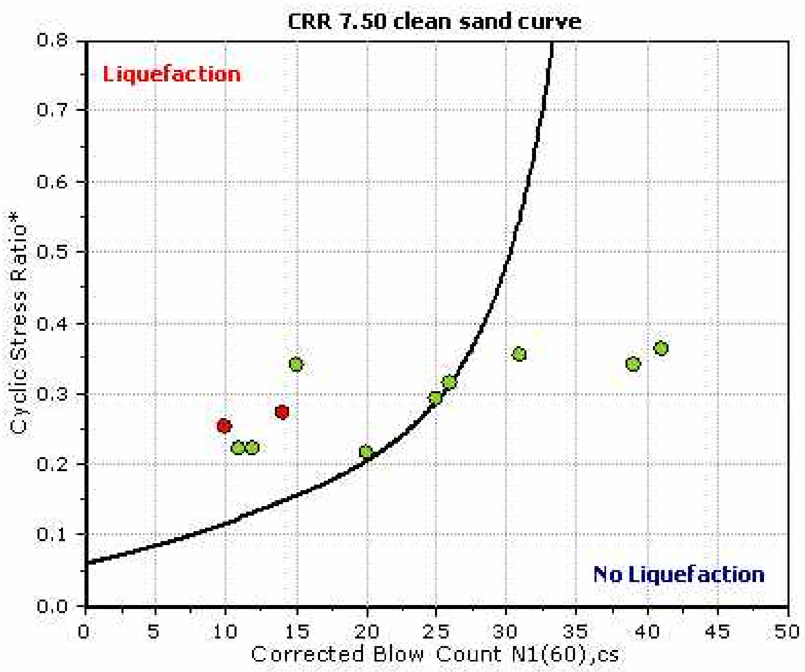
Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	15.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	10.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.30 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.38 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.25		











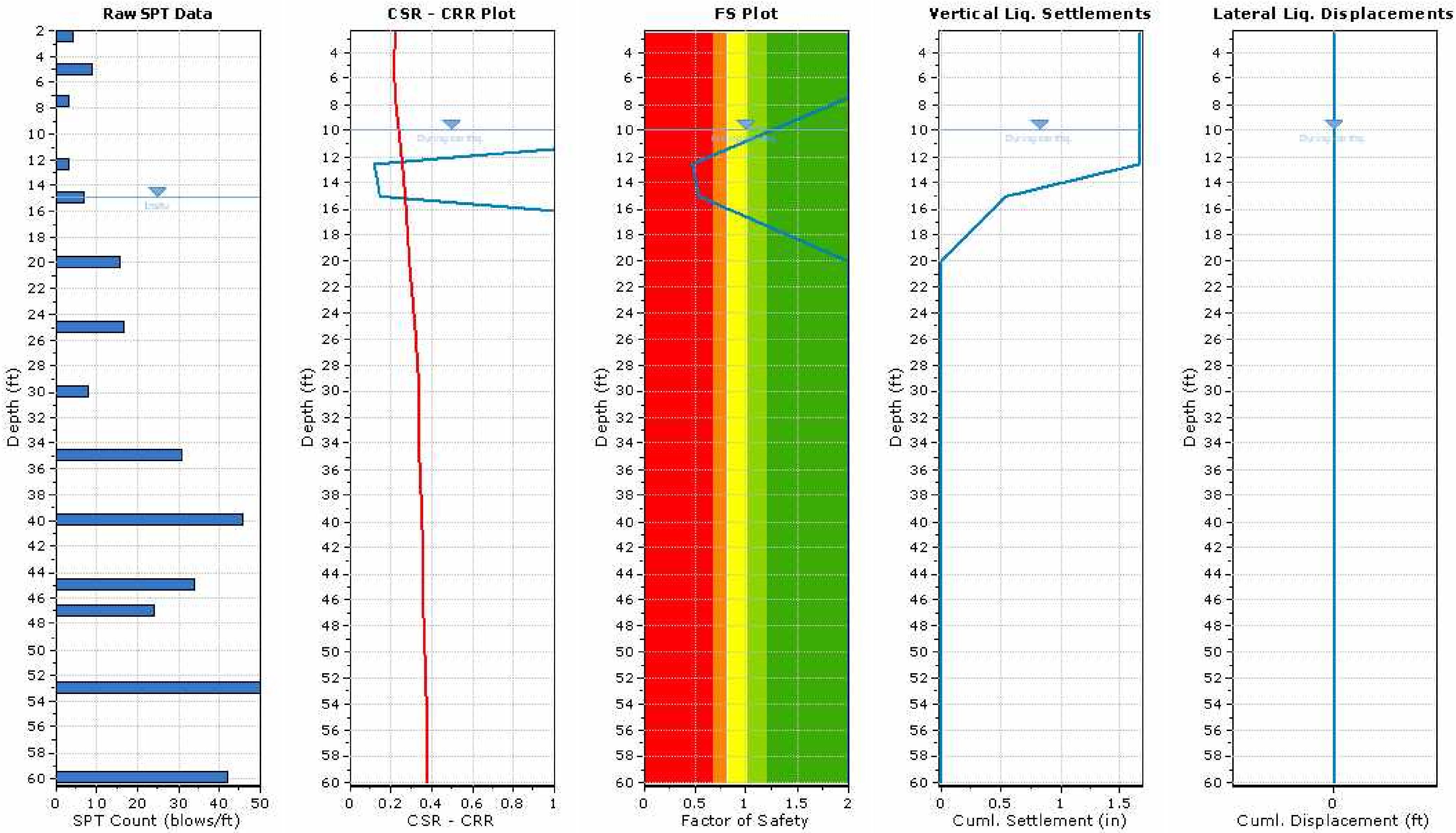
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	4	86.00	115.00	5.00	Yes
5.00	9	86.00	115.00	2.50	Yes
7.50	3	86.00	115.00	5.00	Yes
12.50	3	86.00	115.00	2.50	Yes
15.00	7	95.00	115.00	1.50	Yes
20.00	16	95.00	115.00	8.50	No
25.00	17	95.00	115.00	5.00	No
30.00	8	95.00	115.00	5.00	No
35.00	31	15.00	115.00	1.00	Yes
40.00	46	18.00	115.00	4.00	Yes
45.00	34	18.00	115.00	8.00	Yes
47.00	24	95.00	115.00	5.00	Yes
53.00	57	30.00	115.00	7.00	Yes
60.00	42	95.00	115.00	1.50	Yes

Abbreviations

Depth:	Depth at which test was performed (ft)
SPT Field Value:	Number of blows per foot
Fines Content:	Fines content at test depth (%)
Unit Weight:	Unit weight at test depth (pcf)
Infl. Thickness:	Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy:	User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	4	115.00	0.14	0.00	0.14	0.48	1.70	1.25	1.00	0.75	1.00	6	86.00	5.53	12	4.000
5.00	9	115.00	0.29	0.00	0.29	0.41	1.70	1.25	1.00	0.75	1.00	14	86.00	5.53	20	4.000
7.50	3	115.00	0.43	0.00	0.43	0.50	1.57	1.25	1.00	0.80	1.00	5	86.00	5.53	11	4.000
12.50	3	115.00	0.72	0.00	0.72	0.53	1.23	1.25	1.00	0.85	1.00	4	86.00	5.53	10	0.118
15.00	7	115.00	0.86	0.00	0.86	0.49	1.11	1.25	1.00	0.85	1.00	8	95.00	5.50	14	0.148
20.00	16	115.00	1.15	0.16	0.99	0.40	1.03	1.25	1.00	0.95	1.00	19	95.00	5.50	25	4.000
25.00	17	115.00	1.44	0.31	1.13	0.40	0.98	1.25	1.00	0.95	1.00	20	95.00	5.50	26	4.000
30.00	8	115.00	1.73	0.47	1.26	0.49	0.92	1.25	1.00	1.00	1.00	9	95.00	5.50	15	4.000
35.00	31	115.00	2.01	0.62	1.39	0.31	0.92	1.25	1.00	1.00	1.00	36	15.00	3.26	39	4.000
40.00	46	115.00	2.30	0.78	1.52	0.20	0.93	1.25	1.00	1.00	1.00	53	18.00	4.09	57	4.000
45.00	34	115.00	2.59	0.94	1.65	0.29	0.88	1.25	1.00	1.00	1.00	37	18.00	4.09	41	4.000
47.00	24	115.00	2.70	1.00	1.70	0.36	0.84	1.25	1.00	1.00	1.00	25	95.00	5.50	31	4.000
53.00	57	115.00	3.05	1.19	1.86	0.14	0.93	1.25	1.00	1.00	1.00	66	30.00	5.36	71	4.000
60.00	42	115.00	3.45	1.40	2.05	0.24	0.85	1.25	1.00	1.00	1.00	45	95.00	5.50	51	4.000

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
m: Stress exponent normalization factor
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$ Equivalent clean sand adjustment
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS
2.50	115.00	0.14	0.00	0.14	1.00	1.00	0.247	1.24	12	1.02	0.243	1.10	0.221	2.000
5.00	115.00	0.29	0.00	0.29	0.99	1.00	0.245	1.49	20	1.03	0.238	1.10	0.216	2.000
7.50	115.00	0.43	0.00	0.43	0.99	1.00	0.244	1.21	11	1.01	0.240	1.09	0.221	2.000
12.50	115.00	0.72	0.08	0.64	0.97	1.00	0.269	1.19	10	1.01	0.265	1.05	0.253	0.466
15.00	115.00	0.86	0.16	0.71	0.96	1.00	0.290	1.29	14	1.02	0.284	1.04	0.272	0.543
20.00	115.00	1.15	0.31	0.84	0.94	1.00	0.319	1.72	25	1.05	0.304	1.04	0.293	2.000
25.00	115.00	1.44	0.47	0.97	0.92	1.00	0.337	1.77	26	1.05	0.320	1.01	0.315	2.000
30.00	115.00	1.73	0.62	1.10	0.90	1.00	0.347	1.32	15	1.02	0.339	1.00	0.341	2.000
35.00	115.00	2.01	0.78	1.23	0.87	1.00	0.352	2.20	39	1.08	0.325	0.95	0.340	2.000
40.00	115.00	2.30	0.94	1.36	0.85	1.00	0.353	2.20	57	1.08	0.326	0.93	0.353	2.000
45.00	115.00	2.59	1.09	1.50	0.82	1.00	0.352	2.20	41	1.08	0.325	0.90	0.362	2.000
47.00	115.00	2.70	1.15	1.55	0.81	1.00	0.350	2.06	31	1.07	0.327	0.92	0.356	2.000
53.00	115.00	3.05	1.34	1.71	0.78	1.00	0.346	2.20	71	1.08	0.319	0.86	0.372	2.000
60.00	115.00	3.45	1.56	1.89	0.75	1.00	0.338	2.20	51	1.08	0.313	0.83	0.377	2.000

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d: Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted
FS: Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00
7.50	2.000	0.00	8.86	2.50	0.00
12.50	0.466	0.53	8.10	5.00	6.59

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
15.00	0.543	0.46	7.71	2.50	2.69
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	2.000	0.00	5.43	5.00	0.00
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
47.00	2.000	0.00	2.84	2.00	0.00
53.00	2.000	0.00	1.92	6.00	0.00
60.00	2.000	0.00	0.86	7.00	0.00

Overall potential I_L : 9.28

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
2.50	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000
5.00	14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	0.000
7.50	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical & Lateral displ.acements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60cs}$	γ_{lim} (%)	F_α	FS_{liq}	γ_{max} (%)	e_v (%)	dz (ft)	S_{v-1D} (in)	LDI (ft)
12.50	10	47.32	0.91	0.466	47.32	3.74	2.50	1.121	0.00
15.00	14	30.65	0.79	0.543	30.65	3.02	1.50	0.543	0.00
20.00	25	0.00	0.00	2.000	0.00	0.00	8.50	0.000	0.00
25.00	26	0.00	0.00	2.000	0.00	0.00	5.00	0.000	0.00
30.00	15	0.00	0.00	2.000	0.00	0.00	5.00	0.000	0.00
35.00	39	1.07	-0.73	2.000	0.00	0.00	1.00	0.000	0.00
40.00	57	0.00	-2.17	2.000	0.00	0.00	4.00	0.000	0.00
45.00	41	0.70	-0.88	2.000	0.00	0.00	8.00	0.000	0.00
47.00	31	4.04	-0.16	2.000	0.00	0.00	5.00	0.000	0.00
53.00	71	0.00	-3.38	2.000	0.00	0.00	7.00	0.000	0.00

:: Vertical & Lateral displ.acements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60cs}$	γ_{lim} (%)	F_α	FS_{liq}	γ_{max} (%)	e_v (%)	dz (ft)	S_{v-1D} (in)	LDI (ft)
60.00	51	0.02	-1.67	2.000	0.00	0.00	1.50	0.000	0.00

Cumulative settlements: 1.664 0.00

Abbreviations

γ_{lim}: Limiting shear strain (%)
F_α/N: Maximun shear strain factor
γ_{max}: Maximum shear strain (%)
e_v:: Post liquefaction volumetric strain (%)
S_{v-1D}: Estimated vertical settlement (in)
LDI: Estimated lateral displacement (ft)

References

- Ronald D. Andrus, Hossein Hayati, Nisha P. Mohanan, 2009. Correcting Liquefaction Resistance for Aged Sands Using Measured to Estimated Velocity Ratio, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 135, No. 6, June 1

- Boulanger, R.W. and Idriss, I. M., 2014. CPT AND SPT BASED LIQUEFACTION TRIGGERING PROCEDURES. DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING COLLEGE OF ENGINEERING UNIVERSITY OF CALIFORNIA AT DAVIS

- Dipl.-Ing. Heinz J. Priebe, Vibro Replacement to Prevent Earthquake Induced Liquefaction, Proceedings of the Geotechnique-Colloquium at Darmstadt, Germany, on March 19th, 1998 (also published in Ground Engineering, September 1998), Technical paper 12-57E

- Robertson, P.K. and Cabal, K.L., 2007, Guide to Cone Penetration Testing for Geotechnical Engineering. Available at no cost at http://www.geologismiki.gr/

- Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J., Liao, S., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R., and Stokoe, K.H., Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 127, October, pp 817-833

- Zhang, G., Robertson. P.K., Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, 39: pp 1168-1180

- Zhang, G., Robertson. P.K., Brachman, R., 2004, Estimating Liquefaction Induced Lateral Displacements using the SPT and CPT, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 130, No. 8, 861-871

- Pradel, D., 1998, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 124, No. 4, 364-368

- R. Kayen, R. E. S. Moss, E. M. Thompson, R. B. Seed, K. O. Cetin, A. Der Kiureghian, Y. Tanaka, K. Tokimatsu, 2013. Shear-Wave Velocity–Based Probabilistic and Deterministic Assessment of Seismic Soil Liquefaction Potential, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 139, No. 3, March 1

Carlson Geotechnical
7185 SW Sandburg Street, Suite 200
Tigard, Oregon 97223

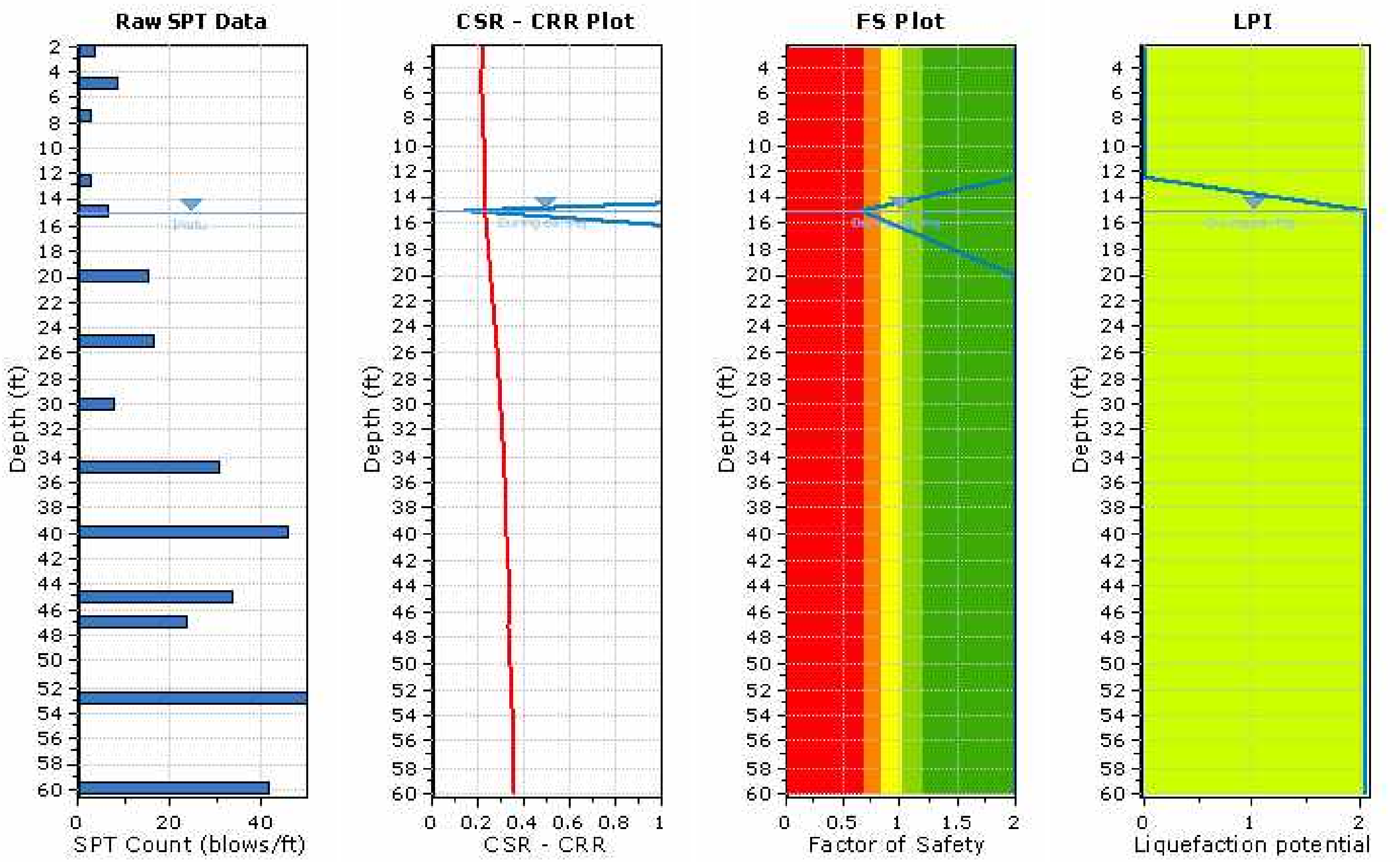
SPT BASED LIQUEFACTION ANALYSIS REPORT

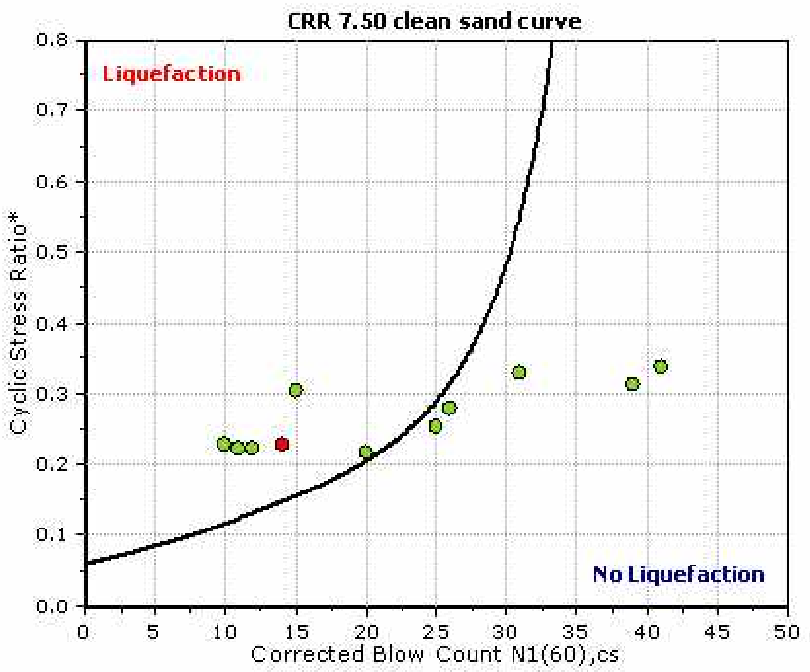
Project title : Marylhurst School New Life Church Site Expansion **SPT Name: B-3**

Location : 19915 Old River Drive, West Linn, OR

:: Input parameters and analysis properties ::

Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	15.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	15.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	7.30 ft
Borehole diameter:	65mm to 115mm	Peak ground acceleration:	0.38 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.25		





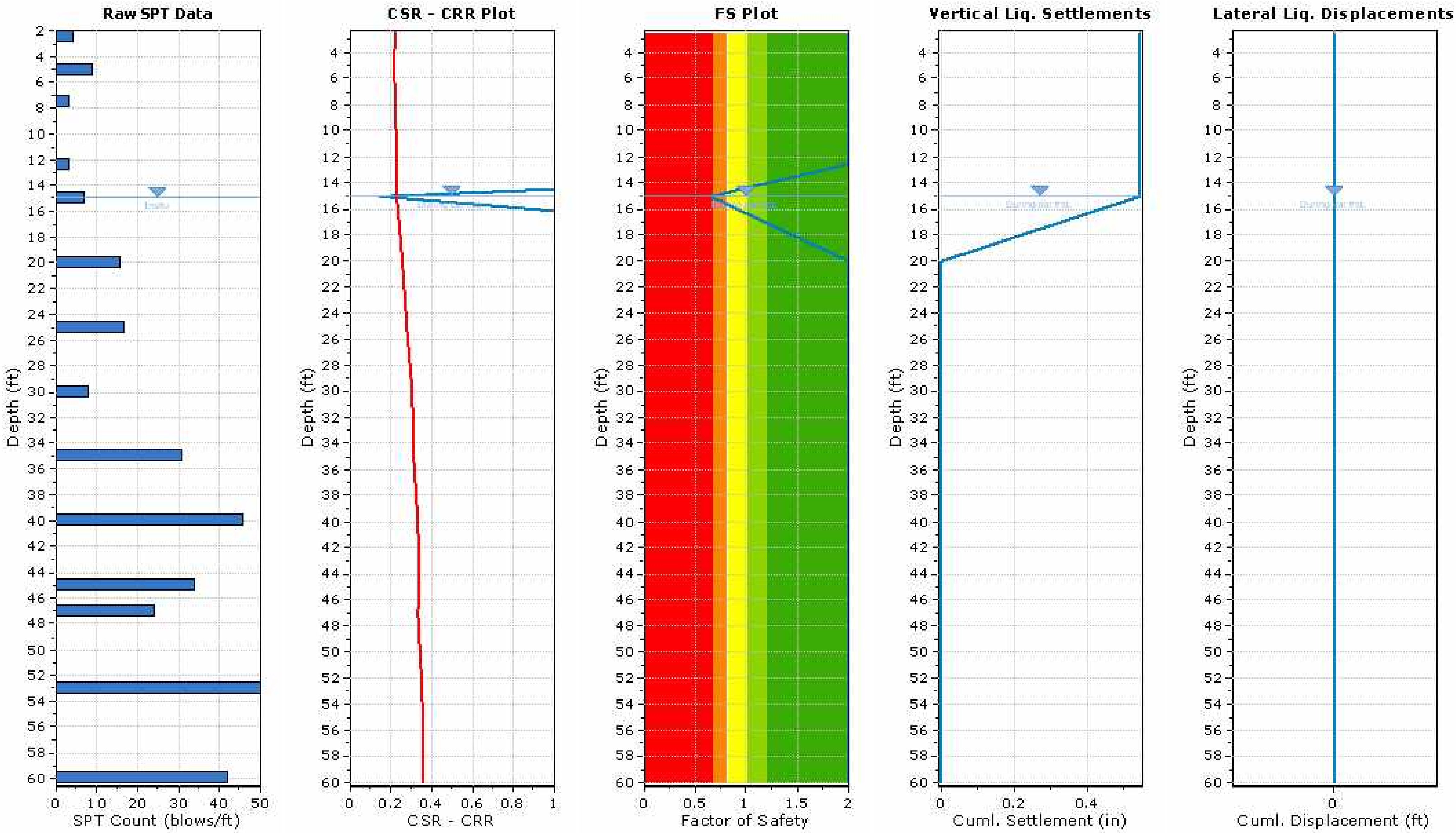
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.50	4	86.00	115.00	5.00	Yes
5.00	9	86.00	115.00	2.50	Yes
7.50	3	86.00	115.00	5.00	Yes
12.50	3	86.00	115.00	2.50	Yes
15.00	7	95.00	115.00	1.50	Yes
20.00	16	95.00	115.00	8.50	No
25.00	17	95.00	115.00	5.00	No
30.00	8	95.00	115.00	5.00	No
35.00	31	15.00	115.00	1.00	Yes
40.00	46	18.00	115.00	4.00	Yes
45.00	34	18.00	115.00	8.00	Yes
47.00	24	95.00	115.00	5.00	Yes
53.00	57	30.00	115.00	7.00	Yes
60.00	42	95.00	115.00	1.50	Yes

Abbreviations

Depth:	Depth at which test was performed (ft)
SPT Field Value:	Number of blows per foot
Fines Content:	Fines content at test depth (%)
Unit Weight:	Unit weight at test depth (pcf)
Infl. Thickness:	Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy:	User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$
2.50	4	115.00	0.14	0.00	0.14	0.48	1.70	1.25	1.00	0.75	1.00	6	86.00	5.53	12	4.000
5.00	9	115.00	0.29	0.00	0.29	0.41	1.70	1.25	1.00	0.75	1.00	14	86.00	5.53	20	4.000
7.50	3	115.00	0.43	0.00	0.43	0.50	1.57	1.25	1.00	0.80	1.00	5	86.00	5.53	11	4.000
12.50	3	115.00	0.72	0.00	0.72	0.53	1.23	1.25	1.00	0.85	1.00	4	86.00	5.53	10	4.000
15.00	7	115.00	0.86	0.00	0.86	0.49	1.11	1.25	1.00	0.85	1.00	8	95.00	5.50	14	0.148
20.00	16	115.00	1.15	0.16	0.99	0.40	1.03	1.25	1.00	0.95	1.00	19	95.00	5.50	25	4.000
25.00	17	115.00	1.44	0.31	1.13	0.40	0.98	1.25	1.00	0.95	1.00	20	95.00	5.50	26	4.000
30.00	8	115.00	1.73	0.47	1.26	0.49	0.92	1.25	1.00	1.00	1.00	9	95.00	5.50	15	4.000
35.00	31	115.00	2.01	0.62	1.39	0.31	0.92	1.25	1.00	1.00	1.00	36	15.00	3.26	39	4.000
40.00	46	115.00	2.30	0.78	1.52	0.20	0.93	1.25	1.00	1.00	1.00	53	18.00	4.09	57	4.000
45.00	34	115.00	2.59	0.94	1.65	0.29	0.88	1.25	1.00	1.00	1.00	37	18.00	4.09	41	4.000
47.00	24	115.00	2.70	1.00	1.70	0.36	0.84	1.25	1.00	1.00	1.00	25	95.00	5.50	31	4.000
53.00	57	115.00	3.05	1.19	1.86	0.14	0.93	1.25	1.00	1.00	1.00	66	30.00	5.36	71	4.000
60.00	42	115.00	3.45	1.40	2.05	0.24	0.85	1.25	1.00	1.00	1.00	45	95.00	5.50	51	4.000

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$

Abbreviations

σ_v:	Total stress during SPT test (tsf)
u_o:	Water pore pressure during SPT test (tsf)
σ'_{vo}:	Effective overburden pressure during SPT test (tsf)
m:	Stress exponent normalization factor
C_N:	Overburden corretion factor
C_E:	Energy correction factor
C_B:	Borehole diameter correction factor
C_R:	Rod length correction factor
C_S:	Liner correction factor
$N_{1(60)}$:	Corrected N_{SPT} to a 60% energy ratio
$\Delta(N_1)_{60}$	Equivalent clean sand adjustment
$N_{1(60)cs}$:	Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$:	Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF_{max}	$(N_1)_{60cs}$	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS
2.50	115.00	0.14	0.00	0.14	1.00	1.00	0.247	1.24	12	1.02	0.243	1.10	0.221	2.000
5.00	115.00	0.29	0.00	0.29	0.99	1.00	0.245	1.49	20	1.03	0.238	1.10	0.216	2.000
7.50	115.00	0.43	0.00	0.43	0.99	1.00	0.244	1.21	11	1.01	0.240	1.09	0.221	2.000
12.50	115.00	0.72	0.00	0.72	0.97	1.00	0.240	1.19	10	1.01	0.236	1.04	0.228	2.000
15.00	115.00	0.86	0.00	0.86	0.96	1.00	0.237	1.29	14	1.02	0.233	1.02	0.228	0.649
20.00	115.00	1.15	0.16	0.99	0.94	1.00	0.269	1.72	25	1.05	0.256	1.01	0.254	2.000
25.00	115.00	1.44	0.31	1.13	0.92	1.00	0.290	1.77	26	1.05	0.275	0.99	0.278	2.000
30.00	115.00	1.73	0.47	1.26	0.90	1.00	0.304	1.32	15	1.02	0.297	0.98	0.303	2.000
35.00	115.00	2.01	0.62	1.39	0.87	1.00	0.312	2.20	39	1.08	0.289	0.92	0.314	2.000
40.00	115.00	2.30	0.78	1.52	0.85	1.00	0.317	2.20	57	1.08	0.293	0.89	0.328	2.000
45.00	115.00	2.59	0.94	1.65	0.82	1.00	0.318	2.20	41	1.08	0.294	0.87	0.339	2.000
47.00	115.00	2.70	1.00	1.70	0.81	1.00	0.318	2.06	31	1.07	0.297	0.90	0.330	2.000
53.00	115.00	3.05	1.19	1.86	0.78	1.00	0.317	2.20	71	1.08	0.293	0.83	0.351	2.000
60.00	115.00	3.45	1.40	2.05	0.75	1.00	0.312	2.20	51	1.08	0.289	0.81	0.358	2.000

Abbreviations

$\sigma_{v,eq}$:	Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$:	Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$:	Effective overburden pressure, during earthquake (tsf)
r_d:	Nonlinear shear mass factor
α:	Improvement factor due to stone columns
CSR :	Cyclic Stress Ratio
MSF :	Magnitude Scaling Factor
$CSR_{eq,M=7.5}$:	CSR adjusted for M=7.5
K_{sigma}:	Effective overburden stress factor
CSR^*:	CSR fully adjusted
FS:	Calculated factor of safety against soil liquefaction

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.50	2.000	0.00	9.62	2.50	0.00
5.00	2.000	0.00	9.24	2.50	0.00
7.50	2.000	0.00	8.86	2.50	0.00
12.50	2.000	0.00	8.10	5.00	0.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
15.00	0.649	0.35	7.71	2.50	2.06
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	2.000	0.00	5.43	5.00	0.00
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
47.00	2.000	0.00	2.84	2.00	0.00
53.00	2.000	0.00	1.92	6.00	0.00
60.00	2.000	0.00	0.86	7.00	0.00

Overall potential I_L : 2.06

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
2.50	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000
5.00	14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	0.000
7.50	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000
12.50	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
α, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical & Lateral displ.acements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60cs}$	γ_{lim} (%)	F_α	FS_{liq}	γ_{max} (%)	e_v (%)	dz (ft)	S_{v-1D} (in)	LDI (ft)
15.00	14	30.65	0.79	0.649	30.65	3.02	1.50	0.543	0.00
20.00	25	0.00	0.00	2.000	0.00	0.00	8.50	0.000	0.00
25.00	26	0.00	0.00	2.000	0.00	0.00	5.00	0.000	0.00
30.00	15	0.00	0.00	2.000	0.00	0.00	5.00	0.000	0.00
35.00	39	1.07	-0.73	2.000	0.00	0.00	1.00	0.000	0.00
40.00	57	0.00	-2.17	2.000	0.00	0.00	4.00	0.000	0.00
45.00	41	0.70	-0.88	2.000	0.00	0.00	8.00	0.000	0.00
47.00	31	4.04	-0.16	2.000	0.00	0.00	5.00	0.000	0.00
53.00	71	0.00	-3.38	2.000	0.00	0.00	7.00	0.000	0.00

:: Vertical & Lateral displ.acements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60cs}$	γ_{lim} (%)	F_α	FS_{liq}	γ_{max} (%)	e_v (%)	dz (ft)	S_{v-1D} (in)	LDI (ft)
60.00	51	0.02	-1.67	2.000	0.00	0.00	1.50	0.000	0.00

Cumulative settlements: 0.543 0.00

Abbreviations

γ_{lim}: Limiting shear strain (%)
F_α/N: Maximun shear strain factor
γ_{max}: Maximum shear strain (%)
e_v:: Post liquefaction volumetric strain (%)
S_{v-1D}: Estimated vertical settlement (in)
LDI: Estimated lateral displacement (ft)

References

- Ronald D. Andrus, Hossein Hayati, Nisha P. Mohanan, 2009. Correcting Liquefaction Resistance for Aged Sands Using Measured to Estimated Velocity Ratio, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 135, No. 6, June 1

- Boulanger, R.W. and Idriss, I. M., 2014. CPT AND SPT BASED LIQUEFACTION TRIGGERING PROCEDURES. DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING COLLEGE OF ENGINEERING UNIVERSITY OF CALIFORNIA AT DAVIS

- Dipl.-Ing. Heinz J. Priebe, Vibro Replacement to Prevent Earthquake Induced Liquefaction, Proceedings of the Geotechnique-Colloquium at Darmstadt, Germany, on March 19th, 1998 (also published in Ground Engineering, September 1998), Technical paper 12-57E

- Robertson, P.K. and Cabal, K.L., 2007, Guide to Cone Penetration Testing for Geotechnical Engineering. Available at no cost at http://www.geologismiki.gr/

- Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J., Liao, S., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R., and Stokoe, K.H., Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 127, October, pp 817-833

- Zhang, G., Robertson. P.K., Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, 39: pp 1168-1180

- Zhang, G., Robertson. P.K., Brachman, R., 2004, Estimating Liquefaction Induced Lateral Displacements using the SPT and CPT, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 130, No. 8, 861-871

- Pradel, D., 1998, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 124, No. 4, 364-368

- R. Kayen, R. E. S. Moss, E. M. Thompson, R. B. Seed, K. O. Cetin, A. Der Kiureghian, Y. Tanaka, K. Tokimatsu, 2013. Shear-Wave Velocity–Based Probabilistic and Deterministic Assessment of Seismic Soil Liquefaction Potential, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 139, No. 3, March 1

June 12, 2018

Robinwood Neighborhood Association
James T. O'Toole, President
Kazi Ahmed, Vice President
Christine Steel, Treasurer
Jenne Henderson, Secretary
Char Marier, at Large

Robinwood Station Community Center
3706 Cedaroak Drive
West Linn, Oregon 97068

Robinwood Neighborhood Association Neighbors within 500 feet of proposed project site

Subject: The Marylhurst School

Proposed Site: 19915 Old River Drive
19803 Old River Drive
West Linn, Oregon 97068

Dear James, board members of the Robinwood Neighborhood Association, and neighbors,

The purpose of this letter is to share with you our proposal to convert the existing New Life Church property at 19915 and 19803 Old River Drive into the new home for the Maryhurst School, a Pre-K through 8th grade nonprofit private school.

The Marylhurst School is an independent, progressive education community currently located in historic Oregon City. Founded in 1972 at the Marylhurst University Campus in West Linn, we embrace the creativity, questions and risk taking of childhood in a supportive, hands-on environment.

The Marylhurst School proposes to purchase the existing church property and combine the two lots to make a single property lot. The proposal may include street improvements, parking lot improvements, new stormwater treatment facilities, renovations of the existing church buildings, and a new classroom building. The proposed development would require a Conditional Use Permit (CUP) and Class II Design Review by the City of West Linn.

We would like to invite the Robinwood Neighborhood Association and any interested persons to a meeting to discuss the proposal in more detail. We formally request that within 60 days, a date and location to have your required neighborhood meeting is scheduled, with a return receipt. The 60 days shall be calculated from the date this letter is mailed. If your neighborhood association does not want to meet within the 60-day timeframe, the applicant may hold a public meeting during the evening after 6:00 p.m., or on the weekend no less than 20 days from the date of mailing of the notice.

All meetings shall be held at a location open to the public within the boundaries of the association or at a public facility within the City of West Linn. If the meeting is held at a business, it shall be posted at the time of the meeting as the meeting place and shall note that the meeting is open to the public and all interested persons may attend. If the meeting is scheduled as part of your neighborhood association's regular monthly meeting, the proposal may not be the only topic of discussion on the meeting agenda.

Concerned citizens should contact your neighborhood association, or their association designee, with any questions that they may want to relay to the applicant.

Please let us know if you have questions or need any additional information.

Sincerely,

Sheila Walker, Head of the Marylhurst School
1232 Linn Ave
Oregon City, Oregon 97045
(503) 650-0978
sheilaw@themarylhurstschool.org

New Life Church

21E24BB01900
William Allen
3870 Ridgewood Way
West Linn, OR 97068

21E24BB02700
Lorene Bay
2045 Ostman Rd
West Linn, OR 97068

21E24BB02000
William Belden
PO Box 388
West Linn, OR 97068

21E23AA01200
Durward Bennett
3320 Walling Way
West Linn, OR 97068

21E23AA00101
David Brandon
19635 Old River Dr
West Linn, OR 97068

21E24BB02900
Carol Bryck
PO Box 603
West Linn, OR 97068

21E24BB01800
Patricia Buffington
3820 Ridgewood Way
West Linn, OR 97068

21E24BB02100
Brent Carlson
19930 Old River Dr
West Linn, OR 97068

21E23AA00703 & 00705
Oak Cedar
PO Box 1919
Wichita Falls, TX 76307

21E13CC06100
Tiffany Chong
18649 Trillium Dr
West Linn, OR 97068

21E24BB01700
Dale Cook
19844 Old River Dr
West Linn, OR 97068

21E13CC07800
Ramona Delano
3737 Ridgewood Way
West Linn, OR 97068

21E24BB01600
David Ehlinger
19790 Old River Dr
West Linn, OR 97068

21E24BB02300
Benjamin Foster
3707 Cedaroak Dr
West Linn, OR 97068

21E23AA01100
Marilyn Frankel
3354 Walling Way
West Linn, OR 97068

21E23AA00300
Michael Hayes
19775 Old River Dr
West Linn, OR 97068

21E13CC07900
Michael Higgins
3753 Ridgewood Way
West Linn, OR 97068

21E24BB01400
Ava Johnson
3716 Ridgewood Way
West Linn, OR 97068

21E13CC05500
Raymond Kestek
3536 Walling Way
West Linn, OR 97068

21E13CC05700
Roxanna Khosravi
19625 Old River Dr
West Linn, OR 97068

21E24BB00600
Karen Kiefert
3751 Cedaroak Dr
West Linn, OR 97068

21E23AA00100
Paul Knudsen
19679 Old River Dr
West Linn, OR 97068

21E23AA03000
Theodore Lachman
35301 SW Geer Rd
Newberg, OR 97132

21E24BB00700
Eleanora Larson
3969 Ridgewood Way
West Linn, OR 97068

21E13CC05900
Judy McCartney
3691 Ridgewood Way
West Linn, OR 97068

21E23AA00200
Penelope McCaslin
18915 Beaver Ln NE
Aurora, OR 97002

21E24BB02500
John Micetic
20024 Old River Dr
West Linn, OR 97068

21E24BB01000
John Miller
3825 Ridgewood Way
West Linn, OR 97068

21E24BB01500
Edward Montpart
19728 Old River Dr
West Linn, OR 97068

21E13CC06000
Scott Morris
3711 Ridgewood Way
West Linn, OR 97068

21E24BB02400
Eric Nepom
19970 Old River Dr
West Linn, OR 97068

21E24BB01401
Tina Olsen
3740 Ridgewood Way
West Linn, OR 97068

21E24BB00800
Michelle Patterson
3927 Ridgewood Way
West Linn, OR 97068

21E24BB01200
Wyliada Price
3787 Ridgewood Way
West Linn, OR 97068

21E13CC05600
Nancy Rowinski
3424 Walling Way
West Linn, OR 97068

21E23AA01300
William Schroeter
PO Box 256
Marylhurst, OR 97036

21E23AA00700 & 00702
Douglas E Seely
1780 SW Advance
West Linn, OR 97068

21E23AA01700
Douglas E Seely
1780 SW Advance
West Linn, OR 97068

21E24BB02200
Kathleen Smith
3950 Ridgewood Way
West Linn, OR 97068

21E13CC05800
William Swartz
3611 Ridgewood Way
West Linn, OR 97068

21E24BB00900
James Wright
3875 Ridgewood Way
West Linn, OR 97068

21E23AA00400
New Life Church Robinwood
PO Box 5
West Linn, OR 97068

21E23AA00600
Tribbett Trust
1942 Westlake Loop
Newberg, OR 97132

21E23AA00601
Cedar Linn LLC
7831 SE Lake Rd Ste 200
Milwaukie, OR 97267

21E23AA00704
West Linn Properties
10250 SW North Dakota St
Tigard, OR 97223

21E23AA01400
West Linn Investors LLC
6830 SW Windemere Loop
Portland, OR 97225

21E23AA03100
City Of West Linn
22500 Salamo Rd #600
West Linn, OR 97068

21E23AD06101
Roic Robinwood LLC
8905 Towne Centre Dr Ste 108
San Diego, CA 92122

21E24BB02600
Hamersly Family LLC
2695 Surrey Ln
West Linn, OR 97068

21E24BB02800
City Of West Linn
22500 Salamo Rd #600
West Linn, OR 97068

21E24BB04800
Presbytery Of The Cascades
19200 Willamette Dr
West Linn, OR 97068

21E24BB04900
Erfan Inc
PO Box 2072
Portland, OR 97208

21E23AA00602
Tribbett Family Ltd Prtnshp
1942 Westlake Loop
Newberg, OR 97132

STAPLES
label size 1" x 2 5/8" compatible with Avery ®5160/8160
Étiquette de format 25 mm x 67 mm compatible avec Avery ®5160/8160

The Marylhurst School
honoring the journey of each child

June 20th, 2018

This is the Marylhurst School's affidavit of mailing. On June 19th, a certified letter was received by James O'Toole, the president of the Robinwood Neighborhood Association. Please see attached page for receipt and delivery confirmation.

Sincerely,

Sheila Walker; Head of School

7014 2120 0000 7900 4069

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at *www.usps.com®*.

WEST LINN, OR 97068 OFFICIAL USE

Postage	$3.45	0155 11
Certified Fee	$0.00 $0.00	
Return Receipt Fee (Endorsement Required)	~~$0.00~~ $0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	~~$0.00~~ $0.50	
Total Postage & Fees	$ $3.95	06/18/2018

Sent To James O'TOOLE

Street & Apt. No., or PO Box No.

City, State, ZIP+4

PS Form 3800, July 2014 See Reverse for Instructions

Add a tracking number

70142120[illegible]00079004069

Delivered:
WEST LINN, OR 97068 on
June 19, 2018 at 12:04 pm

Expected Delivery on:
Tuesday, June 19, 2018 by
8:00pm

The Marylhurst School

19915 Old River Drive
19803 Old River Drive
West Linn, Oregon 97068

This notice is to share with you that this site may be subject to a proposed development to convert the existing New Life Church property at 19915 and 19803 Old River Drive into the new home for the Maryhurst School, a Pre-K through 8th grade nonprofit private school.

The Marylhurst School is an independent, progressive education community currently located in historic Oregon City. Founded in 1972 at the Marylhurst University Campus in West Linn, we embrace the creativity, questions and risk taking of childhood in a supportive, hands-on environment.

The Marylhurst School proposes to purchase the existing church property and combine the two lots to make a single property lot. The proposal may include street improvements, parking lot improvements, new stormwater treatment facilities, renovations of the existing church buildings, and a new classroom building. The proposed development would require a Conditional Use Permit (CUP) and Class II Design Review by the City of West Linn.

Please contact Sheila Walker, Head of the Marylhurst School, for additional information.

Sheila Walker, Head of the Marylhurst School
1232 Linn Ave
Oregon City, Oregon 97045
(503) 650-0978
sheilaw@themarylhurstschool.org

New Life Church

Robinwood Neighborhood Association

Minutes July 10th, 2018

Call to Order, Agenda Review, and Introductions:
- Meeting of the Robinwood Neighborhood Association (RNA) called to order at 7: 08pm.
- New members to introduce: none

Guests of the Association:
- Ms. Sheila Walker, Head, The Marylhurst School, and others. The school will move to Old River Road. The proposed addition is two story, built onto the field. Parking lot changes to include a drop off loop to avoid back up onto the street. Questions were asked about traffic use, locals continuing to use the playground, a walking path, half street improvements, speed bump improvements, etc. Applications may be submitted in August, possibly appearing before the Planning Commission in September or August. The Oregon City lease is up in June 2019 and they plan to move to West Linn with Phase I, using the existing building and as funds become available the master plan will be implemented.
-
- The Honorable Russell Axelrod, Mayor, West Linn. Changes and updates to the Code are being made. The Council has talked about looking at the Transportation System Plan *and* Neighborhood Plan and whether sidewalks make sense in different areas. Last night, the City Council took a position to evaluate new projects and if half street improvements would be required. Neighborhoods were encouraged to review and update their Neighborhood Plan.

Treasurer Report: (Christine Steel): The new sound system cost $1398.84, leaving a balance of $982.84.

Review and Approval of Minutes: (Jenne Henderson) May and June minutes approved as amended.

Announcements, City and Community Events:
- None

Committee and Community Reports:
- Robinwood Station**:** (Randall Fastabend): RNA Picnic 8/25.
- Parks and Rec: (Jim for Don Kingsborough): Summer movies, music and street dance are scheduled. Tomorrow 7/11 there is a tribute to Neal Hennelley, 2:00pm at the Adult Community Center.
- Community Garden: (Randall for Lisa Clifton): Deferred.
- Public Works: (Tony Bracco): Deferred.
- Preparedness/MYN: (Jim for Judy Wiechmann): Deferred.

Old Business:
- None

New Business:

- Neighborhood Picnic, Saturday August 25, 2018. Randall and Kevin are on the picnic committee.

Adjourned at 8:31pm.
Attendees: 26

Respectfully submitted:
/s/ Jenne Henderson, Secretary

ROBINWOOD NEIGHBORHOOD ASSOCIATION

The Honorable Russ Axelrod
Mayor
West Linn, Oregon
22500 Salamo Road
West Linn, Oregon 97068

June 19, 2018

Dear Mr. Mayor,

During this month's meeting of the Robinwood Neighborhood Association the topic of improvements to "sidewalks and streets" was discussed at length. The Association voted, unanimously, to seek your assistance in order to finally resolve this dilemma.

Over the years the sections of Chapter 96 of the Community Development Code have been inconsistently applied to remodel and building projects within the boundaries of the Robinwood Neighborhood. Specifically, those provisions and conditions affecting the installation of concrete curbs and sidewalks, along with street improvements, have been most controversial and problematic.

As you are aware, the majority of residents within the developed sections of the Robinwood Neighborhood have long had a strong preference to maintain the current rural fabric. They enjoy the narrow shared roadways which maximizes the natural setting and minimizes hardscape.

The current thinking of the City planners regarding the piece-meal installation of curbs and sidewalks, seems to be that some day, in the far off future, all of the individual curbs and sidewalks will miraculously all "meet-up" in our life time, is illusory. In the interim, the rational for the installation of a series of "sidewalks to no-where" contributes little to the current aesthetics and/or individual property values within the neighborhood. Given the time it will take to complete this fancy, no account is given for the value of "undeveloped" lands. Nor, does the program take into account that residents will defer upgrades and improvements to their individual properties in light of the significant added expenses which would be incurred. As a result, the neighborhood will not benefit from the improvements, including remodeled and/or new housing normally witnessed within the growth of a typical neighborhood.

There are provisions within the code which allow for a determination to be made which allows the resident to pay for the curbs, sidewalks and street improvements elsewhere in the City; in lieu of placing same at their residence. These provisions are just onerous. The concept, usually reserved for construction of commercial properties is, in most cases, considered the cost of doing business and limited to improvements within and around the exterior of the property to be developed, not properties outside the control of the developer at other locations. Other property owners in neighborhoods within the city, who make improvements to their property, are not subject to the same financial burdens, which are not inexpensive by the way, as neighbors who do not already enjoy the amenities your planning division now find necessary. In short, the application of this development criteria and extra costs to residential units seems by many, to be ambiguous, discriminatory, overreaching, and a punitive tax on certain citizens.

The “in-lieu” program was last presented to the Neighborhood Association meeting by the former City Manager, It was not received well then, and such sentiments have produced little improvement to the muddle since.

The Neighbors are very aware there are others within the neighborhood who would find the addition of sidewalks, and improved streets desirable, particularly those residents in the newer additions, along the periphery of the existing Neighborhood Boundaries; and, there are some who would advocate viable alternatives such as an asphalt pathway along one side of some streets within the older sections of the Robinwood Neighborhood itself.

The purported thinking surrounding safety and remedies can be found on both sides of the street as equal good and bad conclusions have been advanced by both advocates of developed and undeveloped camps. In addition, we have been advised the Tualatin Valley Fire and Rescue officials may have expressed some interest in this program. Certainly their views need to be considered in any new development and accommodated to the extent practical in existing developments.

We would ask you to consider addressing these issues through the City Council and/or Planning Commission, and initiate a comprehensive and narrowly focused study; produce a neighborhood plan based upon a wide-array of Robinwood resident participation, and consider subsequent code revisions which might arise from the foregoing to address future developments and improvements to the neighborhood infrastructure (i.e. curb, sidewalks and street improvements).

Most importantly, we request you and the City Council cause a moratorium be placed into effect on those policies and procedures as described in Chapter 96 of the Community Development Code concerning the consideration of curbs, sidewalks and street improvements in the application for permits from the City, for remodeling and/or the construction of residences, within the Robinwood Neighborhood until the study, plan and subsequent code revisions are finalized.

In the past, for one reason or another, residents of Robinwood have considered these issues resolved, only to find the controversy rise once again. We believe it is time to put this dispute to a final resolution.

The active members of the Robinwood Association stand ready to assist you in this endeavor in any way that will prove helpful.

In this regard, we cordially invite you and/or your designee to address these issues at our next Robinwood Meeting on Tuesday, July 10, 2018 at 7pm. Given the importance of the points of contention we will defer all other neighborhood business to allow an appropriate amount of time for discussion and questions on these issues.

We look forward to your kind response and thank you for your continued support for our neighbors.

Sincerely yours,

/s/ Jim

James T. O’Toole
President

Cc: The Honorable Brenda Perry
Council President, West Linn City Council

The Honorable Robert Martin
Member of the West Linn City Council

The Honorable Teri Cummings
Member of the West Linn City Council

The Honorable Richard Sakelik
Member of the West Linn City Council

Bcc: Robinwood Neighborhood Association Members

ROBINWOOD NEIGHBORHOOD ASSOCIATION

August 14, 2018

Mr. John Williams
Community Development Director
City of West Linn
22500 Salamo Road
West Linn, Oregon 97068

RE: Marylhurst School Project on Old River Drive

Dear Mr. Williams,

On July 10, 2018 the preliminary plans for the Marylhurst School Project were presented to the members attending the monthly meeting of the Robinwood Neighborhood Association.

The Association generally supports the project and believes the transformation of the NewLife Church into The Marylhurst School, on the properties on Old River Drive, will benefit our neighborhood and the larger West Linn Community.

During the meeting, the neighbors expressed two concerns for you, and the West Linn Planning Commission, to deliberate and consider:

1) The owner of the property immediately adjacent to the northern portion of the project will be impacted by the proposed new structures, from a visual perspective, as the height and close proximity will greatly intrude and inhibit the owners current environment, including diminished solar access to their gardens and grounds.

The Association is very aware and supports the concept “your personal view ends at the property line”. However; in this specific case, we would suggest relocating the proposed new structure to the opposite end of the property. The three story building would be more aesthetically in line with the existing apartment complex, situated adjacent to the southern portion of the property, rather than the single residential units to the north.

The addition of plantings would seem an appropriate buffer along the northern and western reaches of the property line.

2) As you know the issue concerning the installation of curbs and sidewalks, or the “in-lieu program”, is a contentious matter with many in the Neighborhood. (Please see the attached letter to Mayor Axelrod, dated June 19, 2018).

The Neighborhood Association is about to embark on an initiative, in conjunction with the City, to revise those portions of the Robinwood Neighborhood Plan dealing with the installation of curbs and sidewalks. While this process will take some time, it is our hope to maintain the current rural fabric enjoyed by the neighborhood.

In the interim, in this case, we would ask that consideration be given to alternatives such as a permeable, more natural pathway if it is determined such an installation is required for the safety of the school children

The members of the Robinwood Neighborhood appreciate the opportunity to review the proposal by The Marylhurst School representatives, and we wish them success in their endeavor.

Thank you for your consideration of our comments.

Best regards,

/s/ Jim

James T. O'Toole
President

Attachment: RNA Letter to Mayor R. Axelrod
June 19, 2018

The Marylhurst School

West Linn, Oregon

Submittal: September 10, 2018

An Application for:
Class 3 Conditional Use
Class 2 Design Review
Class 2 Variances

Applicant:
The Marylhurst School
1232 Linn Avenue
Oregon City, OR 97045
Phone: 503-650-0978
Contact: Sheila Walker
info@themarylhurstchurch.org

Prepared by:
Cardno
6720 SW Macadam Avenue, Suite 200
Portland, Oregon 97219
Phone: 503-419-2500
Contact: Kevin Brady
kevin.brady@cardno.com

TABLE OF CONTENTS

EXHIBITS

I. INTRODUCTION

GENERAL INFORMATION

Applicant:	**Marylhurst School** 1232 Linn Avenue Oregon City, OR 97045 Phone: 503-650-0978 Contact: Sheila Walker Email: info@themarylhurstschool.org
Applicant's Representative:	**Cardno** 6720 SW Macadam Avenue, Suite 200 Portland, Oregon 97219 Phone: 503-419-2500 Contact: Kevin Brady Email: kevin.brady@cardno.com
Tax Lot Information:	Tax Map 21E23AA, Tax Lot 400, 500
Site Address:	19915 Old River Drive, West Linn, Oregon 97068
Lot Area:	0.99 Acres
Current Zoning District:	R-10 Single Family Residential

SUMMARY OF PROPOSAL

The applicant, The Marylhurst School, is requesting approval for a redevelopment of an existing church to a school in the R-10 zone. The Marylhurst School property is at 19915 Old River Road and is legally identified as 21E23AA, tax lots 500 and 400. The site has previously operated as a church, including a preschool program for 195 children. The applicant is proposing to change the use to a school as part of the proposed development plan.

The existing northernmost building will be used for school assemblies, activities, etc., and the church use will be discontinued. A new two-story school will be built on the vacant north portion of the site and will accommodate 12 classrooms serving pre-school through grade eight. Overall the proposal includes: a new/redeveloped school building; new and/or re-designed parking, including vehicle and school bus access ways; outdoor recreation facilities; open space areas; pedestrian pathways; and new landscaped areas.

Phase One will consist of the adaptive reuse of the existing structures on site. The existing northernmost building will be used for school assemblies, activities, etc., and the church use will be discontinued. The existing southernmost building will be used for classrooms, administrative offices and small teaching break out spaces. A portable classroom will be located adjacent to the south and west property line and will house two (2) additional classrooms.

Phase Two will consist of a new two-story school to be built on the vacant north portion of the site, oriented parallel to the west property line. The new facility will accommodate 12 classrooms serving pre-school through grade eight. Overall the proposal includes: a new/redeveloped school building; new and/or re-designed parking, including vehicle and school bus access ways; outdoor recreation facilities; open space areas; pedestrian pathways; and new landscaped areas. The portable classroom will be removed as part of the Phase Two development.

II. CITY OF WEST LINN CODE

CHAPTER 5: GENERAL

05.020 CLASSIFICATION OF ZONES

All areas within the corporate limits of the City of West Linn are hereby divided into zone districts, and the use of each tract and ownership of land within the corporate limits shall be limited to those uses permitted by the zoning classification applicable to each such tract as hereinafter designated. The zoning districts within the City of West Linn are hereby classified and designated as follows:

ZONING DISTRICT	ZONE DESIGNATION	DWELLING UNITS PER NET ACRE	LOT SIZE PER UNIT IN SQUARE FEET
Low Density			
Single-Family Residential detached	**R-10**	**4.35**	**10,000**

Response: The subject site is zoned R-10 on the West Linn Official Zoning Map.

CHAPTER 11: SINGLE-FAMILY RESIDENTIAL DETACHED, R-10

11.020 PROCEDURES AND APPROVAL PROCESS

C. A conditional use (CDC 11.060) is a use the approval of which is discretionary with the Planning Commission. The approval process and criteria for approval are set forth in Chapter 60 CDC, Conditional Uses. If a use is not listed as a conditional use, it may be held to be a similar unlisted use under the provisions of Chapter 80 CDC.

Response: The proposed use is considered School, therefore, the use is considered a Conditional Use. As a Conditional Use, the proposal is addressed below under Section 11.060, Conditional Uses.

D. The following code provisions may be applicable in certain situations:

5. Chapter 75 CDC, Variance.

Response: The proposed use and development include components that cannot meet the relevant standard(s) in the Code. These include Section 46.130 (loading bay standards) and Section 46.070 (parking location within 200 feet of primary entrance). Therefore, this application includes requests for Variances for these two Sections, and the narrative herein addresses the relevant criteria and standards for these Variances below.

11.060 CONDITIONAL USES

The following are conditional uses which may be allowed in this zoning district subject to the provisions of Chapter 60 CDC, Conditional Uses.

7. Schools.

Response: The proposed use is considered School, therefore, the use is considered a Conditional Use. As a Conditional Use, the proposal is addressed below under Section 11.060, Conditional Uses. Therefore, this application includes a request for a Conditional Use, and the narrative herein addresses the relevant criteria and standards for the Conditional Use below.

11.080 DIMENSIONAL REQUIREMENTS, CONDITIONAL USES

Except as may otherwise be established by this code, the appropriate lot or parcel size for a conditional use shall be determined by the approval authority at the time of consideration of the application based upon the criteria set forth in CDC 60.070(A) and (B).

<u>Response</u>: The existing lot is currently configured and no changes to the current configuration are proposed. The current size and shape of the lot adequately accommodates the proposed use, as indicated on the Site Plans for Phase I and II in Exhibit D, Sheets C1.0 and C1.1.

Chapter 34: ACCESSORY STRUCTURES, ACCESSORY DWELLING UNITS, AND ACCESSORY USES

34.020 ACCESSORY USES

Accessory uses are permitted uses which are customary and incidental to principal uses permitted in the zone and shall be permitted outright, or by prescribed conditions as identified below, and may be either attached or separated from the principal dwelling. Accessory uses on designated historic resources are subject to additional regulations in CDC 25.060(B).

<u>Response</u>: No accessory uses are proposed in conjunction with the School as a primary use. Therefore, this Section does not apply.

CHAPTER 41: BUILDING HEIGHT, STRUCTURES ON STEEP LOTS, EXCEPTIONS

41.005 DETERMINING HEIGHT OF BUILDING

A. For all zoning districts, building height shall be the vertical distance above a reference datum measured to the highest point of a flat roof or to the deck line of a mansard roof or to the highest gable, ridgeline or peak of a pitched or hipped roof, not including projections above roofs such as cupolas, towers, etc. The reference datum shall be selected by either of the following, whichever yields a greater height of building.

1. For relatively flat sites where there is less than a 10-foot difference in grade between the front and rear of the building, the height of the building shall be measured from grade five feet out from the exterior wall at the front of the building; or

2. For steeper lots where there is more than a 10-foot difference in grade between the front and rear of the building, the height of the building is measured from grade at a point five feet out from the exterior wall on the lowest side (front or rear) of the building. One then measures vertically to the peak or ridgeline of the roof to determine the height.

<u>Response</u>: The site is considered a relatively flat site, with less than a 10-foot grade differential between the front and rear of the buildings. The maximum height for the proposed Conditional Use in the R-10 zone is 35 feet, per Section 11.070.6 The proposed height for the new modular building structure in Phase I is approximately 22 feet. The proposed height for the new addition in Phase II is approximately 33 feet.. Therefore, the maximum building height requirement is met.

CHAPTER 42: CLEAR VISION AREAS

42.020 CLEAR VISION AREAS REQUIRED, USES PROHIBITED

A. A clear vision area shall be maintained on the corners of all property adjacent to an intersection as provided by CDC 42.040 and 42.050.

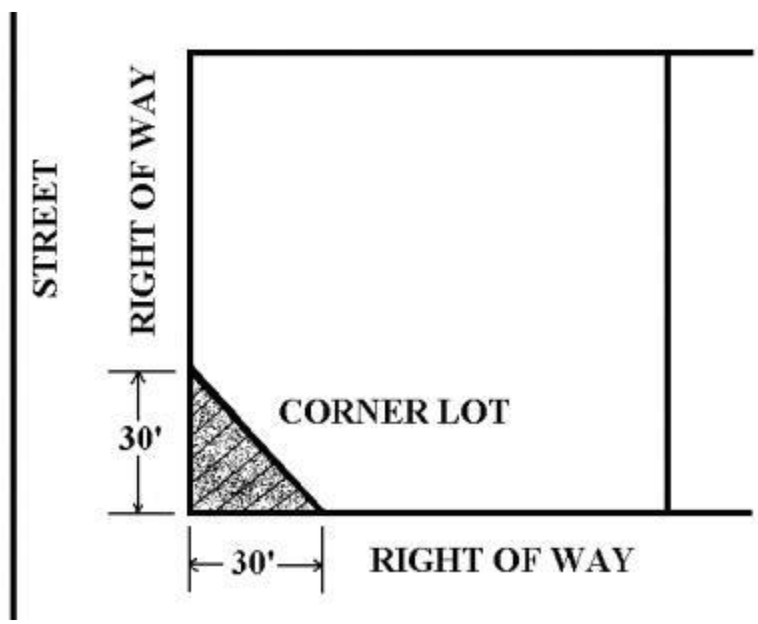
B. A clear vision area shall contain no planting, fence, wall, structure or temporary or permanent obstruction (except for an occasional utility pole or tree) exceeding three feet in height, measured from the top of the curb, or, where no curb exists, from the street centerline grade, except that trees exceeding this height may be located in this area, provided all branches below eight feet are removed.

<u>Response</u>: The subject site is not considered a corner lot, therefore, this Section does not apply. However, clear vision areas are proposed to be maintained at both of the driveway curb cuts at the adjacent right-of-way at Old River Road.

42.040 COMPUTATION; STREET AND ACCESSWAY 24 FEET OR MORE IN WIDTH

The clear vision area for all street intersections and street and accessway intersections (accessways having 24 feet or more in width) shall be that triangular area formed by the right-of-way or property lines along such lots and a straight line joining the right-of-way or property line at points which are 30 feet distant from the intersection of the right-of-way line and measured along such lines.

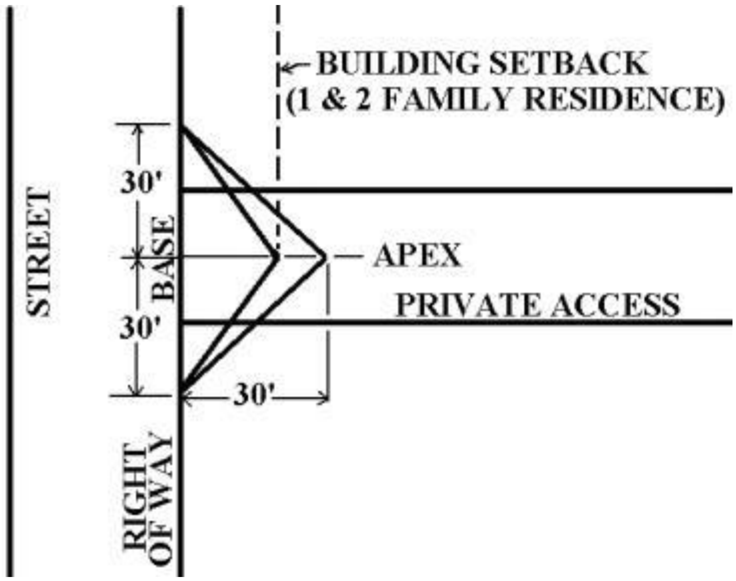
Clear vision area for corner lots and driveways 24 feet or more in width:



42.050 COMPUTATION; ACCESSWAY LESS THAN 24 FEET IN WIDTH

The clear vision area for street and accessway intersections (accessways having less than 24 feet in width) shall be that triangular area whose base extends 30 feet along the street right-of-way line in both directions from the centerline of the accessway at the front setback line of a single-family and two-family residence, and 30 feet back from the property line on all other types of uses.

Clear vision area for corner lots and driveways less than 24 feet in width:



Response: The applicant proposes two driveways to the site and the associated parking area. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school. Both driveways meet the standards indicated in this Section and the associated figures, as depicted in the Site Plan on Sheet C1.0 of the Preliminary Development Plans in Exhibit D.

CHAPTER 44: FENCES

44.020 SIGHT-OBSCURING FENCE; SETBACK AND HEIGHT LIMITATIONS

A. A sight- or non-sight-obscuring fence may be located on the property line or in a yard setback area subject to the following:

1. The fence is located within:

a. A required front yard area, and it does not exceed three feet, except pillars and driveway entry features subject to the requirements of Chapter 42 CDC, Clear Vision Areas, and approval by the Planning Director;

b. A required side yard which abuts a street and it is within that portion of the side yard which is also part of the front yard setback area and it does not exceed three feet;

c. A required side yard which abuts a street and it is within that portion of the side yard which is not also a portion of the front yard setback area and it does not exceed six feet provided the provisions of Chapter 42 CDC are met;

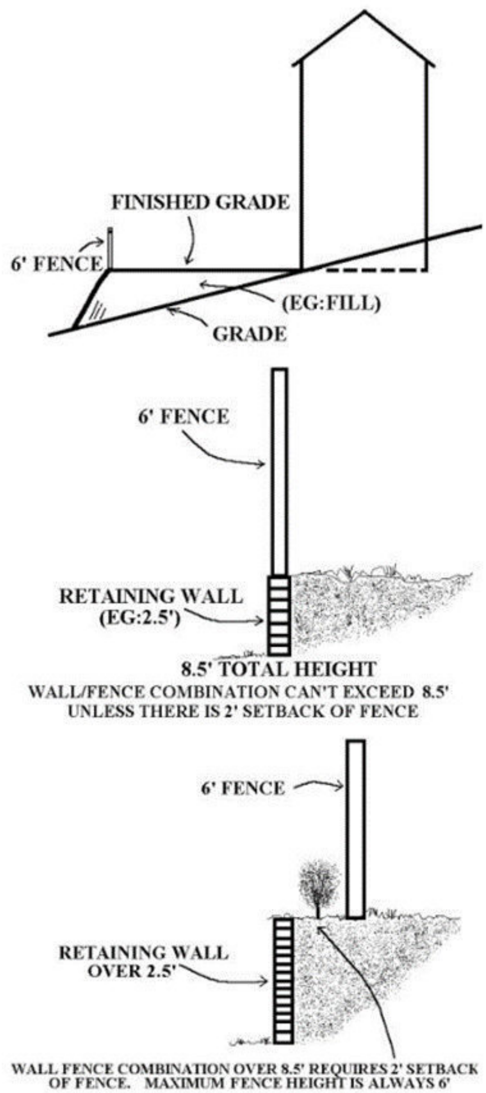
d. A required rear yard which abuts a street and it does not exceed six feet; or

e. A required side yard area which does not abut a street or a rear yard and it does not exceed six feet.

<u>Response</u>: Some new fencing is proposed for Phase II, including retention of existing 6-foot high cyclone fencing along most of the perimeter of the subject site. All proposed and existing 6-foot high fencing is proposed along rear or side yards. A short section of 3-foot high fencing is proposed along the front of the site with portions within the front yard. Therefore, all the existing and proposed fencing proposed for the project meets the standards in this Section.

B. Fence or wall on a retaining wall. When a fence is built on a retaining wall or an artificial berm, the following standards shall apply:

1. **When the retaining wall or artificial berm is 30 inches or less in height from finished grade, the maximum fence or wall height on top of the retaining wall shall be six feet.**
2. **When the retaining wall or earth berm is greater than 30 inches in height, the combined height of the retaining wall and fence or wall from finished grade shall not exceed eight and one-half feet.**
3. **Fences or walls located on top of retaining walls or earth berms in excess of 30 inches above finished grade may exceed the total allowed combined height of eight and one-half feet; provided, that the fence or wall is located a minimum of two feet from the retaining wall and the fence or wall height shall not exceed 6 ft.**



Response: There are two retaining wall locations on the site; (1) partially around the front storm planter and (2) partially around the back storm planter. Maximum exposed height of the walls is approximately 5'. All fencing proposed on top of retaining walls will be provided for fall protection and will be limited to 4' tall.

44.030 SCREENING OF OUTDOOR STORAGE

A. All service, repair, and storage activities carried on in connection with any commercial, business or industrial activity and not conducted within an enclosed building shall be screened from view of all adjacent properties and adjacent streets by a sight-obscuring fence.

Response: All proposed service, repair or storage activities will be accomplished off-site or conducted within enclosed areas of the site. A storage shed at the rear of the site will be retained for enclosed storage purposes.

44.040 LANDSCAPING

Landscaping which is located on the fence line and which impairs sight vision shall not be located within the clear vision area as provided in Chapter 42 CDC.

Response: All proposed landscaping is indicated on the Landscape Plan on Sheets L1.01, L1.02 and L1.03 in Exhibit D, Preliminary Development Plans. No landscaping is located with clear vision areas of driveways.

CHAPTER 46: OFF-STREET PARKING, LOADING, AND RESERVOIR AREAS

46.020 APPLICABILITY AND GENERAL PROVISIONS

A. At the time a structure is erected or enlarged, or the use of a structure or unit of land is changed within any zone, parking spaces, loading areas and reservoir areas shall be provided in accordance with the requirements of this chapter unless other requirements are otherwise established as a part of the development approval process.

B. The provision and maintenance of off-street parking and loading spaces are the continuing obligation of the property owner.

C. No building or other permit shall be issued until plans are approved that show the property that is and will remain available for exclusive use as off-street parking and loading space as required by this chapter.

D. Required parking spaces and loading areas shall be improved to the standards contained in this chapter and shall be available for use at the time of the final building inspection except as provided in CDC 46.150.

Response: The applicant is proposing to develop the site in two phases. The first phase (Phase I) will include the use of existing buildings and parking on the site, with the addition of a 28 feet x 64 feet modular classroom and associated ADA-compliant access facilities. Both the Phase I and Phase II parking shall be upgraded to meet current width, depth and paving requirements, as well as complete compliance with required landscaping. The applicant proposes parking through both phases of parking, with maintenance provided by the owner. This proposed parking shall be used exclusively for parking for the proposed School use. Therefore, the applicant is proposing to provide parking for the site in accordance with Chapter 46, with further specific compliance indicated below. See Site Plans on Sheets C1.0 and C1.1of the Preliminary Development Plans in Exhibit D.

46.030 SUBMITTAL REQUIREMENTS

For any application requiring design review approval, which includes parking areas, the applicant shall submit, within the design review package, a plan drawn to scale showing all the elements necessary to indicate that the requirements of Chapter 55 CDC are met and it shall include but not be limited to:

A. The delineation of individual parking and loading spaces and their dimensions;

B. The identification of compact parking spaces;

C. The location of the circulation area necessary to serve spaces;

D. The access point(s) to streets, alleys, and properties to be served;

E. The location of curb cuts;

F. The location and dimensions of all landscaping, including the type and size of plant material to be used, as well as any other landscape material incorporated into the overall plan;

G. The proposed grading and drainage plans and the slope (percentage) of parking lot;

H. Specifications as to signs and bumper guards;

I. Identification of disabled parking spaces;

J. Location of pedestrian walkways and crossings; and

K. Location of bicycle racks.

Response: All proposed parking is indicated on the Phase I and Phase II Site Plans on Sheets C1.0 and C1.1 in Exhibit D, Preliminary Development Plans. These plans include all of the required information identified in this Section, including depiction of spaces and dimensions, disabled stalls, access points, landscaping, vehicle circulation, pedestrian walkways and location of bicycle racks.

46.040 APPROVAL STANDARDS

Approval shall be based on the standards set forth in this chapter and Chapter 48 CDC, Access, Egress and Circulation; Chapter 52 CDC, Signs; and Chapter 54 CDC, Landscaping.

Response: All of the Sections in Chapter 46 are addressed herein, while the Chapters identified in Section 46.040 are addressed below.

46.070 MAXIMUM DISTANCE ALLOWED BETWEEN PARKING AREA AND USE

A. Off-street parking spaces for single- and two-family dwellings shall be located on the same lot with the dwelling.

Response: No single- and two family dwellings are proposed as part of this project, therefore, this Section does not apply.

B. Off-street parking spaces for uses not listed in subsection A of this section shall be located not farther than 200 feet from an entryway to the building or use they are required to serve, measured in a straight line from the building, with the following exceptions:

1. Shared parking areas for commercial uses which require more than 40 parking spaces may provide for the spaces in excess of the required 40 spaces up to a distance of 300 feet from the entryway to the commercial building or use.

2. Industrial and manufacturing uses which require in excess of 40 spaces may locate the required spaces in excess of the 40 spaces up to a distance of 300 feet from the entryway to the building.

3. **Employee parking areas for carpools and vanpools shall be located closer to the entryway to the building than general employee parking.**

4. **Stacked or valet parking is allowed if an attendant is present to move vehicles. If stacked parking is used for required parking spaces, the applicant shall ensure that an attendant will always be present when the lot is in operation. The requirements for minimum or maximum spaces and all parking area development standards continue to apply for stacked parking.**

5. **All disabled parking shall be placed closest to building entrances than all other parking. Appropriate ADA curb cuts and ramps to go from the parking lot to the ADA-accessible entrance shall be provided unless exempted by ADA code.**

Response: Due to site constraints and overall requirements for parking for the proposed use, it is not possible to locate all of the proposed and required parking within 200 feet of the front entrance of the school. The applicant is requesting a Variance for this Section, which is addressed below.

46.080 COMPUTATION OF REQUIRED PARKING SPACES AND LOADING AREA

A. **Where several uses occupy a single structure or unit of land, a combination of uses is included in one business, or a combination of uses in the same or separate buildings share a common parking area as in the case of a shopping center, the total off-street parking spaces and loading area shall be the sum of the requirements of the several uses, computed separately. For example, parking for an auto sales and repair business would be calculated using the "retail-bulky" calculation for the sales area and the "service and repair" calculation for the repair area. In another example, parking for a shopping center with a grocery store, a restaurant, and a medical office would be calculated using the "general retail store" calculation for the grocery store, the "restaurant" calculation for the restaurant, and the "medical/dental clinics" calculation for the medical office. The total number of required parking spaces may be reduced by up to 10 percent to account for cross-patronage (when a customer visits several commercial establishments during one visit to the commercial center) of adjacent businesses or services in a commercial center with five or more separate commercial establishments.**

B. **To calculate building square footage as a basis for determining how many parking spaces are needed, the area measured shall be gross floor area under the roof measured from the faces of the structure, including all habitable floors and excluding only space devoted to covered off-street parking or loading.**

C. **Where employees are specified, the employees counted are the persons who work on the premises including proprietors, executives, professional people, production, sales, and distribution employees, during the largest shift.**

D. **Fractional space requirements shall be counted as a whole space.**

E. **On-street parking along the immediate property frontage(s) may be counted toward the minimum parking requirement with approval from the City Engineer.**

Response: There is only one use proposed for the subject site, which is considered School under the description of Uses in Chapter 12 (R-7 Zone). The use is further described in Section 46.090 as a 'Public and semi-public building/use'. This proposed use, as well as the total gross floor area of the proposed development was used in determining required parking for the site.

46.090 MINIMUM PARKING SPACE REQUIREMENTS

B. Public and semi-public buildings/ uses.

6. Primary school, middle school, or equivalent private or parochial school.	**One space for every employee, plus 1 space for each 1,000 square feet of floor area.**
7. Senior high, college, or commercial trade school, or equivalent private or parochial school.	**0.2 spaces per staff and student.**
8. Day care, kindergarten, or pre-school facilities.	**One space per employee, plus one space for every 300 square feet of floor area.**

Response: There is only one use proposed for the subject site, which is considered School under the description of Uses in Chapter 12 (R-7 Zone). The use is further described in Section 46.090 as a 'Public and semi-public building/use'. This proposed use, as well as the total gross floor area of the proposed development was used in determining required parking for the site.

All proposed parking is indicated on the Site Plan on Sheets C1.0 and C1.1 in Exhibit D, Preliminary Development Plans. The Site Plan includes a Parking Count Table that identifies the required and proposed amounts of parking for the project. Due to site constraints and overall requirements for parking for the proposed use and associated gross floor area, it is not possible to provide the required amount of parking for the proposal. The applicant is requesting a Variance for this Section, which is addressed below.

F. Maximum parking. Parking spaces (except for single-family and two-family residential uses) shall not exceed the minimum required number of spaces by more than 10 percent.

Response: The applicant is proposing less than the minimum number of parking spaces required, therefore, maximum parking requirements are met.

G. Parking reductions. An applicant may reduce parking up to 10 percent for development sites within one-quarter mile of a transit corridor or within a mixed-use commercial area, and up to 10 percent for commercial development sites adjacent to multi-family residential sites with the potential to accommodate more than 20 dwelling units.

Response: There is a Trimet Bus Stop for route #35 .2 miles from the site Trimet Bus Route #35 on Willamette Drive that connects to the Oregon City Transit Center, the Lake Oswego Transit Center, and the Rose Quarter Transit Center with buses running about every half hour on weekdays when school is in session.

H. For office, industrial, and public uses where there are more than 20 parking spaces for employees on the site, at least 10 percent of the required employee parking spaces shall be reserved for carpool use before 9:00 a.m. on weekdays. The spaces will be the closest to the building entrance, except for any disabled parking and those signed for exclusive customer use. The carpool/vanpool spaces shall be clearly marked "Reserved – Carpool/Vanpool Before 9:00 a.m."

Response: The applicant does not propose more than 20 spaces for employees on the site, therefore, this standard does not apply.

I. Existing developments along transit streets or near transit stops may redevelop up to 10 percent of the existing parking spaces to provide transit-oriented facilities, including bus pullouts, bus stops and shelters, park and ride stations, and other similar facilities.

Response: Transit Orientated facilities are not provided because there currently is no transit on Old River Road.

46.120 DRIVEWAYS REQUIRED ON SITE

Any school or other meeting place which is designed to accommodate more than 25 people at one time shall provide a 15-foot-wide driveway designed for continuous forward flow of passenger vehicles for the purpose of loading and unloading passengers. Depending on functional requirements, the width may be increased with Planning Director approval.

Response: The applicant proposes two driveways to the site and the associated parking area. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school. Therefore, this requirement is met.

46.130 OFF-STREET LOADING SPACES

Buildings or structures to be built or substantially altered, which receive and distribute material or merchandise by truck, shall provide and maintain off-street loading and maneuvering space. The dimensional standard for loading spaces is a minimum of 14 feet wide by 20 feet long or proportionate to accommodate the size of delivery trucks that typically serve the proposed use as follows:

GROSS FLOOR AREA		
Land Use	**At Which First Berth is Required**	**At Which Second Berth is Required**
Institutional:		
Schools	**10,000**	**100,000**

Response: Due to site constraints and overall requirements for parking, circulation and landscaping for the proposed use, it is not possible to include a dedicated loading space that would only be used occasionally. The applicant is requesting a Variance for this Section, which is addressed below.

46.150 DESIGN AND STANDARDS

The following standards apply to the design and improvement of areas used for vehicle parking, storage, loading, and circulation:

A. Design standards.

1. **"One standard parking space" means a minimum for a parking stall of eight feet in width and 16 feet in length. These stalls shall be identified as "compact." To accommodate larger cars, 50 percent of the required parking spaces shall have a minimum dimension of nine feet in width and 18 feet in length (nine feet by 18 feet). When multi-family parking stalls back onto a main driveway, the stalls shall be nine feet by 20 feet. Parking for development in water resource areas may have 100 percent compact spaces.**
2. **Disabled parking and maneuvering spaces shall be consistent with current federal dimensional standards and subsection B of this section and placed nearest to accessible building entryways and ramps.**
4. **Service drives shall be designed and constructed to facilitate the flow of traffic, provide maximum safety of traffic access and egress, and maximum safety of pedestrians and vehicular traffic on the site.**
5. **Each parking and/or loading space shall have clear access, whereby the relocation of other vehicles to utilize the parking space is not required.**
6. **Except for single- and two-family residences, any area intended to be used to meet the off-street parking requirements as contained in this chapter shall have all parking spaces clearly marked using a permanent paint. All interior drives and**

access aisles shall be clearly marked and signed to show direction of flow and maintain vehicular and pedestrian safety. Permeable parking surface spaces may have an alternative delineation for parking spaces.

7. **Except for residential parking, and parking for public parks and trailheads, at least 50 percent of all areas used for the parking and/or storage and/or maneuvering of any vehicle, boat and/or trailer shall be improved with asphalt or concrete surfaces according to the same standards required for the construction and acceptance of City streets. The remainder of the areas used for parking may use a permeable paving surface designed to reduce surface runoff. Parking for public parks or trailheads may use a permeable paving surface designed to reduce surface runoff for all parking areas. Where a parking lot contains both paved and unpaved areas, the paved areas shall be located closest to the use which they serve.**
8. **Off-street parking spaces for single- and two-family residences shall be improved with an asphalt or concrete surface, or a permeable parking surface designed to reduce surface runoff, to specifications as approved by the Building Official. Other parking facilities for two- and single-family homes that are to accommodate additional vehicles, boats, recreational vehicles, and trailers, etc., need not be paved. All parking for multi-family residential development shall be paved with concrete or asphalt. Driveways shall measure at least 20 feet from the back of sidewalk to garage or the end of the parking pad to accommodate cars and sport utility vehicles without the vehicles blocking the public sidewalk.**
9. **Access drives from the street to off-street parking or loading areas shall be designed and constructed to facilitate the flow of traffic and provide maximum safety for pedestrian and vehicular traffic on the site. The number of access drives shall be limited to the minimum that will allow the property to accommodate and service the anticipated traffic. Access drives shall be clearly and permanently marked and defined through use of rails, fences, walls, or other barriers or markers on frontage not occupied by service drives.**
10. **Access drives shall have a minimum vision clearance as provided in Chapter 42 CDC, Clear Vision Areas.**
11. **Parking spaces along the boundaries of a parking lot or adjacent to interior landscaped areas or sidewalks shall be provided with a wheel stop at least four inches high located two feet back from the front of the parking stall. Such parking spaces may be provided without wheel stops if the sidewalks or landscaped areas adjacent the parking stalls are two feet wider than the minimum width.**
12. **Off-street parking and loading areas shall be drained in accordance with plans and specifications approved by the City Engineer. Storm drainage at commercial sites may also have to be collected to treat oils and other residue.**
13. **Artificial lighting on all off-street parking facilities shall be designed to deflect all light downward away from surrounding residences and so as not to create a hazard to the public use of any road or street.**
14. **Directional arrows and traffic control devices which are placed on parking lots**
15. **The maximum driveway grade for single-family housing shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage must maintain a maximum grade of 12 percent as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.**
16. **Visitor or guest parking must be identified by painted “GUEST” or “VISITOR.”**

17. **The parking area shall have less than a five percent grade. No drainage across adjacent sidewalks or walkways is allowed.**

Response: The proposed parking area meets all of the design standards indicated in Standards 1 through 17. All standard spaces are a minimum of 9-feet wide by 18-feet long, with the remaining 18 compact spaces proposed to be a minimum of 8-feet wide by 16-feet long. All proposed ADA parking is designed to meet all federal dimensional standards. All dimensional standards are met for drive aisles, including the one-way driveway intended for users of the drop-off zone at the front of the building. All parking spaces are clearly identified and the entire parking area intended for vehicle use will be paved with asphalt. Access drives are also marked with directional arrows and signage. Wheel stops are provided for all parking spaces, and the parking lot will be lit with artificial lighting to provide for greater safety and security during evening hours. The overall grade for the parking area is generally 5%.

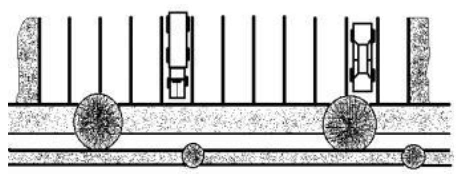
All proposed parking is indicated on the Site Plan on Sheets C1.0 and C1.1 in Exhibit D, Preliminary Development Plans.

18. **Commercial, office, industrial, and public parking lots may not occupy more than 50 percent of the main lot frontage of a development site. The remaining frontage shall comprise buildings or landscaping. If over 50 percent of the lineal frontage comprises parking lot, the landscape strip between the right-of-way and parking lot shall be increased to 15 feet wide and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. The defensible space of the parking lot should not be compromised.**

Response: The proposed use is considered 'semi-public', as the school is a private entity serving a limited public. Since the use is not considered commercial, office, industrial this standard would not apply to this proposal

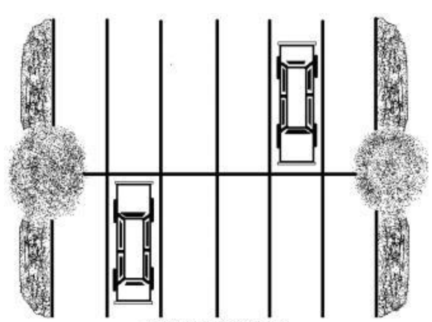
19. **Areas of the parking lot improved with asphalt or concrete surfaces shall be designed into areas of 12 or less spaces through the use of defined landscaped area. Groups of 12 or less spaces are defined as:**

    a. **Twelve spaces in a row, provided there are no abutting parking spaces, as in the case when the spaces are abutting the perimeter of the lot; or**



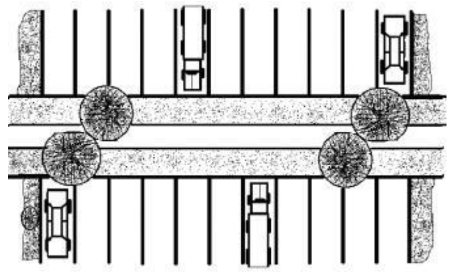
12 SPACES IN A ROW

    b. **Twelve spaces in a group with six spaces abutting together; or**



6 SPACES X 2 = 12

    c. **Two groups of 12 spaces abutting each other, but separated by a 15-foot-wide landscape area including a six-foot-wide walkway.**



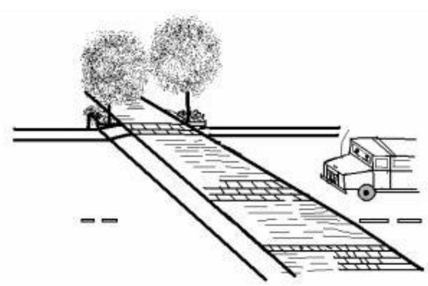
12 SPACES X2 WITH LANDSCAPING

d. **Parking areas improved with a permeable parking surface may be designed using the configurations shown in subsections (A)(19)(a), (b) and (c) of this section except that groups of up to 18 spaces are allowed.**

e. **The requirements of this chapter relating to total parking lot landscaping, landscaping buffers, perimeter landscaping, and landscaping the parking lot islands and interior may be waived or reduced pursuant to CDC 32.110(F) in a WRA application without a variance being required.**

<u>Response</u>: The proposed parking area is designed to insure that no more than 12 spaces are clustered together. In addition, the parking area is designed with perimeter and island landscaping to insure that the parking areas are softened by vegetation. All proposed parking is indicated on the Site Plan on Sheets C1.0 and C1.1 in Exhibit D, Preliminary Development Plans.

20. Pedestrian walkways shall be provided in parking areas having 20 or more spaces. Walkways or sidewalks shall be constructed between major buildings/activity areas (an example in multi-family housing: between recreation center, swimming pool, manager's office, park or open space areas, parking lots, etc.) within a development, between adjacent developments and the new development, as feasible, and between major buildings/activity areas within the development and adjacent streets and all adjacent transit stops. Internal parking lot circulation and design should maintain ease of access for pedestrians from streets and transit stops. Walkways shall be constructed using a material that visually contrasts with the parking lot and driveway surface. Walkways shall be further identifiable to pedestrians and motorists by grade separation, walls, curbs, surface texture (surface texture shall not interfere with safe use of wheelchairs, baby carriages, shopping carts, etc.), and/or landscaping. Walkways shall be six feet wide. The arrangement and layout of the paths shall depend on functional requirements.



RAISED SIDEWALK/TEXTURED SURFACE
AUTOMOBILE BECOMES SUBSERVIENT
TO THE PEDESTRIAN

21. The parking and circulation patterns are easily comprehended and defined. The patterns shall be clear to minimize traffic hazards and congestion and to facilitate

22. **The parking spaces shall be close to the related use.**

23. **Permeable parking spaces shall be designed and built to City standards.**

Response: A pedestrian circulations system has been provided as part of the overall site design. This pedestrian walkway system includes both circulation within the site and connection to the adjacent right-of-way and the proposed asphalt pathway along Old River Road. The pedestrian walkway system also includes a walkway at the center of the parking area connecting the majority of the parking spaces with the rest of the pedestrian walkway system. All proposed pedestrian walkways and parking is indicated on the Site Plan on Sheets C1.0 and C1.1 in Exhibit D, Preliminary Development Plans.

B. Accessible parking standards for persons with disabilities. If any parking is provided for the public or visitors, or both, the needs of the people with disabilities shall be based upon the following standards or current applicable federal standards, whichever are more stringent:

1. **Minimum number of accessible parking space requirements (see following table):**

MINIMUM REQUIRED NUMBER OF TOTAL PARKING SPACES	TOTAL NUMBER OF ACCESSIBLE SPACES	NUMBER OF VAN-ACCESSIBLE SPACES REQUIRED, OF TOTAL	SPACES SIGNED "WHEELCHAIR USE ONLY"
1 – 25	1	1	–
26 – 50	2	1	–

2. **Location of parking spaces. Parking spaces for the individual with a disability that serve a particular building shall be located on the shortest possible accessible circulation route to an accessible entrance to a building. In separate parking structures or lots that do not serve a particular building, parking spaces for the persons with disabilities shall be located on the shortest possible circulation route to an accessible pedestrian entrance of the parking facility.**

3. **Accessible parking space and aisle shall meet ADA vertical and horizontal slope standards.**

4. **Where any differences exist between this section and current federal standards, those standards shall prevail over this code section.**

5. **One in every eight accessible spaces, but not less than one, shall be served by an access aisle 96 inches wide.**

Response: The total number of parking spaces proposed is 37, therefore, 2 accessible spaces are required. The applicant proposes 2 ADA accessible parking spaces near the front of the building, therefore, this requirement is met.

C. Landscaping in parking areas. Reference Chapter 54 CDC, Landscaping.

Response: Requirements and proposals for landscaping for the project are addressed in Chapter 54, below.

D. Bicycle facilities and parking.

1. **Provisions shall be made for pedestrian and bicycle ways if such facilities are shown on an adopted plan.**

2. **Bicycle parking facilities shall either be lockable enclosures in which the bicycle is stored, or secure stationary racks which accommodate bicyclist's locks securing the frame and both wheels. The bicycle parking shall be no more than 50 feet from the entrance to the building, well-lit, observable, and properly signed.**

3. **Bicycle parking must be provided in the following amounts:**

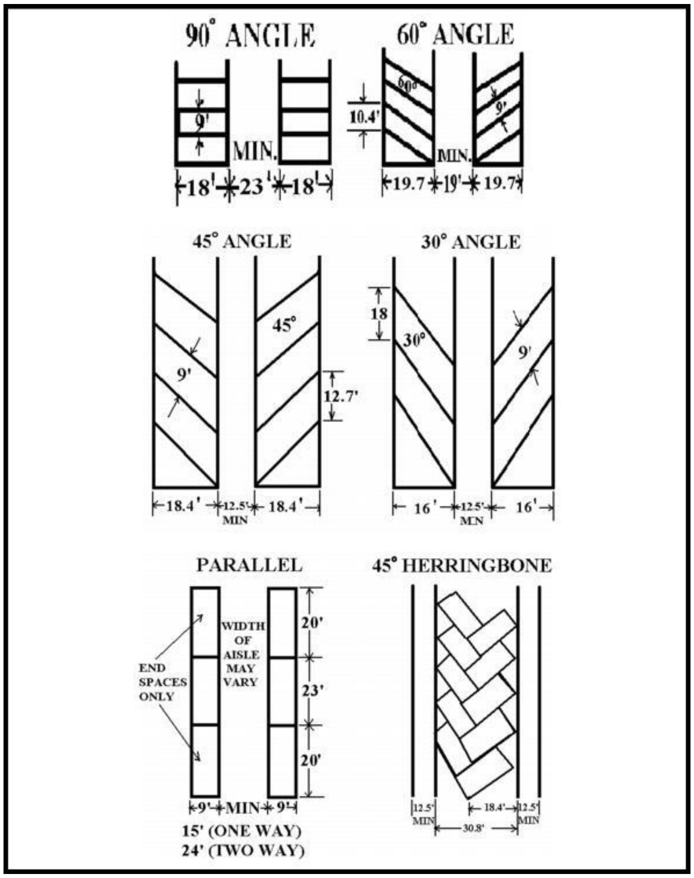
LAND USE CATEGORY	MINIMUM REQUIRED BICYCLE PARKING SPACES	MINIMUM COVERED AMOUNT
Institutional		
Schools – Elementary	**2 spaces per classroom**	**50%**
Schools – Jr. High or Middle Schools	**4 spaces per classroom**	**50%**

Response: Phase 1 has (5) Elementary and (2) Middle School classrooms. This requires a total of (18) bike parking spaces, of which (9) are required to be covered. During this phase (18) spaces are provided and all are covered. This more than meets the requirement for covered spaces and meets the requirement for the total number of spaces.

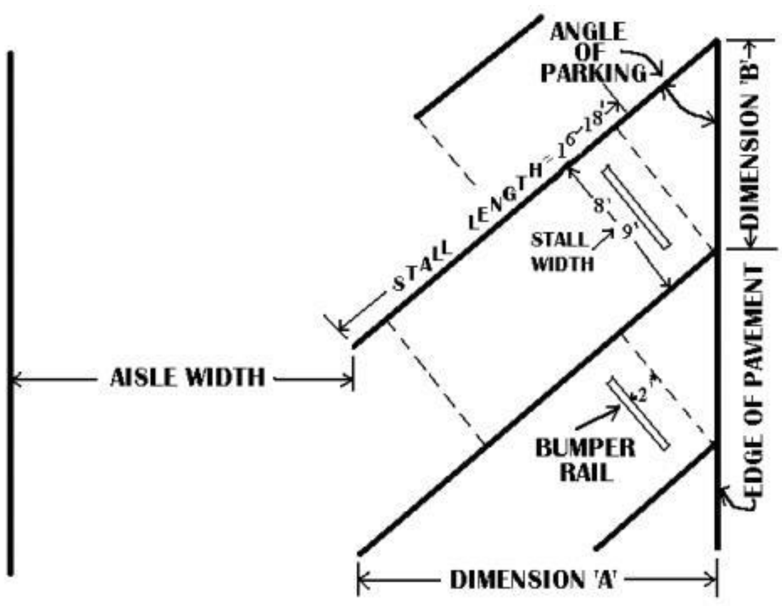
Phase 2 has (11) Elementary and (3) Middle School classroom. This requires a total of (34) bike parking spaces, of which (17) are required to be covered. As noted Phase 1 provides (18) spaces. During Phase 2 (9) more racks are provided. (7) racks provide for (2) bikes each or (14) spaces and (2) of the rack allow for parking on just one side for (2) more spaces. As of this phase (18) Phase 1 spaces and (16) Phase 2 spaces for a total of (34) spaces. (24) of this total are covered. This more than meets the requirement for covered spaces and meets the requirement for total number of spaces.

F. (See Figures 1 and 2 below.)

Figure 1. MINIMUM STANDARDS FOR PARKING LOT LAYOUT



Minimum distance for parking stalls



ANGLE OF PARKING	DIRECTION OF PARKING	AISLE WIDTH		DIMENSION 'A'		DIMENSION 'B'	
		STALL WIDTH		STALL WIDTH		STALL WIDTH	
		9.0'	8.0'	9.0'	8.0'	9.0'	8.0'
30°	DRIVE-IN	12.5'	12.5'	16.8'	13.8'	18.0'	16.0'
45°	DRIVE-IN	12.5'	12.5'	19.1'	17.0'	12.7'	11.3'
60°	DRIVE-IN	19.0'	18.0'	20.1'	17.8'	10.4'	9.2'
60°	BACK-IN	17.0'	17.0'	20.1'	17.8'	10.4'	9.2'
90°	DRIVE-IN	23.0'	23.0'	18.0'	16.0'	9.0'	8.0'
90°	BACK-IN	22.0'	22.0'	18.0'	16.0'	9.0'	8.0'

Response: All proposed parking is 90 degree drive-in. All proposed 2-way aisle widths are 24 feet. Based on the angle and direction of proposed parking, the required and proposed standard spaces are a minimum of 9-feet wide by 18-feet long, with the remaining 18 compact spaces proposed to be a minimum of 8-feet wide by 16-feet long. Therefore, the standards for this Section are met for all proposed parking.

CHAPTER 48: ACCESS, EGRESS AND CIRCULATION

48.020 APPLICABILITY AND GENERAL PROVISIONS

A. The provisions of this chapter do not apply where the provisions of the Transportation System Plan or land division chapter are applicable and set forth differing standards.

B. All lots shall have access from a public street or from a platted private street approved under the land division chapter.

C. No building or other permit shall be issued until scaled plans are presented to the City and approved by the City as provided by this chapter, and show how the access, egress, and circulation requirements are to be fulfilled. Access to State or County roads may require review, approval, and permits from the appropriate authority.

D. Should the owner or occupant of a lot, parcel or building enlarge or change the use to which the lot, parcel or building is put, resulting in increasing any of the requirements of this chapter, it shall be unlawful and a violation of this code to begin or maintain such altered use until the provisions of this chapter have been met, and, if required, until the appropriate approval authority under Chapter 99 CDC has approved the change.

E. Owners of two or more uses, structures, lots, parcels, or units of land may agree to utilize jointly the same access and egress when the combined access and egress of both uses, structures, or parcels of land satisfies the 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 instrument shall be placed on permanent file with the City Recorder.

F. Property owners shall not be compelled to access their homes via platted stems of flag lots if other driveways and easements are available and approved by the City Engineer.

Response: The proposal indicates that access to the site will include access from Old River Road, and the applicant proposes two driveways to the site and the associated parking area. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school.

48.025 ACCESS CONTROL

B. Access control standards.

1. Traffic impact analysis requirements. The City or other agency with access jurisdiction may require a traffic study prepared by a qualified professional to determine access, circulation and other transportation requirements. (See also CDC 55.125, Traffic Impact Analysis.)

2. The City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit, to ensure the safe and efficient operation of the street and highway system. Access to and from off-street parking areas shall not permit backing onto a public street.

3. Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (planned access shall be consistent with adopted public works standards and TSP). These methods are "options" to the developer/subdivider.

a) <u>Option 1</u>. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane, direct access to a public street is not permitted.

b) <u>Option 2</u>. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway"). A public access easement covering the driveway shall be recorded in this case to assure access to the closest public street for all users of the private street/drive.

c) <u>Option 3</u>. Access is from a public street adjacent to the development lot or parcel. If practicable, the owner/developer may be required to close or consolidate an existing access point as a condition of approving a new access. Street accesses shall comply with the access spacing standards in subsection (B)(6) of this section.

4. Subdivisions fronting onto an arterial street. New residential land divisions fronting onto an arterial street shall be required to provide alleys or secondary (local or collector) streets for access to individual lots. When alleys or secondary streets cannot be constructed due to topographic or other physical constraints, access may be provided by consolidating driveways for clusters of two or more lots (e.g., includes flag lots and mid-block lanes).

5. Double-frontage lots. When a lot or parcel has frontage onto two or more streets, access shall be provided first from the street with the lowest classification. For example, access shall be provided from a local street before a collector or arterial street. When a lot or parcel has frontage opposite that of the adjacent lots or parcels, access shall be provided from the street with the lowest classification.

6. Access spacing.

a. The access spacing standards found in the adopted Transportation System Plan (TSP) shall be applicable to all newly established public street intersections and non-traversable medians. Deviation from the access spacing standards may be granted by the City Engineer if conditions are met as described in the access spacing variances section in the adopted TSP.

b. **Private drives and other access ways are subject to the requirements of CDC 48.060.**

7. **Number of access points. For single-family (detached and attached), two-family, and duplex housing types, one street access point is permitted per lot or parcel, when alley access cannot otherwise be provided; except that two access points may be permitted corner lots (i.e., no more than one access per street), subject to the access spacing standards in subsection (B)(6) of this section. The number of street access points for multiple family, commercial, industrial, and public/institutional developments shall be minimized to protect the function, safety and operation of the street(s) and sidewalk(s) for all users. Shared access may be required, in conformance with subsection (B)(8) of this section, in order to maintain the required access spacing, and minimize the number of access points.**

8. **Shared driveways. The number of driveway and private street intersections with public streets shall be minimized by the use of shared driveways with adjoining lots where feasible. The City shall require shared driveways as a condition of land division or site design review, as applicable, for traffic safety and access management purposes in accordance with the following standards:**

Response: The applicant has provided a Traffic Impact Analysis as part of this application. See Traffic Impact Analysis, Exhibit F. The applicant proposes two driveways to the site and the associated parking area. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school. This proposed design provides the greatest efficiency and safety for movement of vehicles, bicycles and pedestrians. No shared driveways are proposed as part of this application.

48.040 MINIMUM VEHICULAR REQUIREMENTS FOR NON-RESIDENTIAL USES

Access, egress, and circulation system for all non-residential uses shall not be less than the following

A. **Service drives for non-residential uses shall be fully improved with hard surface pavement:**

1. **With a minimum of 24-foot width when accommodating two-way traffic; or**
2. **With a minimum of 15-foot width when accommodating one-way traffic. Horizontal clearance shall be two and one-half feet wide on either side of the driveway.**
3. **Meet the requirements of CDC 48.030(E)(3) through (6).**

Response: The applicant proposes two driveways to the site and the associated parking area. All parking areas and vehicle circulation areas will be hard-surfaced with asphalt. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school. This proposed design provides the greatest efficiency and safety for movement of vehicles, bicycles and pedestrians.

The requirements of CDC 48.030(E)(3) through (6) are applicable to multi-family developments only, therefore, those standards do not apply to this project.

B. **All non-residential uses shall be served by one or more service drives as determined necessary to provide convenient and safe access to the property and designed according to CDC 48.030(A). In no case shall the design of the service drive or drives require or facilitate the backward movement or other maneuvering of a vehicle within a street, other than an alley.**

C. **All on-site maneuvering and/or access drives shall be maintained pursuant to CDC 46.130.**

D. **Gated accessways to non-residential uses are prohibited unless required for public safety or security.**

Response: The applicant proposes two driveways to the site and the associated parking area. All parking areas and vehicle circulation areas will be hard-surfaced with asphalt. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school. This proposed design provides the greatest efficiency and safety for movement of vehicles, bicycles and pedestrians. No gates are proposed as part of this project.

48.050 ONE-WAY VEHICULAR ACCESS POINTS

Where a proposed parking facility plan indicates only one-way traffic flow on the site, it shall be accommodated by a specific driveway serving the facility, and the entrance drive shall be situated closest to oncoming traffic, and the exit drive shall be situated farthest from oncoming traffic.

Response: The applicant proposes two driveways to the site and the associated parking area. All parking areas and vehicle circulation areas will be hard-surfaced with asphalt. The first driveway is a 24-foot wide two-way access from Old River Road at the southeast corner of the site. The second driveway is a 20-foot wide one-way ingress that will serve as the main circulation access point for those using the designated drop-off zone at the front of the school. This proposed design provides the greatest efficiency and safety for movement of vehicles, bicycles and pedestrians.

48.060 WIDTH AND LOCATION OF CURB CUTS AND ACCESS SEPARATION REQUIREMENTS

A. **Minimum curb cut width shall be 16 feet.**

B. **Maximum curb cut width shall be 36 feet, except along Highway 43 in which case the maximum curb cut shall be 40 feet. For emergency service providers, including fire stations, the maximum shall be 50 feet.**

C. **No curb cuts shall be allowed any closer to an intersecting street right-of-way line than the following:**

   1. **On an arterial when intersected by another arterial, 150 feet.**
   2. **On an arterial when intersected by a collector, 100 feet.**
   3. **On an arterial when intersected by a local street, 100 feet.**
   4. **On a collector when intersecting an arterial street, 100 feet.**
   5. **On a collector when intersected by another collector or local street, 35 feet.**
   6. **On a local street when intersecting any other street, 35 feet.**

D. **There shall be a minimum distance between any two adjacent curb cuts on the same side of a public street, except for one-way entrances and exits, as follows:**

   1. **On an arterial street, 150 feet.**
   2. **On a collector street, 75 feet.**
   3. **Between any two curb cuts on the same lot or parcel on a local street, 30 feet.**

E. **A rolled curb may be installed in lieu of curb cuts and access separation requirements.**

F. **Curb cuts shall be kept to the minimum, particularly on Highway 43. Consolidation of driveways is preferred. The standard on Highway 43 is one curb cut per business if consolidation of driveways is not possible.**

Response: The distance from the two-way driveway curb cut and the closest intersection is 220 feet. The distance from the one-way driveway curb cut and the closest intersection is 314 feet. The distance between these two proposed curb cuts is 94 feet. **Adequate line of sight pursuant to engineering standards should be afforded at each driveway or accessway.**

Response: Line of sight has been analyzed and included in the Traffic Impact Analysis in Exhibit F, with an adequate line of sight identified in the findings.

CHAPTER 54: LANDSCAPING

54.020 APPROVAL CRITERIA

A. **Every development proposal requires inventorying existing site conditions which include trees and landscaping. In designing the new project, every reasonable attempt should be made to preserve and protect existing trees and to incorporate them into the new landscape plan. Similarly, significant landscaping (e.g., bushes, shrubs) should be integrated. The rationale is that saving a 30-foot-tall mature tree helps maintain the continuity of the site, they are qualitatively superior to two or three two-inch caliper street trees, they provide immediate micro-climate benefits (e.g., shade), they soften views of the street, and they can increase the attractiveness, marketability, and value of the development.**

Response: All proposed landscaping is indicated on the Landscape Plan on Sheets L0.01-L1.03 in Exhibit D, Preliminary Development Plans.

B. **To encourage tree preservation, the parking requirement may be reduced by one space for every significant tree that is preserved in the parking lot area for a maximum reduction of 10 percent of the required parking. The City Parks Supervisor or Arborist shall determine the significance of the tree and/or landscaping to determine eligibility for these reductions.**

Response: No significant trees are being preserved in the parking area as part of the overall proposed development.

Developers must also comply with the municipal code chapter on tree protection.

Response: All aspects of the chapter on tree protection has been considered during site design. Tree preservation is indicated in the written "Arborist Report and Tree Protection Plan" and on Sheets L0.01 and L0.02 of the Preliminary Development Plans, Exhibit D.

C. **Heritage trees. Heritage trees are trees which, because of their age, type, notability, or historical association, are of special importance. Heritage trees are trees designated by the City Council following review of a nomination. A heritage tree may not be removed without a public hearing at least 30 days prior to the proposed date of removal. Development proposals involving land with heritage tree(s) shall be required to protect and save the tree(s). Further discussion of heritage trees is found in the municipal code.**

Response: There are no heritage trees on the site …

D. **Landscaping – By type, location and amount.**

1. **Residential uses (non-single-family). A minimum of 25 percent of the gross area including parking, loading and service areas shall be landscaped, and may include the open space and recreation area requirements under CDC 55.100. Parking lot landscaping may be counted in the percentage.**

2. **Non-residential uses. A minimum of 20 percent of the gross site area shall be landscaped. Parking lot landscaping may be counted in the percentage.**

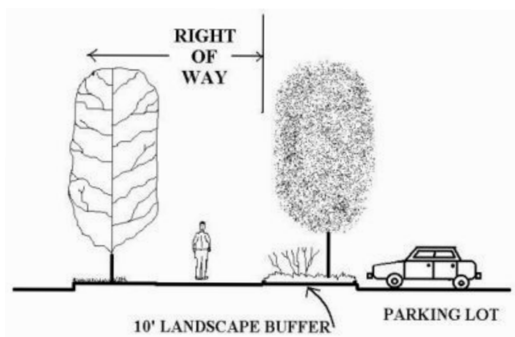
3. **All uses (residential uses (non-single-family) and non-residential uses):**

   a. **The landscaping shall be located in defined landscaped areas which are uniformly distributed throughout the parking or loading area. There shall be one shade tree planted for every eight parking spaces. These trees shall be evenly distributed throughout the parking lot to provide shade. Parking lots with over 20 spaces shall have a minimum 10 percent of the interior of the parking lot devoted to landscaping. Pedestrian walkways in the landscaped areas are not to be counted in the percentage. The perimeter landscaping, explained in subsection (E)(3)(d) of this section, shall not be included in the 10 percent figure. Parking lots with 10 to 20 spaces shall have a minimum five percent of the interior of the parking lot devoted to landscaping. The perimeter landscaping, as explained above, shall not be included in the five percent. Parking lots with fewer than 10 spaces shall have the standard perimeter landscaping and at least two shade trees. Non-residential parking areas paved with a permeable parking surface may reduce the required minimum interior landscaping by one-third for the area with the permeable parking surface only.**

   b. **The landscaped areas shall not have a width of less than five feet.**

   c. **The soils, site, proposed soil amendments, and proposed irrigation system shall be appropriate for the healthy and long-term maintenance of the proposed plant species.**

   d. **A parking, loading, or service area which abuts a street shall be set back from the right-of-way line by perimeter landscaping in the form of a landscaped strip at least 10 feet in width. When a parking, loading, or service area or driveway is contiguous to an adjoining lot or parcel, there shall be an intervening five-foot-wide landscape strip. The landscaped area shall contain:**



      1) **Street trees spaced as appropriate to the species, not to exceed 50 feet apart on the average;**

      2) **Shrubs, not to reach a height greater than three feet, six inches, spaced no more than five feet apart on the average; or**

      3) **Vegetative ground cover such as grass, wildflowers, or other landscape material to cover 100 percent of the exposed ground within two growing seasons. No bark mulch shall be allowed except under the canopy of low level shrubs.**

   e. **If over 50 percent of the lineal frontage of the main street or arterial adjacent to the development site comprises parking lot, the landscape strip between the right-of-way and parking lot shall be increased to 15 feet in width and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. This extra requirement only applies to one street frontage.**

f. **A parking, loading, or service area which abuts a property line shall be separated from the property line by a landscaped area at least five feet in width and which shall act as a screen and noise buffer, and the adequacy of the screen and buffer shall be determined by the criteria set forth in CDC 55.100(C) and (D), except where shared parking is approved under CDC 46.050.**

g. **All areas in a parking lot not used for parking, maneuvering, or circulation shall be landscaped.**

h. **The landscaping in parking areas shall not obstruct lines of sight for safe traffic operation.**

i. **Outdoor storage areas, service areas (loading docks, refuse deposits, and delivery areas), and above-ground utility facilities shall be buffered and screened to obscure their view from adjoining properties and to reduce noise levels to acceptable levels at the property line. The adequacy of the buffer and screening shall be determined by the criteria set forth in CDC 55.100(C)(1).**

j. **Crime prevention shall be considered and plant materials shall not be located in a manner which prohibits surveillance of public and semi-public areas (shared or common areas).**

k. **Irrigation facilities shall be located so that landscaped areas can be properly maintained and so that the facilities do not interfere with vehicular or pedestrian circulation.**

l. **For commercial, office, multi-family, and other sites, the developer shall select trees that possess the following characteristics:**

1) **Provide generous "spreading" canopy for shade.**

2) **Roots do not break up adjacent paving.**

3) **Tree canopy spread starts at least six feet up from grade in, or adjacent to, parking lots, roads, or sidewalks unless the tree is columnar in nature.**

4) **No sticky leaves or sap-dripping trees (no honey-dew excretion).**

5) **No seed pods or fruit-bearing trees (flowering trees are acceptable).**

6) **Disease-resistant.**

7) **Compatible with planter size.**

8) **Drought-tolerant unless irrigation is provided.**

9) **Attractive foliage or form all seasons.**

Plant materials (shrubs, ground cover, etc.) shall be selected for their appropriateness to the site, drought tolerance, year-round greenery and coverage, staggered flowering periods, and avoidance of nuisance plants (Scotch broom, etc.).

Response: The landscape plan is indicated on Sheets L1.01-L1.03 of the Preliminary Development Plans in Exhibit D. The landscape plan includes an overall site area of 64,429 square feet and a site landscaped area of 26,350 feet. Thereby 40% of the site is landscaped per the 20% minimum landscaped area requirement. The site landscaping is evenly distributed throughout the site covers areas with no less than 5 feet in dimension. Plants will be properly planted according to the Planting Plan that is part of the overall Landscape Plan in Exhibit D. Plant types have been carefully selected to insure that the standards and requirements in this

Section are met, and all landscaped areas are proposed to be served by an automatically controlled irrigation system.

54.030 PLANTING STRIPS FOR MODIFIED AND NEW STREETS

All proposed changes in width in a public street right-of-way or any proposed street improvement shall, where feasible, include allowances for planting strips. Plans and specifications for planting such areas shall be integrated into the general plan of street improvements. This chapter requires any multi-family, commercial, or public facility which causes change in public right-of-way or street improvement to comply with the street tree planting plan and standards.

Response: See plans L1.01-L1.03 for compliance with requirements. Street trees are provided on the property side of the site along the back of the sidewalk.

54.040 INSTALLATION

A. All landscaping shall be installed according to accepted planting procedures.

B. The soil and plant materials shall be of good quality.

C. Landscaping shall be installed in accordance with the provisions of this code.

Response: See plans L1.01-L1.03. Requirements are noted.

54.050 PROTECTION OF STREET TREES

Street trees may not be topped or trimmed unless approval is granted by the Parks Supervisor or, in emergency cases, when a tree imminently threatens power lines.

Response: No existing street trees are along this site.

54.060 MAINTENANCE

A. The owner, tenant and their agent, if any, shall be jointly and severally responsible for the maintenance of all landscaping which shall be maintained in good condition so as to present a healthy, neat, and orderly appearance and shall be kept free from refuse and debris.

B. All plant growth in interior landscaped areas shall be controlled by pruning, trimming, or otherwise so that:

1. It will not interfere with the maintenance or repair of any public utility;

2. It will not restrict pedestrian or vehicular access; and

3. It will not constitute a traffic hazard because of reduced visibility.

Response: See plans L1.01 and L1.03. Requirement is noted.

54.070 SPECIFICATION SUMMARY

AREA/ LOCATION	LANSCAPING REQUIRED
1. Between parking lot and R-O-W.	10 ft.
2. Between parking lot and other lot.	5 ft.
3. Between parking lot and R-O-W if parking lot comprises more than 50 percent of main R-O-W frontage.	15 ft.
4. Percentage of residential/ multi-family site to be landscaped.	25%
5. Percentage of non-residential (commercial/ industrial/ office) site to be landscaped.	20%

6. Percentage of 10-25 car parking lot to be landscaped (excluding perimeter).	**5%**
7. Percentage of 1-9 car parking lot to be landscaped (excluding perimeter).	**0%**
8. Percentage of 26+ car parking lot to be landscaped (excluding perimeter).	**10%**

Response: See L1.01-L1.03

CHAPTER 55: DESIGN REVIEW

55.020 CLASSES OF DESIGN REVIEW

B. Class II Design Review. Class II design review applies to all uses/activities except those uses/activities listed under Class I design review, and the exemptions of CDC 55.025. Class II design review applies to the proposed improvements listed in this section when the proposed improvement (e.g., new sidewalk) is part of a major commercial, office, industrial, public, or multi-family construction project (e.g., a new shopping center).

Response: This project qualifies as a Class II Design Review, therefore, the applicant is also addressing Chapter 55, Design Review, as part of this narrative and application package. This Type II Design Review will be reviewed concurrently with the Type III Conditional Use application.

55.025 EXEMPTIONS

The following activities are exempt from the provisions of this chapter:

A. Detached single-family residential construction;

B. Accessory structures;

C. One to two duplexes or single-family attached structures except as indicated otherwise in this chapter;

D. Architectural replacements in kind, or replacement of building materials that are equal or superior to existing materials (in terms of performance or quality) but that do not alter the architectural style of the structure. Retrofitted awnings, changes in color schemes, wall art, and freestanding statuary or art under five feet tall are exempt from design review, but shall be subject to Planning Director review under the provisions of CDC 99.060(A)(2), prescribed conditions, and the approval criteria of CDC 55.100(B)(6)(a) and (b).

Response: This project does not qualify under any of the exemptions listed above, therefore, is subject to Class II Design Review.

55.030 ADMINISTRATION AND APPROVAL PROCESS

A. A pre-application conference is required before submitting a development plan application for design review as provided by CDC 99.030(B).

B. The application shall be submitted by the record owner(s) of the property, authorized agent, or condemner.

C. Action on the development plan application shall be as provided by Chapter 99 CDC, Procedures for Decision-Making: Quasi-Judicial, and the following:

1. The Planning Director for Class I design review applications, or Planning Commission for Class II design review applications, shall approve, approve with conditions, or deny the application based on findings related to the applicable criteria set forth in CDC 99.110 and this chapter.

2. **A decision by the Planning Director may be reviewed by the City Council.**

D. **Substantial modifications made to the approved development plan will require reapplication (e.g., more or fewer lots, different architectural design, etc.).**

Response: A pre-application conference was held on January 18, 2018, per this requirement, and is referred to as PA-18-04. Notes were provided by the City and are included in this application in Exhibit C, Pre-Application Conference Notes. The application form for this application has been signed by the correct owner (owner of record) and shall be reviewed as a Class II Quasi-Judicial Procedure.

55.040 EXPIRATION OR EXTENSION OF APPROVAL

If substantial construction has not occurred within three years from the date of approval of the development plan, the approved proposal will be void, unless an extension is granted under CDC 99.325.

Response: The applicant intends to complete all proposed improvements within 3 years of the date of the approval. Otherwise, the applicant will apply for a two-year extension, if necessary.

55.050 DESIGN REVIEW AMENDMENT TRIGGER

Amendments to design review shall be required when 10 percent or more of the housing type changes (e.g., from single-family units to multi-family units) from the tentatively approved design review plan, or when there is more than a 10 percent change in the number of units, or when the layout of streets and lots significantly changes, or adjusting more than 20 percent of the building footprint or site plan, or significant changes to the architecture that modify the style, mass, or result in elimination of significant design features. Changes in color or materials would not require an amendment unless the colors were non-earth tones and the materials were of poorer quality (for example, going from tile roof to composition roofing) than originally approved. Changes to the project/site plan to meet conditions of approval or legislative changes shall not trigger an amendment.

Response: No housing is proposed as part of this proposal. The applicant understands that a Design Review Amendment would be triggered if changes were proposed after approval of 20% or more, as indicated in this Section.

55.060 STAGED OR PHASED DEVELOPMENT

The applicant may elect to develop the site in stages. Staged development shall be subject to the provisions of CDC 99.125.

Response: The applicant is not proposing a staged or phased development.

55.070 SUBMITTAL REQUIREMENTS

A. **The design review application shall be initiated by the property owner or the owner's agent, or condemnor.**

B. **A pre-application conference, per CDC 99.030(B), shall be a prerequisite to the filing of an**

C. **Documentation of any required meeting with the respective City-recognized neighborhood association per CDC 99.038.**

D. **The applicant shall submit a completed application form and:**

1. **The development plan for a Class I design review shall contain the following elements:**

    a. **A site analysis (CDC 55.110) only if the site is undeveloped;**

    b. **A site plan (CDC 55.120);**

    c. **Architectural drawings, including building envelopes and all elevations (CDC 55.140) only if architectural work is proposed; and**

d. Pursuant to CDC 55.085, additional submittal material may be required.

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the City. When the application submittal is determined to be complete, additional copies may be required as determined by the Community Development Department.

2. The development plan for a Class II design review shall contain the following elements:

a. A site analysis (CDC 55.110);

b. A site plan (CDC 55.120);

c. A grading plan (CDC 55.130);

d. Architectural drawings, indicating floor plan and elevation (CDC 55.140);

e. A landscape plan (CDC 55.150);

f. A utility plan appropriate to respond to the approval criteria of CDC 55.100(I)(1) through (5) relating to streets, drainage, municipal water, sanitary sewers, solid waste, and recycling storage;

g. A light coverage plan with photometric data, including the location and type of outdoor lighting, with specific consideration given to compliance with CDC 55.100(J) pertaining to crime prevention and, if applicable, CDC 46.150(A)(13) pertaining to parking lot lighting;

h. If staff determines before or during the pre-application conference that the land use is expected to generate noise that may exceed DEQ standards, the application shall include a noise study conducted by a licensed acoustical engineer that demonstrates that the application and associated noise sources will meet DEQ standards. Typical noise sources of concern include, but are not limited to, vehicle drive-throughs, parking lots, HVAC units, and public address systems; and

i. Documents as required per the Tree Technical Manual.

Response: A pre-application conference was held on January 18, 2018, per this requirement, and is referred to as PA-18-04. Notes were provided by the City and are included in this application in Exhibit C, Pre-Application Conference Notes. The application form for this application has been signed by the correct owner (owner of record) and shall be reviewed as a Class II Quasi-Judicial Procedure.

A Site Analysis has been included in this narrative and is addressed below under 55.110, Site Analysis. As part of the Preliminary Development Plans in Exhibit D, the applicant has included a site plan, grading plan, utility plan, and landscape plan. The applicant has also included elevations depicting the floor plans and architectural exterior of proposed new buildings. The applicant is not aware of any specific elements of the proposed use that would generate excessive noise, and none were indicated by staff at the Pre-Application Conference.

3. A narrative, based on the standards contained in this code, which supports any requested exceptions as provided under CDC 55.170.

4. Submit full written responses to approval criteria of CDC 55.100 for Class II design review, or CDC 55.090 for Class I design review, plus all applicable referenced approval criteria.

Response: A narrative with full written responses to all applicable criteria, standards and requirements of the CDC are included in this narrative, herein, including those indicated in Sections 55.170 and 55.100, below.

E. The applicant shall submit samples of all exterior building materials and colors in the case of new buildings or building remodeling.

Response: A materials board showing exterior building materials and colors is provided.

F. The applicant shall pay the required deposit and fee.

Response: As part of this application submittal, the applicant is submitting the appropriate fee to the City of West Linn for the applications requested.

55.100 APPROVAL STANDARDS

The approval authority shall make findings with respect to the following criteria when approving, approving with conditions, or denying a Class II design review application:

A. The provisions of the following chapters shall be met:

1. **Chapter 34 CDC, Accessory Structures, Accessory Dwelling Units, and Accessory Uses.**
2. **Chapter 38 CDC, Additional Yard Area Required; Exceptions to Yard Requirements; Storage in Yards; Projections into Yards.**
3. **Chapter 40 CDC, Building Height Limitations, Exceptions.**
4. **Chapter 42 CDC, Clear Vision Areas.**
5. **Chapter 44 CDC, Fences.**
6. **Chapter 46 CDC, Off-Street Parking, Loading and Reservoir Areas.**
7. **Chapter 48 CDC, Access, Egress and Circulation.**
8. **Chapter 54 CDC, Landscaping.**

Response: All of the applicable provisions of the Chapters indicated in Section 55.100 are addressed in various sections of this narrative herein.

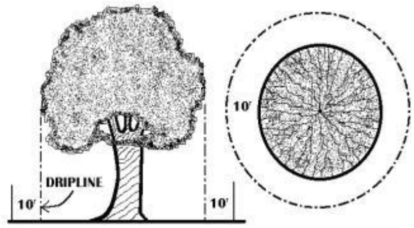
B. Relationship to the natural and physical environment.

1. **The buildings and other site elements shall be designed and located so that all heritage trees, as defined in the municipal code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction.**

Response: There are no designated heritage trees on this site.

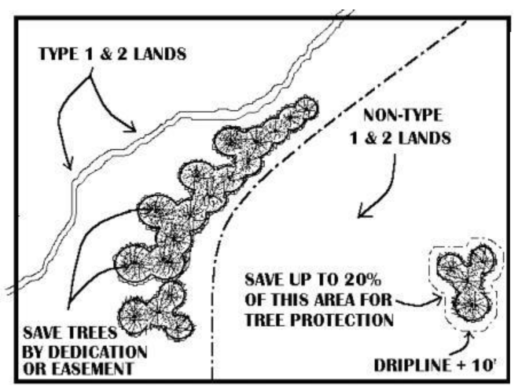
2. **All heritage trees, as defined in the municipal code, all trees and clusters of trees ("cluster" is defined as three or more trees with overlapping driplines; however, native oaks need not have an overlapping dripline) that are considered significant by the City Arborist, either individually or in consultation with certified arborists or similarly qualified professionals, based on accepted arboricultural standards including consideration of their size, type, location, health, long term survivability, and/or numbers, shall be protected pursuant to the criteria of subsections (B)(2)(a) through (f) of this section. In cases where there is a difference of opinion on the significance of a tree or tree cluster, the City Arborist's findings shall prevail. It is important to acknowledge that all trees are not significant and, further, that this code section will not necessarily protect all trees deemed significant.**

   a. **Non-residential and residential projects on Type I and II lands shall protect all heritage trees and all significant trees and tree clusters by limiting development in the protected area. The protected area includes the** protected tree, its dripline, and an additional 10 feet beyond the dripline, as depicted in the figure below. Development of Type I and II lands shall require the careful layout of streets, driveways, building pads, lots, and utilities to avoid heritage trees and significant trees and tree clusters, and other natural resources pursuant to this code. The method for delineating the protected trees or tree clusters ("dripline plus 10 feet") is explained in subsection (B)(2)(b) of this section. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply.**



PROTECTED AREA = DRIPLINE + 10 FEET

b. Non-residential and residential projects on non-Type I and II lands shall set aside up to 20 percent of the protected areas for significant trees and tree clusters, plus any heritage trees. Therefore, in the event that the City Arborist determines that a significant tree cluster exists at a development site, then up to 20 percent of the non-Type I and II lands shall be devoted to the protection of those trees by limiting development in the protected areas. The exact percentage is determined by establishing the driplines of the trees or tree clusters that are to be protected. In order to protect the roots which typically extend further, an additional 10-foot measurement beyond the dripline shall be added. The square footage of the area inside this "dripline plus 10 feet" measurement shall be the basis for calculating the percentage (see figure below). The City Arborist will identify which tree(s) are to be protected. Development of non-Type I and II lands shall also require the careful layout of streets, driveways, building pads, lots, and utilities to avoid significant trees, tree clusters, heritage trees, and other natural resources pursuant to this code. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply. Please note that in the event that more than 20 percent of the non-Type I and II lands comprise significant trees or tree clusters, the developer shall not be required to save the excess trees, but is encouraged to do so.



METHOD OF PERCENTAGE CALCULATION

E.G., DRIPLINE + 10 FT. AREA = 2,500 SQ. FT. OR 18% OF TOTAL NON-TYPE I AND II LAND DENSITY CALULATIONS FOR THIS PARCEL WILL BE BASED ON REMAIING NET SQ. FOOTAGE OF SITE (EXCLUDING THE 2,500 SQ. FT.)

c. Where stub outs of streets occur on abutting properties, and the extension of those streets will mean the loss of significant trees, tree clusters, or heritage trees, it is understood that tree loss may be inevitable. In these cases, the objective shall be to minimize tree loss. These provisions shall also apply in those cases where access, per construction code standards,

to a lot or parcel is blocked by a row or screen of significant trees or tree clusters.

d. **For both non-residential and residential development, the layout shall achieve at least 70 percent of maximum density for the developable net area. The developable net area excludes all Type I and II lands and up to 20 percent of the remainder of the site for the purpose of protection of stands or clusters of trees as defined in subsection (B)(2) of this section.**

e. **For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.**

f. **If the protection of significant tree(s) or tree clusters is to occur in an area of grading that is necessary for the development of street grades, per City construction codes, which will result in an adjustment in the grade of over or under two feet, which will then threaten the health of the tree(s), the applicant will submit evidence to the Planning Director that all reasonable alternative grading plans have been considered and cannot work. The applicant will then submit a mitigation plan to the City Arborist to compensate for the removal of the tree(s) on an "inch by inch" basis (e.g., a 48-inch Douglas fir could be replaced by 12 trees, each four-inch). The mix of tree sizes and types shall be approved by the City Arborist.**

Response: Tree protection zones are designated around trees being preserved. Only trees removed are diseased, poor form, or being displaced by new improvements.

3. **The topography and natural drainage shall be preserved to the greatest degree possible.**

Response: The natural topography and associated drainage of the site will be significantly preserved. Buildings, parking areas and other development will be located and designed so that natural grades will be substantially maintained. However, in order to insure a more safe and usable playground area, some grading is proposed. In addition, grading will be necessary for building foundations and the storm water facility. See Site Plan, Grading Plan and Utility Plan as part of the Preliminary Development Plans in Exhibit D.

4. **The structures shall not be located in areas subject to slumping and sliding. The Comprehensive Plan Background Report's Hazard Map, or updated material as available and as deemed acceptable by the Planning Director, shall be the basis for preliminary determination.**

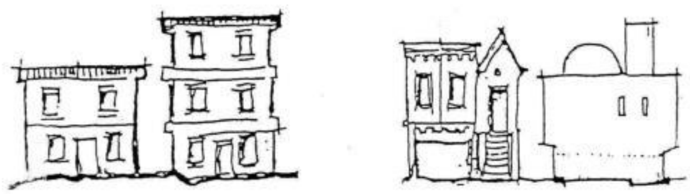
Response: No slumping or sliding has been identified on the site. See Geotechnical Report, Exhibit G.

5. **There shall be adequate distance between on-site buildings and on-site and off-site buildings on adjoining properties to provide for adequate light and air circulation and for fire protection.**

Response: The applicant has designed the mass and height of the building that are part of this redevelopment project, as well as the location of the buildings, to balance the requirements of the anticipated school programs with the desire to minimize impacts associated with noise and adequacy of light and air. The abutting properties are those properties to the south, west and north of the subject site; properties to the east are separated from the site by right-of-way. All proposed buildings and development meet the required setbacks which are intended to insure that adequate light and air, as well as fire suppression access, are all maintained.

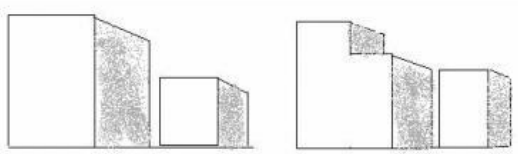
6. **Architecture.**

a. **The proposed structure(s) scale shall be compatible with the existing structure(s) on site and on adjoining sites. Contextual design is required. Contextual design means respecting and incorporating prominent architectural styles, building lines, roof forms, rhythm of windows, building scale and massing of surrounding buildings in the proposed structure. The materials and colors shall be complementary to the surrounding buildings.**

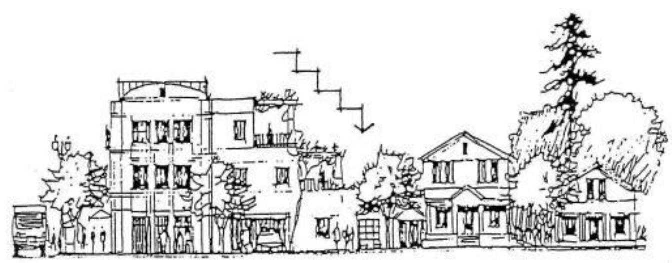


contextual design *contrasting design*

b. **While there has been discussion in Chapter 24 CDC about transition, it is appropriate that new buildings should architecturally transition in terms of bulk and mass to work with, or fit, adjacent existing buildings. This transition can be accomplished by selecting designs that "step down" or "step up" from small to big structures and vice versa (see figure below). Transitions may also take the form of carrying building patterns and lines (e.g., parapets, windows, etc.) from the existing building to the new one.**



mass/bulk overwhelms smaller building *mass/bulk effectively transitions*



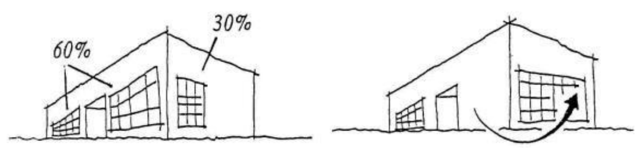
c. **Contrasting architecture shall only be permitted when the design is manifestly superior to adjacent architecture in terms of creativity, design, and workmanship, and/or it is adequately separated from other buildings by distance, screening, grade variations, or is part of a development site that is large enough to set its own style of architecture.**

d. **Human scale is a term that seeks to accommodate the users of the building and the notion that buildings should be designed around the human scale (i.e., their size and the average range of their perception). Human scale shall be accommodated in all designs by, for example, multi-light windows that are broken up into numerous panes, intimately scaled entryways, and visual breaks (exaggerated eaves, indentations, ledges, parapets, awnings, engaged columns, etc.) in the facades of buildings, both vertically and horizontally.**

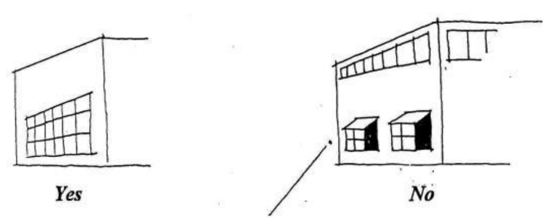
The human scale is enhanced by bringing the building and its main entrance up to the edge of the sidewalk. It creates a more dramatic and interesting streetscape and improves the "height and width" ratio referenced in this section.

Human scale is captured in this example

e. The main front elevation of commercial and office buildings shall provide at least 60 percent windows or transparency at the pedestrian level to create more interesting streetscape and window shopping opportunities. One side elevation shall provide at least 30 percent transparency. Any additional side or rear elevation, which is visible from a collector road or greater classification, shall also have at least 30 percent transparency. Transparency on other elevations is optional. The transparency is measured in lineal fashion. For example, a 100-foot-long building elevation shall have at least 60 feet (60 percent of 100 feet) in length of windows. The window height shall be, at minimum, three feet tall. The exception to transparency would be cases where demonstrated functional constraints or topography restrict that elevation from being used. When this exemption is applied to the main front elevation, the square footage of transparency that would ordinarily be required by the above formula shall be installed on the remaining elevations at pedestrian level in addition to any transparency required by a side elevation, and vice versa. The rear of the building is not required to include transparency. The transparency must be flush with the building elevation.



60 percent of lineal street facing or main elevation is windows. 30 percent of one side elevation is windows. You may transfer windows from the side to front, or vice versa.



(Windows not at eye level and/or not flush with building.)

f. Variations in depth and roof line are encouraged for all elevations.

f. **To vary the otherwise blank wall of most rear elevations, continuous flat elevations of over 100 feet in length should be avoided by indents or variations in the wall. The use of decorative brick, masonry, or stone insets and/or designs is encouraged. Another way to vary or soften this elevation is through terrain variations such as an undulating grass area with trees to provide vertical relief.**

g. **Consideration of the micro-climate (e.g., sensitivity to wind, sun angles, shade, etc.) shall be made for building users, pedestrians, and transit users, including features like awnings.**

h. **The vision statement identified a strong commitment to developing safe and attractive pedestrian environments with broad sidewalks, canopied with trees and awnings.**

Trees, awnings, and building orientation enhance the mircro-climate

i. **Sidewalk cafes, kiosks, vendors, and street furniture are encouraged. However, at least a four-foot-wide pedestrian accessway must be maintained per Chapter 53 CDC, Sidewalk Use.**

<u>Response:</u> The form of the new building compliments the existing structures as viewed from Old River Road, and the simplicity of the shape of the new structure does not compete with the shape of the other structures. The taller portions of the new structure have been set back from Old River Road and from the front façade of the existing buildings, resulting in the new structure having the scale and appearance of a one story building. Both the existing building and the new building will be similar in height at the front eave line facing Old River Road. The buildings will also share a similar width and scale dimension facing Old River Road. In addition, the new parking area will be landscaped along the perimeter to provide additional visual aesthetics to the overall site and character of the district, which is primarily school activities associated with school buildings and outdoor areas.

<u>Exterior Design</u>: The form of the new building compliments the existing structure as viewed from Old River Road, and the simplicity of the shape of the new structure does not compete with the shape of the existing structure. The utilization of significant window glazing elements are used to designate the connection of the interior with the exterior campus.

<u>Massing</u>: The taller portions of the new structure have been set back from Old River Road and from the front façade of the existing structure, resulting in the new structure having the scale and appearance of a one story building

<u>Arrangement</u>: For the new structures, the front yard setback from Old River Road exceeds the setback requirement. Both the Phase I and Phase II new structures are set back 20 feet or greater from the rear property line, 10 feet or greater from the side property lines, and 95 feet or greater from the front property line, allowing for adequate levels of light and air. The façade and building line of the new structure is aligned with the façade and building line of the

other existing structures. This allows for all of the structure to retain their prominence as elements of a small scale campus visible to the street.

<u>Proportion</u>: The height and width of the front facade of the new building in Phase II that fronts on Old River Road is similar to, and compatible with, the front facade of the existing structures. The overall building program includes a two story 12 classroom building and a library. The two story portion of the new building is placed to the rear of the site to minimize it's scale, with the smaller scaled library placed in front behind the existing trees.

<u>Detail</u>: The existing buildings are detailed with simplicity, and there are very simple and humble materials included in the design. There is little use of ornament, simple and minimal use of trim, and a fairly direct expression of structure, particularly at the porches and eaves. The new building will also be detailed in a very similar manner, with a simple and minimal material pallet, restrained use of ornament and trim, and minimal expression of structure at the porches and eaves. The intention of restrained expression of these elements will allow the landscape and outdoor learning and outdoor play areas to stand out on the site and as viewed from the public right-of-way.

<u>Scale:</u> The new Phase II building will be only approximately 6 feet taller in height than the existing buildings facing Old River Road. The new building has a linear organization with hallways used as extended learning spaces and the smaller scaled library facing the outdoor learning and play areas and Old River Road. Right angle and linear placement of the structure relative to existing structures provides adequate space for connectivity, while also providing a comfortable scale. This allows for all of the structures to appear to be elements of a small scale campus visible to the street.

<u>Color</u>: The existing structures are painted a light tan color, while both the Phase I and Phase II new structures will be earth toned in color. The Phase II earth toned color may be achieved through natural cedar wood siding and/or painted earth tone siding. The result will be a campus of buildings where the new building and the existing buildings will form a neutral earth toned background behind the landscape, outdoor learning and play areas, and the pedestrian network.

<u>Texture</u>: The primary consideration of texture is the exterior siding and some compatibility with the existing structure. The existing structures have a combination of smooth wood lap siding, smooth wood trim, and smooth concrete block. The exterior of the Phase I modular classroom building will be smooth lap siding to relate to the existing structures and adjacent residential structures. The exterior of the Phase II structure will also have natural cedar wood siding with trim and/or painted siding with trim, which may vary in orientation and width to break up the scale of the larger building facades.

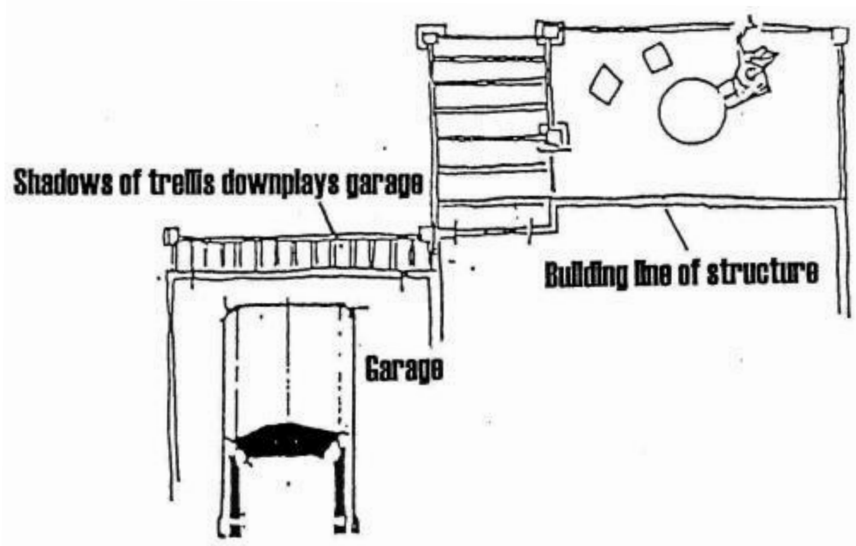
<u>Materials</u>: Exterior materials are chosen to relate to the existing neighborhood residential earth toned structures and to align with the school's mission of sustainability and outdoor learning. Exterior siding may be natural cedar wood siding or painted siding. Larger exterior windows connect students to the outside learning and play areas.

7. **Transportation. The automobile shall be shifted from a dominant role, relative to other modes of transportation, by the following means:**

    a. **Commercial and office development shall be oriented to the street. At least one public entrance shall be located facing an arterial street; or, if the project does not front on an arterial, facing a collector street; or, if the project does not front on a collector, facing the local street with highest traffic levels. Parking lots shall be placed behind or to the side of commercial and office development. When a large and/or multi-building development is occurring on a large undeveloped tract (three plus acres), it is acceptable to focus internally; however, at least 20 percent of the main adjacent right-of-way shall have buildings contiguous to it unless waived per subsection (B)(7)(c) of this section. These buildings shall be oriented to** the adjacent street and include pedestrian-oriented transparencies on those elevations.

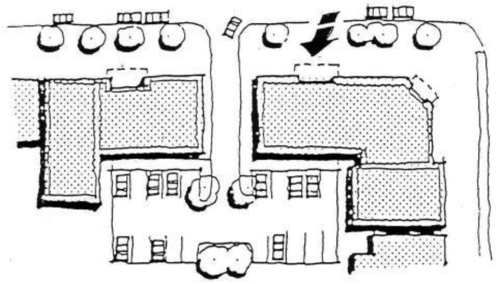
For individual buildings on smaller individual lots, at least 30 lineal feet or 50 percent of the building must be adjacent to the right-of-way unless waived per subsection (B)(7)(c) of this section. The elevations oriented to the right-of-way must incorporate pedestrian-oriented transparency.

b. Multi-family projects shall be required to keep the parking at the side or rear of the buildings or behind the building line of the structure as it would appear from the right-of-way inside the multi-family project. For any garage which is located behind the building line of the structure, but still facing the front of the structure, architectural features such as patios, patio walls, trellis, porch roofs, overhangs, pergolas, etc., shall be used to downplay the visual impact of the garage, and to emphasize the rest of the house and front entry.



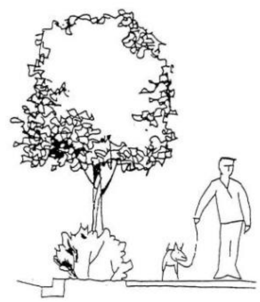
The parking may be positioned inside small courtyard areas around which the units are built. These courtyard spaces encourage socialization, defensible space, and can provide a central location for landscaping, particularly trees, which can provide an effective canopy and softening effect on the courtyard in only a few years. Vehicular access and driveways through these courtyard areas is permitted.

c. Commercial, office, and multi-family projects shall be built as close to the adjacent main right-of-way as practical to facilitate safe pedestrian and transit access. Reduced frontages by buildings on public rights-of-way may be allowed due to extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations, not just inconveniences or design challenges.



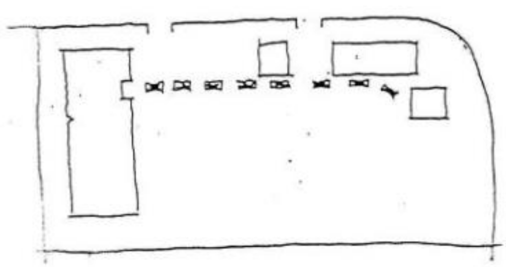
Entrance from right-of-way

d. Accessways, parking lots, and internal driveways shall accommodate pedestrian circulation and access by specially textured, colored, or clearly defined footpaths at least six feet wide. Paths shall be eight feet wide when abutting parking areas or travel lanes. Paths shall be separated from parking or travel lanes by either landscaping, planters, curbs, bollards, or raised surfaces. Sidewalks in front of storefronts on the arterials and main store entrances on the arterials identified in CDC 85.200(A)(3) shall be 12 feet wide to accommodate pedestrians, sidewalk sales, sidewalk cafes, etc. Sidewalks in front of storefronts and main store entrances in commercial/OBC zone development on local streets and collectors shall be eight feet wide.



Landscaping

e. Paths shall provide direct routes that pedestrians will use between buildings, adjacent rights-of-way, and adjacent commercial developments. They shall be clearly identified. They shall be laid out to attract use and to discourage people from cutting through parking lots and impacting environmentally sensitive areas.

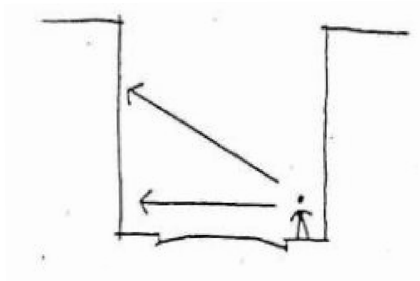


Direct pedestrian route required (--)

f. At least one entrance to the building shall be on the main street, or as close as possible to the main street. The entrance shall be designed to identify itself as a main point of ingress/egress.

g. Where transit service exists, or is expected to exist, there shall be a main entrance within a safe and reasonable distance of the transit stop. A pathway shall be provided to facilitate a direct connection.

h. **Projects shall bring at least part of the project adjacent to or near the main street right-of-way in order to enhance the height-to-width ratio along that particular street. (The "height-to-width ratio" is an architectural term that emphasizes height or vertical dimension of buildings adjacent to streets. The higher and closer the building is, and the narrower the width of the street, the more attractive and intimate the streetscape becomes.) For every one foot in street width, the adjacent building ideally should be one to two feet higher. This ratio is considered ideal in framing and defining the streetscape.**



1:1 height to width ratio is ideal (example only)

i. **These architectural standards shall apply to public facilities such as reservoirs, water towers, treatment plants, fire stations, pump stations, power transmission facilities, etc. It is recognized that many of these facilities, due to their functional requirements, cannot readily be configured to meet these architectural standards. However, attempts shall be made to make the design sympathetic to surrounding properties by landscaping, setbacks, buffers, and all reasonable architectural means.**

j. **Parking spaces at trailheads shall be located so as to preserve the view of, and access to, the trailhead entrance from the roadway. The entrance apron to the trailhead shall be marked: "No Parking," and include design features to foster trail recognition.**

Response: Though not technically a commercial or office development, the new campus redevelopment will focus on a connection between the front of the new building and Old River Road. The new front door of the school faces out towards Old River Road, with various connections to the street and to other portions of the site, including the parking area. The existing buildings on the site will be retained and the new building is located with the intention and purpose of maintaining and enhancing a campus character of the site. Due to retention of the existing buildings, it was also necessary to locate the parking area in the existing location, which is essentially at the side of the overall campus. Overall, the site design includes a pedestrian network providing connectivity among existing buildings, parking areas, the front of the new building and the adjacent street.

C. Compatibility between adjoining uses, buffering, and screening.

1. **In addition to the compatibility requirements contained in Chapter 24 CDC, buffering shall be provided between different types of land uses; for example, buffering between single-family homes and apartment blocks. However, no buffering is required between single-family homes and duplexes or single-family attached units. The following factors shall be considered in determining the adequacy of the type and extent of the buffer:**

   a. **The purpose of the buffer, for example to decrease noise levels, absorb air pollution, filter dust, or to provide a visual barrier.**

   b. **The size of the buffer required to achieve the purpose in terms of width and height.**

   c. **The direction(s) from which buffering is needed.**

d. **The required density of the buffering.**

e. **Whether the viewer is stationary or mobile.**

Response: Abutting properties are not significantly impacted by the redevelopment project beyond the existing scale of the church campus, as there will be only a slight increase in height from the existing height of some portions of the existing church campus buildings, as well as minor changes in overall building coverage of the site. Most of those abutting properties will see no impact related to the project, as most of the renovation and additions proposed are essentially within the existing developed area. Besides temporary construction noise impacts, the future enrollment for the campus is expected to stay relatively moderate and similar to peak use periods at the existing church, so noise impacts will not increase as part of this final redevelopment of the campus. However, the applicant is proposing buffering and effective screening along the perimeter of the parking areas to further protect private areas of adjoining properties from noise impacts.

Overall, the proposal includes the maintenance of existing landscaping and new landscaping in those areas that provide more robust buffering and screening to meet Code requirements. See Landscape Plan on Sheets L0.01-L1.03 of the Preliminary Development Plans in Exhibit D.

2. **On-site screening from view from adjoining properties of such things as service areas, storage areas, and parking lots shall be provided and the following factors will be considered in determining the adequacy of the type and extent of the screening:**

   a. **What needs to be screened?**

   b. **The direction from which it is needed.**

   c. **How dense the screen needs to be.**

   d. **Whether the viewer is stationary or mobile.**

   e. **Whether the screening needs to be year-round.**

Response: 6 foot tall chain link fencing and gates surround the trash area. The south and west sides, where the area is adjacent to landscape areas, are screened with closely planted hedging (Arborvitae).

3. **Rooftop air cooling and heating systems and other mechanical equipment shall be screened from view from adjoining properties.**

Response: Interior mechanical units will be utilized for the majority of the Phase II new building. Any outdoor mechanical units will be screened from view from adjoining properties.

D. Privacy and noise.

1. **Structures which include residential dwelling units shall provide private outdoor areas for each ground floor unit which is screened from view from adjoining units.**
2. **Residential dwelling units shall be placed on the site in areas having minimal noise exposure to the extent possible. Natural-appearing sound barriers shall be used to lessen noise impacts where noise levels exceed the noise standards contained in West Linn Municipal Code Section 5.487.**
3. **Structures or on-site activity areas which generate noise, lights, or glare shall be buffered from adjoining residential uses in accordance with the standards in subsection C of this section where applicable.**
4. **Businesses or activities that can reasonably be expected to generate noise in excess of the noise standards contained in West Linn Municipal Code Section**

5.487 shall undertake and submit appropriate noise studies and mitigate as necessary to comply with the code. (See CDC 55.110(B)(11) and 55.120(M).)

If the decision-making authority reasonably believes a proposed use may generate noise exceeding the standards specified in the municipal code, then the authority may require the applicant to supply professional noise studies from time to time during the user's first year of operation to monitor compliance with City standards and permit requirements.

Response: Abutting properties are not significantly impacted by the redevelopment project beyond the existing church campus, as there will be only a slight increase in height from the existing height of some portions of the existing church campus buildings. Most of those abutting properties will see no impact related to the project, as most of the renovation and additions proposed are essentially within the existing building envelopes, and additions are all to the northwest of the existing building area. Besides temporary construction noise impacts, the future enrollment for the campus is expected to stay relatively the same, so noise impacts will not increase as part of this final redevelopment of the campus. However, the applicant is proposing buffering and effective screening along the perimeter of the parking areas, as well as other portions of the property boundary, to further protect private areas of adjoining properties from visual or noise impacts.

E. Private outdoor area. This section only applies to multi-family projects.

1. **In addition to the requirements of residential living, unit shall have an outdoor private area (patio, terrace, porch) of not less than 48 square feet in area;**
2. **The outdoor space shall be oriented towards the sun where possible; and**
3. **The area shall be screened or designed to provide privacy for the users of the space.**
4. **Where balconies are added to units, the balconies shall not be less than 48 square feet, if they are intended to be counted as private outdoor areas.**

Response: The project does not include any multi-family elements, therefore, this Section does not apply.

F. Shared outdoor recreation areas. This section only applies to multi-family projects and projects with 10 or more duplexes or single-family attached dwellings on lots under 4,000 square feet. In those cases, shared outdoor recreation areas are calculated on the duplexes or single-family attached dwellings only. It also applies to qualifying PUDs under the provisions of CDC 24.170.

1. **In addition to the requirements of subsection E of this section, usable outdoor recreation space shall be provided in residential developments for the shared or common use of all the residents in the following amounts:**
   a. **Studio up to and including two-bedroom units: 200 square feet per unit.**
   b. **Three or more bedroom units: 300 square feet per unit.**
2. **The required recreation space may be provided as follows:**
   a. **It may be all outdoor space; or**
   b. **It may be part outdoor space and part indoor space; for example, an outdoor tennis court and indoor recreation room; and**
   c. **Where some or all of the required recreation area is indoor, such as an indoor recreation room, then these indoor areas must be readily accessible to all residents of the development subject to clearly posted restrictions as to hours of operation and such regulations necessary for the safety of minors.**

d. In considering the requirements of this subsection F, the emphasis shall be on usable recreation space. No single area of outdoor recreational space shall encompass an area of less than 250 square feet. All common outdoor recreational space shall be clearly delineated and readily identifiable as such. Small, marginal, and incidental lots or parcels of land are not usable recreation spaces. The location of outdoor recreation space should be integral to the overall design concept of the site and be free of hazards or constraints that would interfere with active recreation.

3. The shared space shall be readily observable to facilitate crime prevention and safety.

<u>Response:</u> The project does not include any multi-family elements, therefore, this Section does not apply.

G. Demarcation of public, semi-public, and private spaces. The structures and site improvements shall be designed so that public areas such as streets or public gathering places, semi-public areas, and private outdoor areas are clearly defined in order to establish persons having a right to be in the space, to provide for crime prevention, and to establish maintenance responsibility. These areas may be defined by:

1. A deck, patio, fence, low wall, hedge, or draping vine;

2. A trellis or arbor;

3. A change in level;

4. A change in the texture of the path material;

5. Sign; or

6. Landscaping.

Use of gates to demarcate the boundary between a public street and a private access driveway is prohibited.

<u>Response:</u> The new design includes an open play area oriented toward Old River Road and the neighborhood. This area is intended for the sole use of the school patrons during operating hours, due to safety and security issues, however, this open area will be open to the public after school hours.

H. Public transit.

1. Provisions for public transit may be required where the site abuts an existing or planned public transit route. The required facilities shall be based on the following:

a. The location of other transit facilities in the area.

b. The size and type of the proposed development.

c. The rough proportionality between the impacts from the development and the required facility.

2. The required facilities shall be limited to such facilities as the following:

a. A waiting shelter with a bench surrounded by a three-sided covered structure, with transparency to allow easy surveillance of approaching buses.

b. A turnout area for loading and unloading designed per regional transit agency standards.

c. Hard-surface paths connecting the development to the waiting and boarding areas.

d. **Regional transit agency standards shall, however, prevail if they supersede these standards.**

3. **The transit stop shall be located as close as possible to the main entrance to the shopping center, public or office building, or multi-family project. The entrance shall not be more than 200 feet from the transit stop with a clearly identified pedestrian link.**

4. **All commercial business centers (over three acres) and multi-family projects (over 40 units) may be required to provide for the relocation of transit stops to the front of the site if the existing stop is within 200 to 400 yards of the site and the exaction is roughly proportional to the impact of the development. The commercial or multi-family project may be required to provide new facilities in those cases where the nearest stop is over 400 yards away. The transit stop shall be built per subsection (H)(2) of this section.**

Response: It is not likely that the students and staff use will use public transit to a significant level, as most members of the school come from locations around the region and not necessarily West Linn. It is estimated that approximately 5% of all staff and students will use public transit in the form of Tri-Met bus service. There is an existing transit facilities (bus stop) near the intersection of Willamette /Drive and Cedar Oak Drive, approximately .2 miles from the subject property.

I. **Public facilities. An application may only be approved if adequate public facilities will be available to provide service to the property prior to occupancy.**

1. **Streets. Sufficient right-of-way and slope easement shall be dedicated to accommodate all abutting streets to be improved to the City's Improvement Standards and Specifications. The City Engineer shall determine the appropriate level of street and traffic control improvements to be required, including any off-site street and traffic control improvements, based upon the transportation analysis submitted. The City Engineer's determination of developer obligation, the extent of road improvement and City's share, if any, of improvements and the timing of improvements shall be made based upon the City's systems development charge ordinance and capital improvement program, and the rough proportionality between the impact of the development and the street improvements.**

   In determining the appropriate sizing of the street in commercial, office, multi-family, and public settings, the street should be the minimum necessary to accommodate anticipated traffic load and needs and should provide substantial accommodations for pedestrians and bicyclists. Road and driveway alignment should consider and mitigate impacts on adjacent properties and in neighborhoods in terms of increased traffic loads, noise, vibrations, and glare.

   The realignment or redesign of roads shall consider how the proposal meets accepted engineering standards, enhances public safety, and favorably relates to adjacent lands and land uses. Consideration should also be given to selecting an alignment or design that minimizes or avoids hazard areas and loss of significant natural features (drainage ways, wetlands, heavily forested areas, etc.) unless site mitigation can clearly produce a superior landscape in terms of shape, grades, and reforestation, and is fully consistent with applicable code restrictions regarding resource areas.

   Streets shall be installed per Chapter 85 CDC standards. The City Engineer has the authority to require that street widths match adjacent street widths. Sidewalks shall be installed per CDC 85.200(A)(3) for commercial and office projects, and CDC 85.200(A)(16) and 92.010(H) for residential projects, and applicable provisions of this chapter. Where streets bisect or traverse water resource areas (WRAs) the

street width shall be reduced to the appropriate "constrained" cross-section width indicated in the TSP or alternate configurations which are appropriate to site conditions, minimize WRA disturbance or are consistent with an adopted transportation system plan. The street design shall also be consistent with habitat friendly provisions of CDC 32.060(I).

Based upon the City Manager's or Manager's designee's determination, the applicant shall construct or cause to be constructed, or contribute a proportionate share of the costs, for all necessary off-site improvements identified by the transportation analysis commissioned to address CDC 55.125 that are required to mitigate impacts from the proposed development. Proportionate share of the costs shall be determined by the City Manager or Manager's designee, who shall assume that the proposed development provides improvements in rough proportion to identified impacts of the development.

Response: The subject site fronts along the Old River Road right-of-way, which is classified as a Neighborhood Route that can adequately serve this development and the associated neighborhood. The current width of this right-of-way is 60 feet and the proposed width is 60 feet, therefore, a there is no right-of-way dedication proposed. The applicant is proposing an alternative design for sidewalk based on commentary from the neighbors at the neighborhood meeting. The proposed design is a 6 feet wide asphalt pedestrian (multi-modal) path along the entire frontage of the site. This alternative design allows for a softer aesthetic along the frontage of the site, while still providing a pathway for multiple modes of alternative transportation. The alternative design considers and mitigates for impacts associated with the standard design on adjacent properties and in neighborhoods in terms of aesthetic, safety, traffic, noise, vibrations, and glare. The alternative to required street standards is further addressed in Chapter 85, below.

2. **Storm detention and treatment and geologic hazards. Per the submittals required by CDC 55.130 and 92.010(E), all proposed storm detention and treatment facilities must comply with the standards for the improvement of public and private drainage systems located in the West Linn Public Works Design Standards, there will be no adverse off-site impacts caused by the development (including impacts from increased intensity of runoff downstream or constrictions causing ponding upstream), and the applicant must provide sufficient factual data to support the conclusions of the submitted plan.**

   Per the submittals required by CDC 55.130(E), the applicant must demonstrate that the proposed methods of rendering known or potential hazard sites safe for development, including proposed geotechnical remediation, are feasible and adequate to prevent landslides or other damage to property and safety. The review authority may impose conditions, including limits on type or intensity of land use, which it determines are necessary to mitigate known risks of landslides or property damage.

3. **Municipal water. A registered civil engineer shall prepare a plan for the provision of water which demonstrates to the City Engineer's satisfaction the availability of sufficient volume, capacity, and pressure to serve the proposed development's domestic, commercial, and industrial fire flows. All plans will then be reviewed by the City Engineer.**
4. **Sanitary sewers. A registered civil engineer shall prepare a sewerage collection system plan which demonstrates sufficient on-site capacity to serve the proposed development. The City Engineer shall determine whether the existing City system has sufficient capacity to serve the development.**
5. **Solid waste and recycling storage areas. Appropriately sized and located solid waste and recycling storage areas shall be provided. Metro standards shall be used.**

Response: All required public facilities currently serve the site, including storm water, water, sanitary sewer and waste/recycling. A new storm water management system is also proposed to serve on-site flow and collection through a surface rain garden and onsite underground detention system for the new development areas. This new system will discharge onsite drainage to the existing public storm drainage system in Old River Road. A new 6" fire water service is proposed to provide a complete sprinkler system for both the existing and proposed new buildings. This new service will connect to the existing 8" public water line in Old River Road.. There is an 8-inch sanitary sewer line in Old River Road that will continue to serve the site. There is an existing solid waste and recycling area on-site. This area will temporarily relocated in Phase I to make room for the proposed temporary portable classroom building. The area is shown on the site drawings and will be enclosed within 6' high chain link fencing with privacy slats. The area will be relocated in Phase II as shown on the site drawings within a similar fencing system with privacy slats.

J. Crime prevention and safety/defensible space.

1. **Windows shall be located so that areas vulnerable to crime can be surveyed by the occupants.**
2. **Interior laundry and service areas shall be located in a way that they can be observed by others.**
3. **Mailboxes, recycling, and solid waste facilities shall be located in lighted areas having vehicular or pedestrian traffic.**
4. **The exterior lighting levels shall be selected and the angles shall be oriented towards areas vulnerable to crime.**
5. **Light fixtures shall be provided in areas having heavy pedestrian or vehicular traffic and in potentially dangerous areas such as parking lots, stairs, ramps, and abrupt grade changes.**
6. **Fixtures shall be placed at a height so that light patterns overlap at a height of seven feet which is sufficient to illuminate a person. All commercial, industrial, residential, and public facility projects undergoing design review shall use low or high pressure sodium bulbs and be able to demonstrate effective shielding so that the light is directed downwards rather than omni-directional. Omni-directional lights of an ornamental nature may be used in general commercial districts only.**
7. **Lines of sight shall be reasonably established so that the development site is visible to police and residents.**
8. **Security fences for utilities (e.g., power transformers, pump stations, pipeline control equipment, etc.) or wireless communication facilities may be up to eight feet tall in order to protect public safety. No variances are required regardless of location.**

Response: The new building is designed with a substantial amount of glazing, both on the first and second floors of the building, which allows for surveillance from most portions of the new building. The proximity of all buildings and areas of pedestrian activity to the street enables substantial visibility (lines of sight) between the site and Old River Road.

K. Provisions for persons with disabilities.

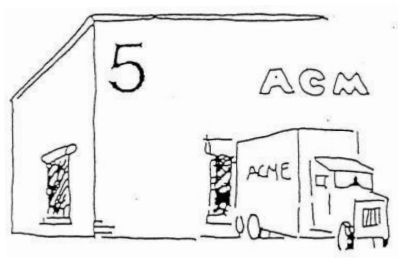
1. **The needs of a person with a disability shall be provided for. Accessible routes shall be provided between all buildings and accessible site facilities. The accessible route shall be the most practical direct route between accessible building entries, accessible site facilities, and the accessible entry to the site. An accessible route shall connect to the public right-of-way and to at least one on-site or adjacent transit stop (if the area is served by transit). All facilities shall conform**

to, or exceed, the Americans with Disabilities Act (ADA) standards, including those included in the Uniform Building Code.

Response: The pedestrian network on-site includes accessible routes among the buildings and with the proposed parking area. This network also provides a direct connection between the main building and the public right-of-way.

L. Signs.

1. **Based on considerations of crime prevention and the needs of emergency vehicles, a system of signs for identifying the location of each residential unit, store, or industry shall be established.**



2. **The signs, graphics, and letter styles shall be designed to be compatible with surrounding development, to contribute to a sense of project identity, or, when appropriate, to reflect a sense of the history of the area and the architectural style.**
3. **The sign graphics and letter styles shall announce, inform, and designate particular areas or uses as simply and clearly as possible.**
4. **The signs shall not obscure vehicle driver's sight distance.**
5. **Signs indicating future use shall be installed on land dedicated for public facilities (e.g., parks, water reservoir, fire halls, etc.).**
6. **Signs and appropriate traffic control devices and markings shall be installed or painted in the driveway and parking lot areas to identify bicycle and pedestrian routes.**

Response: Signage will be submitted as a separate application.

M. Utilities. The developer shall make necessary arrangements with utility companies or other persons or corporations affected for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting, and cable television, shall be placed underground, as practical. The design standards of Tables 1 and 2 above, and of subsection 5.487 of the West Linn Municipal Code relative to existing high ambient noise levels shall apply to this section.

Response: The proposed site is within a developed neighborhood and franchise utilities such as power, telephone and communication/telecom are already installed along the street and within the site. Any new service lateral upgrades into the site will be coordinated with the appropriate service providers.)

N. Wireless communication facilities (WCFs). (This section only applicable to WCFs.) WCFs as defined in Chapter 57 CDC may be required to go through Class I or Class II design review. The approval criteria for Class I design review is that the visual impact of the WCF shall be minimal to the extent allowed by Chapter 57 CDC. Stealth designs shall be sufficiently camouflaged so that they are not easily seen by passersby in the public right-of-way or from any adjoining residential unit. WCFs that are classified as Class II design review must respond to all of the approval criteria of this chapter.

Response: No Wireless Communication Facilities are part of this proposal, therefore, this Section does not apply.

O. Refuse and recycling standards.

1. **All commercial, industrial and multi-family developments over five units requiring Class II design review shall comply with the standards set forth in these provisions. Modifications to these provisions may be permitted if the Planning Commission determines that the changes are consistent with the purpose of these provisions and the City receives written evidence from the local franchised solid waste and recycling firm that they are in agreement with the proposed modifications.**

2. **Compactors, containers, and drop boxes shall be located on a level Portland cement concrete pad, a minimum of four inches thick, at ground elevation or other location compatible with the local franchise collection firm's equipment at the time of construction. The pad shall be designed to discharge surface water runoff to avoid ponding.**

3. **Recycling and solid waste service areas.**

    a. **Recycling receptacles shall be designed and located to serve the collection requirements for the specific type of material.**

    b. **The recycling area shall be located in close proximity to the garbage container areas and be accessible to the local franchised collection firm's equipment.**

    c. **Recycling receptacles or shelters located outside a structure shall have lids and be covered by a roof constructed of water and insect-resistive material. The maintenance of enclosures, receptacles and shelters is the responsibility of the property owner.**

    d. **The location of the recycling area and method of storage shall be approved by the local fire marshal.**

    e. **Recycling and solid waste service areas shall be at ground level and/or otherwise accessible to the franchised solid waste and recycling collection firm.**

    f. **Recycling and solid waste service areas shall be used only for purposes of storing solid waste and recyclable materials and shall not be a general storage area to store personal belongings of tenants, lessees, property management or owners of the development or premises.**

    g. **Recyclable material service areas shall be maintained in a clean and safe condition.**

4. **Special wastes or recyclable materials.**

    a. **Environmentally hazardous wastes defined in ORS 466.005 shall be located, prepared, stored, maintained, collected, transported, and disposed in a manner acceptable to the Oregon Department of Environmental Quality.**

    b. **Containers used to store cooking oils, grease or animal renderings for recycling or disposal shall not be located in the principal recyclable materials or solid waste storage areas. These materials shall be stored in a separate storage area designed for such purpose.**

5. **Screening and buffering.**

    a. **Enclosures shall include a curbed landscape area at least three feet in width on the sides and rear. Landscaping shall include, at a minimum, a continuous hedge maintained at a height of 36 inches.**

b. Placement of enclosures adjacent to residentially zoned property and along street frontages is strongly discouraged. They shall be located so as to conceal them from public view to the maximum extent possible.

c. All dumpsters and other trash containers shall be completely screened on all four sides with an enclosure that is comprised of a durable material such as masonry with a finish that is architecturally compatible with the project. Chain link fencing, with or without slats, will not be allowed.

6. Litter receptacles.

a. Location. Litter receptacles may not encroach upon the minimum required walkway widths.

b. Litter receptacles may not be located within public rights-of-way except as permitted through an agreement with the City in a manner acceptable to the City Attorney or his/her designee.

c. Number. The number and location of proposed litter receptacles shall be based on the type and size of the proposed uses. However, at a minimum, for non-residential uses, at least one external litter receptacle shall be provided for every 25 parking spaces for first 100 spaces, plus one receptacle for every additional 100 spaces.

Response: There is an existing solid waste and recycling area on-site. This area will temporarily relocated in Phase I to make room for the proposed temporary portable classroom building. The area is shown on the site drawings and will be enclosed within 6' high chain link fencing with privacy slats. The area will be relocated in Phase II as shown on the site drawings within a similar fencing system with privacy slats.

55.110 SITE ANALYSIS

The site analysis shall include:

A. A vicinity map showing the location of the property in relation to adjacent properties, roads, pedestrian and bike ways, transit stops and utility access.

B. A site analysis on a drawing at a suitable scale (in order of preference, one inch equals 10 feet to one inch equals 30 feet) which shows:

1. The property boundaries, dimensions, and gross area.

2. Contour lines at the following minimum intervals:

a. Two-foot intervals for slopes from zero to 25 percent; and

b. Five- or 10-foot intervals for slopes in excess of 25 percent.

3. Tables and maps identifying acreage, location and type of development constraints due to site characteristics such as slope, drainage and geologic hazards, including a slope analysis which identifies portions of the site according to the land types (I, II, III and IV) defined in Chapter 02 CDC.

4. The location and width of adjoining streets.

5. The drainage patterns and drainage courses on the site and on adjacent lands.

6. Potential natural hazard areas including:

a. Floodplain areas pursuant to the site's applicable FEMA Flood Map panel;

b. **Water resource areas as defined by Chapter 32 CDC;**

c. **Landslide areas designated by the Natural Hazard Mitigation Plan, Map 16; and**

d. **Landslide vulnerable analysis areas, designated by the Natural Hazard Mitigation Plan, Map 17.**

7. **Resource areas including:**

a. **Wetlands;**

b. **Riparian corridors;**

c. **Streams, including intermittent and ephemeral streams;**

d. **Habitat conservation areas; and**

e. **Large rock outcroppings.**

8. **Potential historic landmarks and registered archaeological sites. The existence of such sites on the property shall be verified from records maintained by the Community Development Department and other recognized sources.**

9. **Identification information including the name and address of the owner, developer, project designer, lineal scale and north arrow.**

10. **Identify Type I and II lands in map form. Provide a table which identifies square footage of Type I and II lands also as percentage of total site square footage.**

Certain development proposals required that a Traffic Impact Analysis (TIA) be provided which may result in modifications to the site plan or conditions of approval to address or minimize any adverse impacts created by the proposal. The purpose, applicability and standards of this analysis are found in CDC 85.170(B)(2).

Response: The site analysis for this project is embedded in this narrative under various the Sections addressing compliance with CDC standards, requirements and criteria. In addition, the Site Analysis can also be found represented in the various Sheets of the Preliminary Development Plans in Exhibit D

55.120 SITE PLAN

The site plan shall be at the same scale as the site analysis (CDC 55.110) and shall show:

A. **The applicant's entire property and the surrounding property to a distance sufficient to determine the relationship between the applicant's property and proposed development and adjacent property and development.**

B. **Boundary lines and dimensions for the perimeter of the property and the dimensions for all proposed lot or parcel lines.**

C. **Streams and stream corridors.**

D. **Identification information, including the name and address of the owner, developer, project designer, lineal scale and north arrow.**

E. **The location, dimensions, and names of all existing and proposed streets, public pathways, easements on adjacent properties and on the site, and all associated rights-of-way.**

F. **The location, dimensions and setback distances of all:**

1. **Existing and proposed structures, improvements, and utility facilities on site; and**

2. **Existing structures and driveways on adjoining properties.**

G. **The location and dimensions of:**

1. **The entrances and exits to the site;**
2. **The parking and circulation areas;**
3. **Areas for waste disposal, recycling, loading, and delivery;**
4. **Pedestrian and bicycle routes, including designated routes, through parking lots and to adjacent rights-of-way;**
5. **On-site outdoor recreation spaces and common areas;**
6. **All utilities, including storm water detention and treatment; and**
7. **Sign locations.**

H. The location of areas to be landscaped. Certain development proposals required that a Traffic Impact Analysis (TIA) be provided which may result in modifications to the site plan or conditions of approval to address or minimize any adverse impacts created by the proposal. The purpose, applicability and standards of this analysis are found in CDC 85.170(B)(2).

Response: All of the Site Plan requirements indicated in this Section can be found on the Site Plan on Sheet C1.0 and C1.1 of the Preliminary Development Plans in Exhibit D.

55.125 TRANSPORTATION ANALYSIS

Certain development proposals required that a Traffic Impact Analysis (TIA) be provided which may result in modifications to the site plan or conditions of approval to address or minimize any adverse impacts created by the proposal. The purpose, applicability and standards of this analysis are found in CDC 85.170(B)(2). (Ord. 1584, 2008)

Response: A transportation analysis in the form of a Traffic Impact Study has been provided in this application package as Exhibit F.

55.130 GRADING AND DRAINAGE PLANS

For Type I, II and III lands (refer to definitions in Chapter 02 CDC), a registered civil engineer must prepare a grading plan and a storm detention and treatment plan pursuant to CDC 92.010(E), at a scale sufficient to evaluate all aspects of the proposal, and a statement that demonstrates:

A. The location and extent to which grading will take place indicating general contour lines, slope ratios, slope stabilization proposals, and location and height of retaining walls, if proposed.

B. All proposed storm detention and treatment facilities comply with the standards for the improvement of public and private drainage systems located in the West Linn Public Works Design Standards.

C. There is sufficient factual data to support the conclusions of the plan.

D. Per CDC 99.035, the Planning Director may require the information in subsections A, B and C of this section for Type IV lands if the information is needed to properly evaluate the proposed site plan.

E. For Type I, II and III lands (refer to definitions in Chapter 02 CDC), the applicant must provide a geologic report, with text, figures and attachments as needed to meet the industry standard of practice, prepared by a certified engineering geologist and/or a geotechnical professional engineer, that includes:

1. **Site characteristics, geologic descriptions and a summary of the site investigation conducted;**
2. **Assessment of engineering geological conditions and factors;**
3. **Review of the City of West Linn's Natural Hazard Mitigation Plan and applicability to the site; and**
4. **Conclusions and recommendations focused on geologic constraints for the proposed land use or development activity, limitations and potential risks of development, recommendations for mitigation approaches and additional work needed at future development stages including further testing and monitoring.**

F. Identification information, including the name and address of the owner, developer, project designer, and the project engineer.

Certain development proposals required that a Traffic Impact Analysis (TIA) be provided which may result in modifications to the site plan or conditions of approval to address or minimize any adverse impacts created by the proposal. The purpose, applicability and standards of this analysis are found in CDC 85.170(B)(2).

Response: A Preliminary Drainage Report (Exhibit E), Grading Plan (Sheet C2.0 in Exhibit D) and Utility Plan (Sheet C3.0 in Exhibit D) are all included in this application package. The Preliminary Draiange Report (and associated calculations) both convey and outline compliance with the standards, definitions and requirements of CDC Chapter 2 and Section 92.010(E) . A conveyance network of underground piping will both treat and convey runoff to public storm mains located at the perimeter of the site and in public-right-of-way. The storm drainage system is completely separate from the sanitary sewer system. Filter strips are proposed to treat new impervious sidewalk along Old River Road frontage and/or a storm water planter treats the runoff from public right-of-way on Old River Road

55.140 ARCHITECTURAL DRAWINGS

This section does not apply to single-family residential subdivisions or partitions, or up to two duplexes or single-family attached dwellings.

Architectural drawings shall be submitted showing:

A. Building elevations and sections tied to curb elevation;

B. Building materials: color and type; and

C. The name of the architect or designer.

Response: Architectural drawings are included on Sheets A301 and A302 in the Preliminary Development Plans in Exhibit D. These drawings include elevations, building materials and the name of the architect.

55.150 LANDSCAPE PLAN

This section does not apply to detached single-family residential subdivisions or partitions, or up to two duplexes or single-family attached dwellings.

A. The landscape plan shall be prepared and shall show the following:

1. **Preliminary underground irrigation system, if proposed;**
2. **The location and height of fences and other buffering of screening materials, if proposed;**
3. **The location of terraces, decks, patios, shelters, and play areas, if proposed;**
4. **The location, size, and species of the existing and proposed plant materials, if proposed; and**

5. Building and pavement outlines.

B. The landscape plan shall be accompanied by:

1. The erosion controls that will be used, if necessary;

2. Planting list; and

3. Supplemental information as required by the Planning Director or City Arborist.

Response: A Landscape Plan is included on Sheets L0.01-L1.03 of the Preliminary Development Plans in Exhibit D. These plans include landscaped areas, outdoor areas, irrigation system, screening information, building outlines and a planting list.

55.170 EXCEPTIONS TO UNDERLYING ZONE, YARD, PARKING, SIGN PROVISIONS, AND LANDSCAPING PROVISIONS

A. The Planning Director may grant an exception to the dimensional building setback or yard requirements in the applicable zone based on findings that the approval will satisfy the following criteria:

1. A minor exception that is not greater than 20 percent of the required setback.

2. A more efficient use of the site.

3. The preservation of natural features that have been incorporated into the overall design of the project.

4. No adverse affect to adjoining properties in terms of light, air circulation, noise levels, privacy, and fire hazard.

5. Safe vehicular and pedestrian access to the site and safe on-site vehicular and pedestrian circulation.

Response: The applicant is not requesting adjustments to the underlying zone, yard, parking, sign provisions, nor landscaping provisions.

B. The Planning Director may grant an exception to the off-street parking dimensional and minimum number of space requirements in the applicable zone so long as the following criteria are met:

1. The minor exception is not greater than 10 percent of the required parking;

2. The application is for a use designed for a specific purpose which is intended to be permanent in nature (for example, a nursing home) and which has a low demand for off-street parking; or

3. There is an opportunity for sharing parking and there is written evidence that the property owners are willing to enter into a legal agreement; or

4. Public transportation is available to the site reducing the standards and will not adversely affect adjoining uses, and there is a community interest in the preservation of particular natural feature(s) of the site which make it in the public interest to grant an exception to parking standards.

Response: A variance is requested for reduced required minimum number of parking spaces.

55.180 MAINTENANCE

All on-site improvements shall be the ongoing responsibility of the property owner or occupant.

Response: The applicant understands the ongoing responsibility of the property owner or occupant for all on-site improvements.

CHAPTER 60: CONDITIONAL USES

60.030 ADMINISTRATION AND APPROVAL PROCESS

A. Conditional use applications shall be decided by the Planning Commission in the manner set forth in CDC 99.060(B). A petition for review by the Council may be filed as provided by CDC 99.240(B).

Response: The applicant understands that the application shall be decided by the Planning Commission, as set forth in CDC 99.060(B).

B. All approved conditional use applications in new buildings, or buildings with a major modification, shall be subject to design review under the provisions of Chapter 55 CDC, and in the manner set forth in CDC 99.060(B).

Response: This application includes new and existing buildings. The applicant understands that the application for Conditional Use requires and additional application for Class II Design Review. This application package includes both Conditional Use and Design Review applications and associated required material.

C. All approved conditional use applications within existing buildings shall not be subject to design review.

Response: This application includes new and existing buildings. The applicant understands that the application for Conditional Use requires and additional application for Class II Design Review. This application package includes both Conditional Use and Design Review applications and associated required material.

60.040 TIME LIMIT ON A CONDITIONAL USE APPROVAL

Approval of a conditional use that required a design review shall be subject to the time limitations set forth in CDC 55.040. Approval of a conditional use that did not require design review shall be void unless either the use is commenced or an extension is granted per CDC 99.325 within three years of the approval.

Response: The applicant understands that approval of a conditional use that required a design review shall be subject to the time limitations set forth in CDC 55.040., which is 3 years. Further, the applicant understands that an approval of a conditional use and associated design review shall be void unless either the use is commenced or a 2-year extension is granted, per CDC 99.325, within three years of the approval.

60.050 BUILDING PERMITS FOR AN APPROVED CONDITIONAL USE

Building permits for all or any portion of a conditional use shall be issued only on the basis of the conditional use plan and conditions as approved by the Planning Commission.

Response: The applicant understands that approval of a conditional use by the Planning Commission will include specific approvals and conditions, and that subsequent building permits will be based on those approvals and conditions.

60.060 APPLICATION

A. A conditional use application shall be initiated by the property owner or the owner's authorized agent.

B. A prerequisite to the filing of an application is a pre-application conference at which time the Director shall explain the requirements and provide the appropriate forms as specified in CDC 99.030(B) and (C).

C. A prerequisite to the filing of an application is a meeting with the respective City-recognized neighborhood association, per CDC 99.038, at which time the applicant will present his/her proposal and receive comments.

D. An application for a conditional use shall include the completed application form and:

1. **A narrative which addresses the approval criteria set forth in CDC 60.070 and which sustains the applicant's burden of proof;**
2. **A site plan as provided by CDC 60.080; and**
3. **If site modification or construction is proposed, a storm detention and treatment plan and narrative pursuant to CDC 92.010(E).**

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the City. When the application submittal is determined to be complete, additional copies may be required as determined by the Community Development Department.

E. The applicant shall pay the requisite fee.

Response: The application form for this application has been signed by the correct owner (owner of record) and the application shall be reviewed as a Class II Quasi-Judicial Procedure. A pre-application conference was held on January 18, 2018, per this requirement, and is referred to as PA-18-04. Notes were provided by the City and are included in this application in Exhibit C, Pre-Application Conference Notes. Neighborhood Meeting Materials are also included with this application package in Exhibit H. In addition, a narrative herein is also provided as Exhibit I. The Preliminary Drainage Report has been provided in Exhibit E, with design of storm water facilities depicted in the Utility Plan on Sheet C3.0 in Exhibit D, Preliminary Development Plans. The required sizes and number of copies are all included as part of the application package, including the correct fee amount of $20,130 made out to the City of West Linn.

60.070 APPROVAL STANDARDS AND CONDITIONS

A. The Planning Commission shall approve, approve with conditions, or deny an application for a conditional use, except for a manufactured home subdivision in which case the approval standards and conditions shall be those specified in CDC 36.030, or to enlarge or alter a conditional use based on findings of fact with respect to each of the following criteria:

1. **The site size and dimensions provide:**
    a. **Adequate area for the needs of the proposed use; and**
    b. **Adequate area for aesthetic design treatment to mitigate any possible adverse effect from the use on surrounding properties and uses.**

Response: The overall proposed project development area is approximately 38,500 square feet (paving and roof areas) and the overall site size is 64,430 square feet (approximately 1.48 acres). This equates to approximately 59.8% of the overall site needed for the proposed development area and associated school use. The proposed use requires 48 parking spaces and 37 spaces are provided. The parking includes all required landscaping and screening, as well as pedestrian connections and vehicle accessways. Therefore, the size of the site is more than adequate to accommodate the needs of the proposed use.

2. **The characteristics of the site are suitable for the proposed use considering size, shape, location, topography, and natural features.**

Response: The overall proposed project development area is approximately 38,500 square feet (paving and roof areas) and the overall site size is 64,430 square feet (approximately 1.48 acres). This equates to approximately 59.8% of the overall site needed for the proposed development area and associated school use. The proposed increase in floor area for Phase I is approximately 24% beyond the existing floor area. The proposed development is located on an existing developed site that is relatively uniform in shape as a square or rectangle and is served by adjacent streets and utilities. The site has been used as an institutional use (church and/or school) in a residential neighborhood since the 1960's. Therefore, the size, shape and location of the site is more than adequate to accommodate the relatively minor impacts of the proposed use. The site slopes from the northwest to the southeast, with some grading or cut/fill required. There are no significant natural features on, or adjacent to, the overall site. No significant amount of additional traffic will be generated from the campus redevelopment, with a limited number of additional trips anticipated. All required parking for the school use is provided on the existing site through the proposed parking lot areas.

3. The granting of the proposal will produce a facility that provides an overall benefit to the City.

Response: This small neighborhood school will provide many overall benefits to the City. The school will provide a local opportunity for education and community connection, including the use of the facility as a community center for a variety of local events. Short-term economic benefits include salaries for instructors, with long-term benefits including the advantages of education and training of future residents of the City.

4. Adequate public facilities will be available to provide service to the property at the time of occupancy.

Response: All required public facilities currently serve the site, including storm water, water and sanitary sewer (West Linn Public Works), waste/recycling (West Linn Refuse), electrical (PGE), and Gas (NW Natural). A new storm water management system is also proposed to serve on-site flow and collection through a surface rain garden and onsite underground detention system for the new development areas. This new system will discharge onsite drainage to the existing public storm drainage system in Old River Road. A new 6" fire water service is proposed to provide a complete sprinkler system for both the existing and proposed new buildings. This new service will connect to the existing 8" public water line in Old River Road.. There is an 8-inch sanitary sewer line in Old River Road that will continue to serve the site. There is an existing solid waste and recycling area on-site. This area will temporarily relocated in Phase I to make room for the proposed temporary portable classroom building. The area is shown on the site drawings and will be enclosed within 6' high chain link fencing with privacy slats. The area will be relocated in Phase II as shown on the site drawings within a similar fencing system with privacy slats.

5. The applicable requirements of the zone are met, except as modified by this chapter.

Response: All applicable requirements of the underlying R-10 zoning district are met, through both the Conditional Use approval criteria and the associated R-10 standards, which are addressed in this narrative. However, two Variances are requested for loading space requirements and minimum distance between parking and building front entrance. In addition, an Adjustment for minimum parking is also requested in this application. All of these requests are addressed in this narrative.

6. The supplementary requirements set forth in Chapters 52 to 55 CDC and CDC 92.010(E) are met, if applicable.

Response: The supplementary requirements set forth in the other chapters of this code, including, but not limited to, Chapters 52 to 55 and CDC 92.010(E), are addressed in this narrative.

7. The use will comply with the applicable policies of the Comprehensive Plan.

Response: The development of the site complies with the applicable policies of the Comprehensive Plan.

B. An approved conditional use or enlargement or alteration of an existing conditional use shall be subject to the development review provisions set forth in Chapter 55 CDC.

Response: Chapter 55 is addressed in a separate section of this narrative.

C. **The Planning Commission may impose conditions on its approval of a conditional use which it finds are necessary to assure the use is compatible with other uses in the vicinity. These conditions may include, but are not limited to, the following:**

1. **Limiting the hours, days, place, and manner of operation.**
2. **Requiring design features which minimize environmental impacts such as noise, vibration, air pollution, glare, odor, and dust.**
3. **Requiring additional setback areas, lot area, or lot depth, or width.**
4. **Limiting the building height, size or lot coverage, or location on the site.**
5. **Designating the size, number, location and design of vehicle access points.**
6. **Requiring street right-of-way to be dedicated and the street to be improved including all steps necessary to address future street improvements identified in the adopted Transportation System Plan.**
7. **Requiring participation in making the intersection improvement or improvements identified in the Transportation System Plan when a traffic analysis (compiled as an element of a conditional use application for the property) indicates the application should contribute toward.**
8. **Requiring landscaping, screening, drainage, and surfacing of parking and loading areas.**
9. **Limiting the number, size, location, height, and lighting of signs.**
10. **Limiting or setting standards for the location and intensity of outdoor lighting.**
11. **Requiring berming, screening, or landscaping and the establishment of standards for their installation and maintenance.**
12. **Requiring and designating the size, height, location, and materials for fences.**
13. **Requiring the protection and preservation of existing trees, soils, vegetation, watercourses, habitat areas, and drainage areas.**

Response: The applicant understands that approval of a conditional use by the Planning Commission will include specific approvals and conditions, and that subsequent building permits will be based on those approvals and conditions, including those identified in this Section.

D. **Aggregate extraction uses shall also be subject to the provisions of ORS 541.605.**

Response: No aggregate extraction is proposed, therefore, this Section does not apply.

E. **The Historic Review Board shall review an application for a conditional use, or to enlarge a conditional use on a property designated as a historic resource, based on findings of fact that the use will:**

1. **Preserve or improve a historic resource which would probably not be preserved or improved otherwise; and**
2. **Utilize existing structures rather than new structures.**

Response: The subject property does not include any historic resources, therefore, this Section does not apply.

60.080 SITE PLAN AND MAP

A. **All site plans and maps shall include the name, address, and telephone number of the applicant, the scale of the site plan, north arrow, and a vicinity map.**

B. The applicant shall submit a site plan drawn to an appropriate scale (in order of preference, one inch equals 10 feet to one inch equals 30 feet) which contains the following information:

1. The subdivision name, block, and lot number or the section, township, range, and tax lot number.

2. The lot or parcel boundaries, dimensions, and gross area.

3. The applicant's property and the surrounding property to a distance sufficient to determine the relationship between the applicant's property and proposed development to the adjacent property and development.

4. The location, dimensions, and names of all existing and platted streets and other public ways and easements on adjacent property and on the site.

5. The location, dimensions, and setback distances of all:

a. Existing structures, improvements, utilities, and drainage facilities on adjoining properties;

b. Existing structures, improvements, utilities, and drainage facilities to remain on the site; and

c. Proposed structures or changes to existing structures, improvements, utilities, and drainage facilities.

6. The existing and proposed dimensions of:

a. The entrances and exits to the site;

b. The parking and circulation areas;

c. Loading and service areas for waste disposal, loading and delivery;

d. Pedestrian and bicycle circulation area;

e. On-site outdoor recreation spaces and common areas; and

f. Above-ground utilities.

7. The location of areas to be landscaped and the proposed landscape plan.

8. The location of all trees having a six-inch caliper at a height of five feet.

C. The applicant shall submit the site plan on a map showing two-foot contours up to 20 percent grade and 10-foot contours on grades above 20 percent.

<u>Response:</u> All of the Site Plan requirements indicated in this Section can be found on the Site Plans on Sheets C1.0 and C1.1of the Preliminary Development Plans in Exhibit D.

60.100 ADDITIONAL CRITERIA FOR SCHOOLS AND OTHER GOVERNMENT FACILITIES

Schools and other government facilities that attract a regular and significant volume of users shall, to the greatest extent possible, be centrally located relative to the majority of the population that they will serve and be serviceable by sidewalks and bike routes/lanes. Police and fire stations shall meet these standards to the greatest extent possible but it is acknowledged that access to arterials remains a key locational determinant for those uses.

<u>Response:</u> The proposed school is centrally located based on the clientele and enrollment demographics. Most attendees of the school will come from within 10 miles of the facility. Enrollment: 1/3 of the families enrolled in the school come from West Linn, 1/3 come from Sellwood, and 1/3 come from Oregon City. …

CHAPTER 75: VARIANCES AND SPECIAL WAIVERS

75.020 CLASSIFICATION OF VARIANCES

A. Class I Variance. Class I variances provide minor relief from certain code provisions

where it can be demonstrated that the modification will not harm adjacent properties, and it conforms with any other code requirements. Class I variances are allowed for the following code provisions:

1. **Required Yard and Minimum Lot Dimensional Requirements. Required yards may be modified up to 20 percent, lot dimensions by up to 10 percent and lot area by up to five percent if the decision-making authority finds that the resulting approval:**
   a. **Provides for a more efficient use of the site;**
   b. **Preserves and incorporates natural features into the overall design of the project;**
   c. **Does not adversely affect adjoining properties in terms of light, air circulation, noise levels, privacy, and fire hazards; and**
   d. **Provides for safe vehicular and pedestrian access to the site and safe on-site vehicular and pedestrian circulation.**
2. **Off-street parking dimensional and minimum number of space requirements may be modified up to 10 percent if the decision-making authority finds that the use is designed for a specific purpose, which is intended to be permanent in nature.**
3. **Dimensional sign requirements may be modified up to 10 percent if the decision-making authority finds that the proposed larger sign is:**
   a. **Necessary for adequate identification of the use on the property; and**
   b. **Compatible with the overall site plan, the structural improvements, and with the structures and uses on adjoining properties.**
4. **Landscaping requirements in the applicable zone may be modified up to 10 percent if the decision-making authority finds that the resulting approval:**
   a. **Provides for a more efficient use of the site;**
   b. **Preserves and incorporates natural features into the overall design of the project; and**
   c. **Will have no adverse effect on adjoining property.**

<u>**Response:**</u> No Class I Variance is being requested, therefore, this Section does not apply.

B. Class II Variance. Class II variances may be utilized when strict application of code requirements would be inconsistent with the general purpose of the CDC and would create a burden upon a property owner with no corresponding public benefit. A Class II variance will involve a significant change from the code requirements and may create adverse impacts on adjacent property or occupants. It includes any variance that is not classified as a Class I variance or special waiver.

<u>**Response:**</u> Two Variances are being requested and they do not qualify under the Class I Variance criteria listed in 75.020.A.1-4, therefore, this Section does apply. The two requested Variances will be considered Class II, and are for the following standards:

1) CDC 46.130, Loading Bay Requirements; and
2) CDC 46.090, Minimum Off-Street Parking Space Requirements

Each of these Variances is addressed separately, below.

CDC 46.130, Loading Bay Requirements

1. **Class II Variance Approval Criteria. The approval authority may impose appropriate conditions to ensure compliance with the criteria. The appropriate approval authority shall approve a variance request if all the following criteria are met and corresponding findings of fact prepared.**

   a. **The variance is the minimum variance necessary to make reasonable use of the property. To make this determination, the following factors may be considered, together with any other relevant facts or circumstances:**

      1) **Whether the development is similar in size, intensity and type to developments on other properties in the City that have the same zoning designation.**

      2) **Physical characteristics of the property such as lot size or shape, topography, or the existence of natural resources.**

      3) **The potential for economic development of the subject property.**

Response: The variance being requested is the minimum needed to negate the requirement for a loading bay that is not functionally necessary for the proposed use. The existing church does not have a loading bay and was never necessary. This is also true for the proposed use. The standard in CDC under 46.130 states that for a building over 10,000 square feet, a loading space with minimum dimensions of 14 feet wide and 20 feet long is required. Nearly all of the deliveries required for the operation of the school can be accomplished by a large van that could fit in one of the standard parking lot spaces on a temporary basis. Due to site size and requirements for certain building square footage to accommodate minimal enrollment feasibility, it is not practicable to include a truck loading space as part of the development.

The site size is similar to other commercial properties along Willamette Drive that do not have designated loading spaces. Again, the lot size of the subject site is relatively constrained when considering building size needs, preservation of trees, a necessary pedestrian network and required parking areas. Finally, a requirement for truck loading would diminish the ability to provide all other elements required of the development, thereby jeopardizing the project feasibility.

   b. **The variance will not result in violation(s) of any other code standard, and the variance will meet the purposes of the regulation being modified.**

Response: The variance being requested does not result in violation of any other applicable Code standard, as all other applicable Code standards are addressed in this narrative indicating compliance. The purpose of this regulation is to ensure that a designated space is provided for normal on-site loading. The proposed parking spaces can provide the adequate space needed for temporary on-site loading.

   c. **The need for the variance was not created by the applicant and/or owner requesting the variance.**

Response: The variance being requested is not necessarily resultant of any action by the owner. The normal functioning of the school simply does not require a relatively large loading space for normal operation.

   d. **If more than one variance is requested, the cumulative effect of the variances results in a project that is consistent with the overall purpose of the zone.**

Response: Two variances are being requested, however, the cumulative effect of the variances is still consistent with the Conditional Use in an R-10 zone. The purpose of the zone is to allow primarily residential use and development, with other uses allowed through a Conditional

Use. If the Conditional Use is approved and associated standards are met, then it can be deduced that the effect of the variances is consistent with the overall purpose of the R-10 zone, which allows for schools as a Conditional Use.

CDC 46.090, Minimum Off-Street Parking Space Requirements

2. **Class II Variance Approval Criteria. The approval authority may impose appropriate conditions to ensure compliance with the criteria. The appropriate approval authority shall approve a variance request if all the following criteria are met and corresponding findings of fact prepared.**

    e. **The variance is the minimum variance necessary to make reasonable use of the property. To make this determination, the following factors may be considered, together with any other relevant facts or circumstances:**

        1) **Whether the development is similar in size, intensity and type to developments on other properties in the City that have the same zoning designation.**

        2) **Physical characteristics of the property such as lot size or shape, topography, or the existence of natural resources.**

        3) **The potential for economic development of the subject property.**

Response: The proposed development is similar in size, intensity and type to developments on other properties in the City with the same zoning designation. The application is for redevelopment of an existing use. Existing parking at the site currently meets CDC requirements for Phase II. However, the City of West Linn required development of a pick-up drop-off area of students reduces the number of parking spaces. The attached memo from Lancaster Engineering (Exhibit K) addresses city required vehicular circulation improvements that reduce available parking but will increase site safety, queuing, and both vehicular and pedestrian circulation.

The proposed number of parking spaces is the minimum variance necessary to make reasonable use of the property. The lot size is just large enough to accommodate the school program, vehicular and pedestrian areas, storm water treatment and detention, and outdoor learning and play areas. The steep topography of the site also prohibits the addition of additional parking.

f. **The variance will not result in violation(s) of any other code standard, and the variance will meet the purposes of the regulation being modified.**

Response: The variance is consistent with other code standards and addresses the minimum parking requirement. The application eliminates some existing stalls in the interest of providing greater pick-up and drop-off area for parents. The extended pick-up/drop-off area reduces the need for greater parking and provides a safer circulation for pedestrians and vehicles.

g. **The need for the variance was not created by the applicant and/or owner requesting the variance.**

Response: The need for the variance was generated by the City as a response to improve student drop off and pick up circulation. The vehicular circulation required by the City eliminates 12 parking stalls that previously counted towards addressing the minimum required.

h. **If more than one variance is requested, the cumulative effect of the variances results in a project that is consistent with the overall purpose of the zone.**

Response: Two variances are being requested, however, the cumulative effect of the variances is still consistent with the Conditional Use in an R-10 zone. The purpose of the zone is to allow primarily residential use and development, with other uses allowed through a Conditional Use. If the Conditional Use is approved and associated standards are met, then it can be deduced that the effect of the variances is consistent with the overall purpose of the R-10 zone, which allows for schools as a Conditional Use.

C. Special Waivers. Special waivers are only applicable in mixed use and non-residential zoning districts. Special waivers may be granted by the approval authority when it can be shown that the proposed site design provides a superior means of furthering the intent and purpose of the regulation to be waived. A special waiver involves a waiver of a standard to permit a specific proposed development. It does not require demonstration of a hardship. It is a request to modify specific requirements in order to provide a superior site design that would not otherwise be possible under the standard requirements of the code.

Response: No Special Waiver is being requested, therefore, this Section does not apply.

75.030 ADMINISTRATION AND APPROVAL PROCESS

A. Class I variances shall be decided by the Planning Director in the manner set forth in CDC 99.060(A). An appeal may be taken as provided by CDC 99.240(A).

B. Class II variances and special waivers shall be decided by the Planning Commission in the manner set forth in CDC 99.060(B). A petition for review by the Council may be filed as provided by CDC 99.240(B).

Response: Both requested Class II Variances are included with this application package and will be reviewed by the Planning Commission as part of this Quasi-Judicial Procedure, per CDC 99.060(A).

75.040 TIME LIMIT ON A VARIANCE AND SPECIAL WAIVERS

Approval of a variance or special waiver shall be void after three years unless substantial construction has taken place or an extension is granted per Chapter 99 CDC.

Response: The applicant understands that approval of the variances shall be subject to the time limitations set forth in CDC 55.040., which is 3 years. Further, the applicant understands that an approval of the variances shall be void unless either the use is commenced or a 2-year extension is granted, per CDC 99.325, within three years of the approval.

75.050 APPLICATION

A. A variance request shall be initiated by the property owner or the owner's authorized agent.

B. A prerequisite to the filing of an application for a Class II variance or special waiver is a pre-application conference at which time the Planning Director shall explain the requirements and provide the appropriate form(s).

C. An application for a variance shall include the completed application form and:

1. A narrative which addresses the approval criteria set forth in CDC 75.020, and which sustains the applicant's burden of proof.

2. A site plan as provided by CDC 75.060.

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the City. When the application submittal is determined to be complete, additional copies may be required as determined by the Community Development Department.

D. Requests for more than one Class II variance for the same lot or parcel shall be consolidated in one application and reviewed concurrently by the City.

E. **Not more than two Class II variances may be approved for any one lot or parcel in a continuous 12-month period.**

F. **The applicant shall pay the requisite fee.**

Response: The application form for this application has been signed by the correct owner (owner of record) and the application shall be reviewed as a Class II Quasi-Judicial Procedure. A pre-application conference was held on January 18, 2018, per this requirement, and is referred to as PA-18-04. Notes were provided by the City and are included in this application in Exhibit C, Pre-Application Conference Notes. In addition, a narrative herein is also provided as Exhibit I. The Site Plan on Sheets C1.0 and C1.1 in Exhibit D, Preliminary Development Plans, is also included. The required sizes and number of copies are all included as part of the application package, including the correct fee amount of $20,130 made out to the City of West Linn.

75.060 SITE PLANS AND MAP

A. **All plot plans and maps shall include the name, address, and telephone number of the applicant; the scale; north arrow; and a vicinity map.**

B. **The applicant shall submit a plot plan drawn to an appropriate scale (in order of preference: one inch equals 10 feet to one inch equals 30 feet) which shows the following:**

1. **The subdivision name, block, and lot number or the section, township, range, and tax lot number.**
2. **In the case of a request for a variance to a lot or parcel dimensional or building setback requirement:**
    a. **The lot or parcel configuration and dimensions, and the location of all existing structures; the setback distances and the location of all structures on abutting units of land, and the setback distances; and**
    b. **The proposed variances.**
3. **In the case of a request for a variance to the building height provisions:**
    a. **An elevation drawing of the structure and the proposed variances; and**
    b. **A drawing(s) to scale showing the impact on adjoining properties; for example, will the height variance, if granted, block a viewpoint from an adjoining property of a significant land feature.**

Response: All of the Site Plan requirements indicated in this Section can be found on the Site Plans on Sheet C1.0 and C1.1 of the Preliminary Development Plans in Exhibit D.

CHAPTER 91 IMPROVEMENT GUARANTEE

91.010 IMPROVEMENTS

A. **Before approval by the Planning Director and the City Engineer of a final subdivision, partition plat, building permit, or construction plans (other than plans for required improvements), the developer shall:**

1. **Install required improvements and repair existing streets and other public facilities damaged in the development of the property; or**
2. **The developer shall also provide reimbursement to the City for costs of processing inspection, professional services, etc., of said required improvements by the City. Monthly costs of the City shall be billed against the six percent of construction cost deposit made by the developer to the City prior to construction of required improvements. The developer shall ensure that the deposit balance remains**

positive. If the developer is notified that the balance is negative, the developer has seven calendar days to correct the overage and provide additional deposit as specified by the City Engineer. Failure of the developer to correct the situation by that date will result in the issuance of a stop work order by the City which shall remain in force until said fees are paid in full and additional deposit provided.

Response: The applicant (developer) will install all required improvements, per the decision and associated conditions of approval.

B. The City shall install all street name signs and traffic control devices for the initial signing of a new development, with said costs to be reimbursed by the developer.

Response: It is not anticipated that either street signs or traffic control devices will be required as part of this proposal and application.

C. Upon written acceptance by the City of required improvements, the developer shall execute a maintenance bond with a surety company authorized to transact business in the State; such bond to be in a form approved by the City Attorney. The maintenance bond shall guarantee satisfactory performance required and installed improvements included in the subdivision or partition for a maximum period of 18 months from the date of written approval/acceptance by the City of said improvements. The amount of said maintenance bond shall be in an amount equivalent to 20 percent of the total installation cost of required improvements. The maintenance bond shall also provide financial guarantee for any damage caused to said improvement during the period of the maintenance bond.

Response: This proposal does not include a partition or subdivision, therefore, this Section is not applicable.

D. Until such time as all required improvements within the subdivision or partition have been accepted by the City, the developer shall be solely responsible for the cleanup of debris, dirt, and foreign materials derived from this development or project upon sidewalks and roadways. To guarantee performance of this responsibility, the developer shall provide a cash deposit in the amount of five percent of the total installation of the improvements. The developer shall be responsible for all safety and cleaning all debris, dirt, and foreign material derived from his or her development or project by 5:00 p.m. of each workday; except that if said debris, dirt, or foreign material is found by the City Engineer to constitute an immediate traffic or safety hazard, it shall be immediately removed by the developer. The developer shall furnish the City with information as to where the developer or a designated subordinate may be reached at all times by the City regarding the performance of such cleanup work. Failure of the developer to clean up debris, dirt, or foreign material as hereinabove stated shall give the City the right to clean up said debris, dirt, or foreign material utilizing City crews, or to hire an independent contractor to do the same, and deduct same costs from the five percent cash deposit. The City shall bill the developer for all such cleanup services at the rate of twice the actual City labor costs incurred plus 35 percent of such actual labor costs reflecting utilization of City equipment. In the event that the City hires a private contractor to perform these services, the City shall bill the developer the actual cost incurred by the private contractor plus 50 percent of said actual costs reflecting the administrative costs incurred. The deposit shall be kept in a positive balance within the same criteria as the deposit noted in subsection (A)(2) of this section with the same ramifications for failure.

Response: This proposal does not include a partition or subdivision, therefore, this Section is not applicable.

E. Before the City accepts any required improvements within a subdivision or major partition and releases the performance bond, the developer shall furnish to the City certification of a registered civil engineer that said improvements have been installed and meet all applicable City, State, and federal requirements.

Response: This proposal does not include a partition or subdivision, therefore, this Section is not applicable.

CHAPTER 96: STREET IMPROVEMENT CONSTRUCTION

96.010 CONSTRUCTION REQUIRED

A. New construction.

1. Building permits shall not be issued for the construction of any new building or structure, or for the remodeling of any existing building or structure, which results in an increase in size or includes a change in use, including building permits for single-family dwellings but excepting building permits for alteration or addition to an existing single-family dwelling, unless the applicant for said building permit agrees to construct street improvements as required by the land use decision authorizing the construction activity. The placement of new curbs and the drainage facilities required shall be determined by the City Manager or the Manager's designee.

Response: The applicant (developer) will install all required improvements, per the decision and associated conditions of approval.

3. An applicant for a building permit may apply for a waiver of street improvements and the option to make a payment in lieu of construction. The option is available if the City Manager or the Manager's designee determines the transportation system plan does not include the street improvement for which the waiver is requested.

Response: The applicant (developer) would appreciate the opportunity to meet with the City to discuss paying the fee in lieu of construction.

4. When an applicant applies for and is granted a waiver of street improvements under subsection (A)(3) of this section, the applicant shall pay an in-lieu fee equal to the estimated cost, accepted by the City Engineer, of the otherwise required street improvements. As a basis for this determination, the City Engineer shall consider the cost of similar improvements in recent development projects and may require up to three estimates from the applicant. The in-lieu fee shall be used for in kind or related improvements.

Response: The applicant (developer) would appreciate the opportunity to meet with the City to discuss paying the fee in lieu of construction.

96.020 STANDARDS

Street improvements shall be installed according to the City standards and shall be completed prior to the issuance of any occupancy permit for the new or remodeled structure or building. In unimproved areas of the City, the City Engineer may grant a time extension of the provisions of this section; provided, that the applicant provides sufficient security in amount and quantity satisfactory to the City Attorney to assure payment of such improvement costs.

Response: The applicant (developer) agrees to either put the street improvements in place or pay the fee in lieu of prior to the issuance of any occupancy permit.

III. CONCLUSION

Based upon the findings of this narrative and the submitted exhibits, the applicant has demonstrated compliance with relevant sections of the West Linn Code. Therefore, the applicant requests that this submitted application be approved.

Portland Tree Consultancy

Lou Phemister
ASCA Registered Consulting Arborist #590
(573) 999-3886 / louphemister@outlook.com

ARBORIST REPORT and TREE PROTECTION PLAN

Tree Survey and Tree Protection Plan conforming to the West Linn, Oregon Community Tree Ordinance (Chapter 8.500) and West Linn Tree Technical Manual

DATE: 9.4.18
PROPERTY ADDRESS: 19915 Old Lower River Road, West Linn, Oregon
CITY REFERENCE:
PROJECT DESCRIPTION: Marylhurst School
Construction of temporary and new building and infrastructure improvements

Introduction

This project involves the placement of a temporary building at the southwest corner of the site and construction of a new classroom building at the northwest corner of the property and associated infrastructure. Phase 1 of the project will involve placement of a temporary manufactured building, repaving and re-design of the parking areas, and the construction of a stormwater facility along the east property line. Phase 2 will involve the construction of a two story permanent building on the northwest corner of the property and stormwater facilities along the west property line.

Tree Survey

A survey of all trees on or over 6-inches DBH on or adjacent to the property was carried out on August 31st, 2018. The condition of the trees on the property was examined to ISA Level 2 standards using the standard arboricultural techniques of Visual Tree Assessment. The offsite trees adjacent to the property line were examined as closely as possible, and their size and condition estimated (these estimates are noted by an asterisk in the survey). The survey has produced management recommendations for the trees based both on the expected disturbance and construction impacts at the site, and on the future of the site as a place where children will be moving around under the trees. A detailed summary of the management recommendations is given in the survey table at the end of the report.

Summary of Actions on Surveyed Trees

Trees removed due to construction impacts (includes boundary trees along north property line)	17
Trees removed due to existing condition	4
Trees to be protected on the property	5
Trees to be protected off site	12

Tree Protection Discussion

Phase 1

Phase 1 of the project will involve the construction of a stormwater basin along the east property line, the repaving, regrading, and re-alignment of the parking area at the southeast section of the site, and the placement of a temporary classroom on paved surface at the southwest section.

The repaving of the parking area will result in the removal and replacement of curbing that is between 5 to 10 feet from seven fence line trees along the south boundary of the property; this work will be just within the required tree protection distance for some of the trees. However, the finished grade of the adjacent parking area will be slightly higher than the existing grade, so any root zone disturbance will be minimal. Extraction of the old concrete curbing should be completed carefully, and if done so, will not result in significant root severance (see items 8 and 9 of the Tree Protection Plan). Tree Protection Fencing will be placed as near to the curb-line as practicable.

Tree Protection Fencing will also be placed at the southwest corner to protect the high value offsite trees there. Fencing will also be placed as close as possible to the north edge of the site proposed for the stormwater basin along the east property line. This will give adequate protection to the mature ash and oak trees at the north end of the property.

Phase 2

Phase 2 of the project will involve the construction of a large building at the northwest corner of the site. A stormwater basin will be constructed along the west property line and a large trench will be dug along the north property line to accommodate stormwater lines.

Excavation for the trench to contain large diameter pipes will be the biggest tree issue Phase 2. The excavated area should be kept as close to the north property line as possible and the protection fencing as tight to the line of excavation as possible. Fortunately, Tree 29 is in good condition, but it is likely that it will lose at least 20% of its roots during this excavation (note items 8 thru 11 of the Tree Protection Plan). There is also a 4-inch sanitary sewer proposed to pass within around 5-ft of Tree 29. If this alignment cannot be altered the line should either be directionally drilled, or trenched using hand tools, within 15-ft of the base of the tree.

The southwest root zone area of Tree 22 will be affected by a change in grade resulting from the construction of a childrens playground. This may negatively affect around 10-15% of the tree's root zone, which is significant considering the other construction impacts and the maturity of this tree. Any proposed reduction of construction impacts will be significant in reducing stress.

It is important that the root zone of the grouping of oaks and ash trees (Trees 22,27,28,29) is protected from compaction as much as possible. In addition to the area required to be protected under code, the Tree Protection Fencing should be placed to protect the entire lawn area that is not necessary for access or construction.

Access to the site for construction of the building at the northwest section of the property should protect the surface grade. Although the access alignment is over the area to be excavated for stormwater lines the general area should still be protected from compaction by using steel plates supported by 18-inches to 24-inches depth of wood chip underlain by high strength geotextile fabric.

Tree Protection Plan

The following conditions will be part of the Tree Protection Plan and displayed on the construction plan sheets.

See also the Protection Notes for individual trees in the table below.

Site Management Standards

1. The Project Arborist will be an ISA Certified Arborist with proven experience of managing trees on construction sites. All pre-construction tree work (including tree removals) will be undertaken under the direct supervision of an ISA Certified Arborist.
2. The Project Arborist will be on site at all times when any of the following occur: actions that result in disturbance of the existing grade level; the placement of the materials for the Phase 2 access point to the construction area; to approve the initial placement of Tree Protection Fencing; before any movement or modification of a Tree Protection Fence location occurs during the project.
3. A site meeting must take place between a site supervisor representing the contractor and the Project Arborist to discuss the tree protection requirements. This must occur before any movement of materials or equipment onto the site and will occur before both Phase 1 and Phase 2 of the project.
4. All tree work detailed in this report will be completed before any construction work is initiated at the site.
5. The Project Arborist will provide a letter of verification to the City of West Linn showing that the pre-construction standards have been met for the site.
6. The Project Arborist will visit the site on a regular basis and will provide a monthly report and a project completion report to the City of West Linn providing a condition assessment of the protected trees and detailing any breaches of the Tree Protection Plan.
7. The project arborist may recommend and require tree care measures designed to ameliorate the health of protected trees due to unforeseen weather events or in the event that construction impacts are having a detrimental effect on the protected trees.

Ground Disturbance Standards

8. Any excavation or disturbance of the existing grade will be undertaken with the Project Arborist present at the site. The Project Arborist may require hand held equipment to be used when excavating adjacent to the Tree Protection Fencing.
9. Any existing paving or curbing to be removed shall be broken and lifted carefully out of the root protection zone area with the Project Arborist present to approve the machinery used and to examine any exposed roots.
10. Any roots 2-inches or more in diameter uncovered during construction and required to be removed must be first approved for removal by the Project Arborist.
11. Any severed or badly damaged roots of any size must be cut cleanly using hand-held tools (e.g. hand saw, reciprocating saw, circular saw or angle grinder)

Tree Protection Fencing Standards

12. The placement of all Tree Protection Fencing as shown on the plans must occur before any grading, construction, excavation or storage of materials or equipment takes place at the site.
13. Tree Protection Fencing will conform to the standard city requirements as detailed in the Tree Technical Manual See applicable detail for location and type on the plans. Fence poles will be secured firmly into the ground unless otherwise approved by the Project Arborist.
14. No ground disturbance, including vehicle access, or any storage of spoil or equipment will occur within the tree protection fence. The fence location will not be altered or breached without approval of the Project Arborist.
15. Erosion control devices will be placed at the Tree Protection Fencing if the base of the tree is at, or below, the new grade elevation. Any erosion control device installed must be able to prevent the ingress of any materials or fluids beyond the fence line.
16. Any damage to the Tree Protection Fencing must be reported immediately to the Project Arborist and remedied within 24 hrs.

ID	Tree Species	DBH	Condition	Tree work & Tree Notes	Site redesign/ Protection Notes	Action
1	Oregon White oak *Quercus garryana*	25	Fair/Poor	Significant basal defects & likely decay resulting from loss of twin stem	Existing planter area will be removed	Remove
2	Japanese flowering cherry *Prunus serrulata*	11	Fair	Heavily crown reduced	Proposed paved walkway within 1-ft of tree. Significantly modified planter area	Remove
3	Japanese flowering cherry *Prunus serrulata*	9	Fair	Heavily crown reduced	Existing planter area will be paved over	Remove
4	Japanese flowering cherry *Prunus serrulata*	8	Fair	Heavily crown reduced	Existing planter area will be paved over	Remove
5	Japanese flowering cherry Prunus serrulata	8	Fair/Poor	Heavily crown reduced	Existing planter area will be paved over	Remove
6	Austrian Pine *Pinus nigra*	11.5	Poor	Stem lean 20-deg. Poor crown form. Soil cracking around root plate		Remove (Condition)
7	Douglas Fir *Pseudotsuga menziezii*	36	Fair/Good*		OFFSITE TREE. Install tree protection fencing meeting or exceeding minimum distance requirements	Protect
8	Norway spruce *Picea abies*	9*	Fair/Poor*		OFFSITE TREE. Tree will not be influenced by site work	Protect
9	Blue elderberry *Sambucus nigra*	6	Dying	Heavy dieback on multi-stem tree.	No protection required	Remove (Condition)
10	Big leaf maple *Acer macrophyllum*	14	Fair	Fence line volunteer	OFFSITE TREE Install tree protection fencing meeting or exceeding minimum distance requirements	Protect
11	Red alder *Alnus rubra*	15	Dying/ Dangerous	Heavy dieback in crown. Large branches will fail		Remove (Condition)
12	Red alder *Alnus rubra*	19	Dying	Partial failure. Loss of upper crown. Heavy decay in bole		Remove (Condition)
13	Big leaf maple *Acer macrophyllum*	10	Fair/Good	Fence line volunteer. Crown raise over parking area	OFFSITE TREE Install tree protection fencing within 1-ft of existing park place curbing	Protect

ID	Tree Species	DBH	Condition	Tree work & Tree Notes	Site redesign/ Protection Notes	Action
14	Big leaf maple *Acer macrophyllum*	14	Fair	Fence line volunteer. Twin stems. Crown raise over parking area	OFFSITE TREE Install tree protection fencing within 1-ft of existing park place curbing	Protect
15	Big leaf maple *Acer macrophyllum*	9	Fair	Fence line volunteer. Crown raise over parking area	OFFSITE TREE Install tree protection fencing within 1-ft of existing park place curbing	Protect
16	Big leaf maple *Acer macrophyllum*	14	Fair	Fence line volunteer. Crown raise over parking area	OFFSITE TREE Install tree protection fencing within 1-ft of existing park place curbing	Protect
17	Big leaf maple *Acer macrophyllum*	12	Fair	Fence line volunteer. Crown raise over parking area	OFFSITE TREE Install tree protection fencing within 1-ft of existing park place curbing	Protect
18	Big leaf maple *Acer macrophyllum*	22	Fair	Three fused stems	OFFSITE TREE. Tree will not be influenced by site work	Protect
19	Douglas fir Pseudotsuga menziesii	20	Fair		OFFSITE TREE. Tree will not be influenced by site work	Protect
20	Big leaf maple *Acer macrophyllum*	13	Fair		OFFSITE TREE. Build out adjacent will be expanded slightly Install tree protection fencing adjacent to park place curbing	Protect
21	Big leaf maple *Acer macrophyllum*	12	Fair/Poor	Stem defect	OFFSITE TREE. Build out adjacent will be expanded slightly Install tree protection fencing within adjacent to park curbing	Protect
22	Oregon White oak *Quercus garryana*	42	Fair	Crown raise to 8-ft from grade; Remove deadwood 2" diam.or greater; 20% crown reduction on S side of tree to reduce stress load	Install tree protection fencing meeting minimum distance standards and exceed wherever possible	Protect
23	Oregon White oak *Quercus garryana*	24	Fair	Codominant crown. Ash anthracnose	Site of Phase 1 stormwater basin	Remove
24	Oregon ash *Fraxinus latifolia*	18	Fair	Ash anthracnose	Site of Phase 1 stormwater basin	Remove
25	Oregon ash *Fraxinus latifolia*	18	Fair	Codominant crown. Ash anthracnose	Site of Phase 1 stormwater basin	Remove
26	Oregon ash *Fraxinus latifolia*	20.5	Fair/Poor	4-ftx5" lower stem wound with internal decay. Remove if exposed by loss of trees 22 or 27	Install tree protection fencing meeting minimum distance standards and exceeding wherever possible	Protect

ID	Tree Species	DBH	Condition	Tree work & Tree Notes	Site redesign/ Protection Notes	Action
27	Oregon ash *Fraxinus latifolia*	20	Fair	Codominant crown. Ash anthracnose	Install tree protection fencing meeting minimum distance standards and exceeding wherever possible	Protect
28	Oregon ash *Fraxinus latifolia*	16	Fair	Partially suppressed. Crown raise to 10-ft over work areas	Install tree protection fencing meeting minimum distance standards and exceeding wherever possible	Protect
29	Oregon White oak *Quercus garryana*	32	Good/Fair	Crown raise to 10-ft over work areas	Install tree protection fencing meeting minimum distance standards and exceeding wherever possible. Excavate by hand within 10-ft of the base of this tree	Protect
30	Douglas fir *Pseudotsuga menziesii*	15*	Fair/Good*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
31	Douglas fir *Pseudotsuga menziesii*	13*	Fair*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
32	Douglas fir *Pseudotsuga menziesii*	20*	Fair/Good*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
33	Douglas fir *Pseudotsuga menziesii*	7*	Fair*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
34	Douglas fir *Pseudotsuga menziesii*	18*	Fair/Poor*		OFFSITE TREE. Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
35	Douglas fir *Pseudotsuga menziesii*	22*	Fair/Good*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
36	Douglas fir *Pseudotsuga menziesii*	20*	Fair/Good*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
37	Douglas fir *Pseudotsuga menziesii*	18*	Fair*		Boundary tree. Phase 2 building foundations within 10-ft. Utility trenching within 5-ft.	Remove with both owners approval
38	Western red cedar *Thuja plicata*	18	Fair/Good*		OFFSITE TREE Phase 2 building foundations within 15-ft. Utility trenching within 10-ft.	Remove with both owners approval

Technical Memorandum

LANCASTER
ENGINEERING

321 SW 4th Ave., Suite 400
Portland, OR 97204
phone: 503.248.0313
fax: 503.248.9251
lancasterengineering.com

To: City of West Linn

From: Jessica Hijar

Date: September 7, 2018

Subject: Marylhurst School Parking Variance Memorandum

This document is written to supplement the Marylhurst School's Variance for a Reduction in Required Parking. The Marylhurst School is a private school (K-8) that is proposed at 19915 Old River Drive in West Linn, Oregon. The City of West Linn has required a new designated drop-off and pick-up area within the project site that will result in the elimination of 12 parking stalls. Based on the revised site plan shown in Figure 1, the site will provide a total of 37 parking spaces. A summary of the required parking stalls for the site is shown in Figure 2 on page 2.

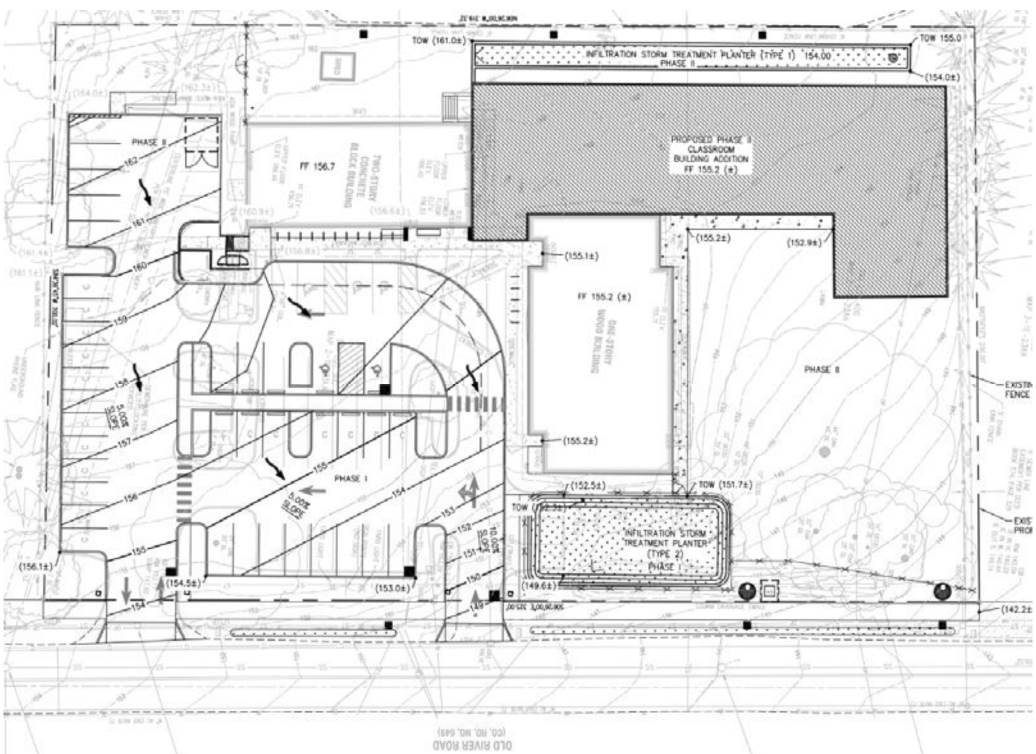


Figure 1 - Site Plan

BUILDING	PROPOSED USE	AREA	PARKING REQ.	NO. STALLS REQUIRED
EXISTING CHURCH ANNEX BUILDING	MIDDLE SCHOOL CLASSROOM	4,000 SF	1 SPACE PER 1,000 SF	4
EXISTING MAIN CHURCH BUILDING	MULTI-USE COMMONS AREA	4,500 SF	1 SPACE PER 1,000 SF	5
25% PROPOSED NEW ADDITION	KINDERGARTEN & PRE-K	3,300 SF	1 SPACE PER 300 SF	11
75% PROPOSED NEW ADDITION	PRIMARY SCHOOL	13,000 SF	1 SPACE PER 1,000 SF	13
STAFF	15 (AN ANY ONE TIME)			15
TOTAL PARKING STALLS REQUIRED				48
TOTAL PARKING STALLS PROPOSED				37

Figure 2 - Required Parking Stalls

Queuing Analysis

Queues were examined for the site access under Year 2021 Background plus Phase Two scenarios. The queue lengths were calculated using a Synchro/SimTraffic simulation, with the reported values based on the 95th percentile queue lengths. This means that during the peak hour, 95 percent of the time the queue lengths will be less than or equal to the reported values.

Table 1 - Queuing Analysis Summary

Intersection	Movement	AM Queue Length	AFTN Queue Length	PM Queue Length
Old Rive Road at Southern Site Access	EBLR	53 feet	45 feet	43 feet
Old River Road at Northern Site Access	NBLT	15 feet	14 feet	14 feet

The longest queue length occurs for the eastbound approach, and therefore the queuing will occur within the site, and not interfere with traffic circulation on Old River Road. The northern site access has a northbound 95th percentile queue length of approximately one vehicle during all analysis scenarios.

It is typical for school facilities to experience the afternoon peak period (pick-up) during a peak of about 15 minutes. However, the Marylhurst School has several different academic programs which begin and end at varying times throughout the day. Due to the unique schedule at Marylhurst School, it is expected that these peaks will occur at staggered times throughout the day. Therefore, it is not expected that queue lengths will exceed the area provided on-site or degrade the traffic flow on Old River Drive. Detailed queuing analysis worksheets are provided in the appendix.

Safety

The reduction in parking stalls will increase the curb area of the drop-off and pick-up area. This will increase the efficiency of the drop-off/pick-up process, allowing more students to enter/exit the vehicles at one time, while also reducing the amount of on-foot circulation that will occur within the parking lot and possible conflicts between vehicles and crossing students.

Conclusions

The proposed revision to the site plan is expected to enhance the functionality and safety of the on-site circulation of the school. Due to the physical characteristics of the site, there is not available area to relocate the stalls within the site. Additionally, the variance is required as a result of a city requirement, and therefore falls under Approval Criteria 75.020.B.1.c for Class II Variances.

Appendix

Intersection: 1: Willamette Drive & Cedar Oak Drive

Movement	WB	WB	SE	SE	NW
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	153	74	92	118	720
Average Queue (ft)	70	17	32	44	612
95th Queue (ft)	131	50	73	95	870
Link Distance (ft)		390		541	666
Upstream Blk Time (%)					32
Queuing Penalty (veh)					0
Storage Bay Dist (ft)	170		110		
Storage Blk Time (%)	0		0	0	
Queuing Penalty (veh)	0		1	0	

Intersection: 2: Old River Road & Cedar Oak Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	37	4	60	70
Average Queue (ft)	3	0	21	34
95th Queue (ft)	19	3	50	55
Link Distance (ft)	390	573	293	213
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Old River Road & Southern Site Access

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	61	5
Average Queue (ft)	33	0
95th Queue (ft)	53	4
Link Distance (ft)	161	213
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Old River Road & Northern Site Access

Movement	NB
Directions Served	LT
Maximum Queue (ft)	24
Average Queue (ft)	2
95th Queue (ft)	15
Link Distance (ft)	185
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 1

Intersection: 1: Willamette Drive & Cedar Oak Drive

Movement	WB	WB	SE	SE	NW
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	123	160	154	541	453
Average Queue (ft)	78	29	30	227	191
95th Queue (ft)	131	106	94	480	367
Link Distance (ft)		390		541	666
Upstream Blk Time (%)				3	0
Queuing Penalty (veh)				0	0
Storage Bay Dist (ft)	100		150		
Storage Blk Time (%)	9	0		9	
Queuing Penalty (veh)	5	0		3	

Intersection: 2: Old River Road & Cedar Oak Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	37	4	40	46
Average Queue (ft)	4	0	15	30
95th Queue (ft)	21	3	40	44
Link Distance (ft)	390	573	293	213
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Old River Road & Southern Site Access

Movement	EB
Directions Served	LR
Maximum Queue (ft)	52
Average Queue (ft)	28
95th Queue (ft)	45
Link Distance (ft)	189
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Old River Road & Northern Site Access

Movement	NB
Directions Served	LT
Maximum Queue (ft)	16
Average Queue (ft)	2
95th Queue (ft)	14
Link Distance (ft)	156
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 8

Intersection: 1: Willamette Drive & Cedar Oak Drive

Movement	WB	WB	SE	SE	NW
Directions Served	L	R	L	T	TR
Maximum Queue (ft)	118	17	113	480	314
Average Queue (ft)	63	2	29	203	133
95th Queue (ft)	110	10	85	399	249
Link Distance (ft)		390		541	666
Upstream Blk Time (%)				1	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	100		150		
Storage Blk Time (%)	3			8	
Queuing Penalty (veh)	1			3	

Intersection: 2: Old River Road & Cedar Oak Drive

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	22	42	50
Average Queue (ft)	1	15	27
95th Queue (ft)	10	41	46
Link Distance (ft)	390	293	203
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Old River Road & Southern Site Access

Movement	EB
Directions Served	LR
Maximum Queue (ft)	55
Average Queue (ft)	16
95th Queue (ft)	43
Link Distance (ft)	244
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Old River Road & Nothern Site Access

Movement	NB
Directions Served	LT
Maximum Queue (ft)	31
Average Queue (ft)	2
95th Queue (ft)	14
Link Distance (ft)	103
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 4

The Marylhurst School

			Monday		Tuesday		Wednesday		Thursday		Friday	
# of Students	Grades		Drop Off	Pickup	Drop Off	Pickup	Drop Off	Pickup	Drop Off	Pickup	Drop Off	Pickup
15	Middle School	Drive Through	8:30	3:15	8:30	3:15	8:30	3:15	8:30	3:15	8:30	3:15
72	Primary	Drive Through	8:30	2:30	8:30	2:30	8:30	2:30	8:30	2:30	8:30	2:30
18	Threes/Fours	Park & Drop	9:00	1:00	9:00	1:00	9:00	1:00	9:00	1:00	No Class	
Full-Time	Faculty	10										

*Incentives for teachers who take public transportation

**Some families carpool

***On average 20 Extended care children stay later; get picked up between 2:30 - 5:00

***On average 10 Extended care children arrive early; get dropped off between 7:30 - 8:00

<u>Variables:</u>

- Our teachers currently park in a park and ride across the street from our current location. There is a park and ride on Cedar Oak where teachers could potentially park.
- 36 of our families have multiple children that go to this school so they would arrive in the same car.
- There are 11 students who have parents who teach at our school. They would be included in the faculty parking rather than parent drop off.

	Morning:	8:00-8:30	8:30-9:00	9:00-9:30	9:30-10:00	10:00-10:30	10:30-11:00	11:00-11:30	11:30-12:00
Staff: 14	Monday								
Staff: 14	Tuesday								
Staff: 14	Wednesday								
Staff: 14	Thursday								
Staff: 14	Friday								

	Afternoon:	12:00-12:30	12:30-1:00	1:00-1:30	1:30-2:00	2:00-2:30	2:30-3:00	3:00-3:30	3:30-4:00
Staff: 14	Monday								
Staff: 14	Tuesday								
Staff: 14	Wednesday								
Staff: 14	Thursday								
Staff: 14	Friday								

Staff Only
10 - 15 cars parked
15 - 20 Cars parked

Special School Events:

- Parent Association meetings; once a month alternating am meeting and pm meeting
- Back to School Night; one for Primary & one for Preschool both in September
- Work Party; twice a year on a Saturday one October & one April
- Info night; once a year November
- Winter Performance; once a year December
- Preschool Celebration; once a year December
- Open House; once a year January
- Preschool Picnic; once a year June
- Parent Education Night; possibly twice a year month varies