Troutdale Reynolds Industrial Park

Phase II Public Improvements

Prepared for:

Port of Portland
P.O. Box 3529
Portland, Oregon 97208-3529

Prepared by:

CA^{3}D Consultants
100 Kearny Hall
Corvallis, OR 97330
Group 10

March 2010

EXECUTIVE SUMMARY

Introduction

The Port of Portland is currently looking for consultants to develop designs for the Troutdale Reynolds Industrial Park (TRIP). CA^{3}D Consultants provides experience from many engineering disciplines and would meet the client's expectations. Our proposal includes the extension of Swigert Way to Graham Road, construction of office/manufacturing building space, mitigation of existing wetlands, and considerations for contaminated soils and groundwater. Design will consider sustainability and preserving the natural atmosphere of the site. Completion of the project will take into account future growth and potential land development within the area.

Figure 1. Aerial view of project site.

Land Development

Two new parcels will be created from subdividing the eastern portion of Lot 6. Lot 6a will be 4.4 acres and be bounded by Swigert Road to the north and east and the high pressure gas line to the south. Lot 6b will be 6.5 acres and be bounded by the high pressure gas line on the north side, Graham road on the south, and Swigert Road to the east.

The current drainage plan for Phase II improvement areas was evaluated. A plan was developed to make use of current conveyance infrastructure as well as make additions where necessary. Future developments include the extension of the Swigert Way system east to the high pressure gas line easement boundary, stormwater accommodations for the proposed manufacturing building, and a grassy swale system as part of the Graham Road improvements.

The impact of future Phase II development on stormwater runoff volumes entering Salmon Creek Ditch was evaluated. Review of previous literature proposed that improvements to Salmon Creek Ditch made during Phase I development would be capable of passing a 100-year storm event under full build out conditions for the entire TRIP area. The previous study will be reevaluated and confirmed for Phase II development. In anticipation of the Phase II build out including the development of Lots 4, 5, 6, 6a and 6b the suggested sanitary sewer design for Area 2 and Area 3 by David Evans and Associates (DEA) will be implemented. Area 1 sanitary sewer design will serve Lots 1, 8, 9 but will not be installed until those lots are developed.

Soil constraints were defined for each lot contained in the Phase II improvement area. The decision was made to cap the South Wetlands area and restrict future development in the contaminated area. Lot 6 was chosen as the site for a manufacturing building with an attached office building. Auger Pressure Grout Displacement (APGD) piles were chosen to support a slab-on-grade foundation. APGD piles displace soil laterally throughout drilling which produces a negligible amount of spoils. Additionally, grout is injected through the auger stem at high pressure which will prevent vertical migration of contaminated groundwater.

The largest wetland in the Phase II development area is the South Wetland, approximately 16 acres. This wetland will be filled and capped in anticipation of future development. Compensatory mitigation replacement wetlands will be created at 1.5:1 ratio per Oregon Division of State Lands requirements. Approximately twenty acres of replacement wetlands will be created in the open space west of Lots 8 and 9 off of Sundial road. An additional four acres of replacement wetlands will be created immediately north and south of wetland K which will also act as a visual buffer between Lots 5 and 6.

Transportation

In order to support the TRIP Phase 1 and 2 developments, the surrounding transportation network requires a number of improvements. A traffic impact analysis was performed to determine future traffic demands along Swigert Way, Sundial Rd., and Graham Rd. due to the TRIP developments. To improve access to the TRIP sites, Swigert Way will be extended along its current alignment and connect to Graham Rd. with a stop-controlled intersection. The extension will maintain the same typical section as the existing road and will include water quality swales. Sidewalk will be installed along both sides of Swigert Way to accommodate the development on Lots 4, 5, 6, and 7. The design along Swigert Way will conform to all City of Troutdale standards and specifications.

Graham Rd. as it is currently constructed will not be sufficient to support the forecasted volumes generated by the TRIP development. The improvements to be made to Graham Rd. include widening the 22-ft section to meet City of Troutdale Industrial road cross-section standards along with any necessary realignment to accommodate the widening. A landscape buffer and sidewalk will be added along the entire north side of Graham Rd. to provide connectivity and pedestrian access to the TRIP sites. A transit route is being proposed along Graham Rd and looping around the airport via Sundial Rd. and Marine Dr. A bus stop would be inserted on Graham Rd. to accommodate the industrial and manufacturing development occurring in Lot 6.

The intersection of Graham Rd. and Sundial Rd. is a critical point in the transportation network surrounding the TRIP sites. Forecasted traffic volumes were utilized to analyze the intersection to determine the possible need for a traffic signal. A traffic signal warrant analysis and a Synchro analysis was performed on the intersection using the forecasted volumes. From the analysis, it was determined that a traffic signal is both warranted and necessary at the Graham/Sundial intersection to support the forecasted PM peak hour volumes that will be generated by the TRIP sites.

Site Development

To ensure that the project is more environmentally sustainable, a number of options were looked into including permeable concrete, porous asphalt, recycled concrete aggregate, extensive vs. intensive green roofing, stormwater runoff collection, and blackwater systems. After analyzing costs and benefits it was determined that all the above options would be incorporated, with the exclusion of blackwater systems and intensive green roofing. While both were viable options, it would be too expensive to incorporate a blackwater system into a non-densely populated location and extensive green roofing proved to be the better choice for an office building.

A 100,000 square foot manufacturing building and 20,000 square foot office space has been developed for the west side of Lot 6. The buildings will be designed to obtain a LEED Silver Rating and provide docking facilities. The parking area required to meet the peak amount of employees was calculated to be approximately 1.5 acres.

Additional wetlands and natural rehabilitation efforts will occur that expands the wetland currently located on the eastern side of Lot 5. Natural vegetation will be planted to preserve and enhance the natural environment and provide preservation to the natural habitat. Improvements are to be made to the dirt path currently located along the top of the levee. Improvements include enhancing the existing trail to create a multi-use path and extending the path to tie into the Graham Road sidewalk addition to provide public access.

Williams Gas owns a high pressure natural gas line that runs directly through the land development area encompassed by Phase II. The current location could potentially impede future land development and hinder construction activities within the fifty foot easement. An analysis was made to determine if moving the gas line to a more suitable location was feasible. Determined by a cost basis analysis, the results concluded that keeping the gas line at its current location would provide the lowest long term cost to the owner.

Prior to any construction activities, the owner and client must obtain multiple permits at various agencies. To construct a roadway over the existing pipeline, an encroachment allowance/permit must be provided by Williams Gas. Additionally, permits must be acquired from the City of Troutdale to verify that construction activities will comply with municipal standards. For wetland mitigation and stormwater/pollutant control, permits must be obtained from the Corps of Engineers, Department of State Lands, and Multnomah County. Due to the agency review and extended review period for public comment, permits will extend the schedule up to four months.

Schedule and Costs

The design schedule was determined to be approximately six months, including review periods by the owner at 30, 60, and 90 percent completion of the plans. Time elapsed for acquiring permits and LEED certification is taken into account during the schedule and a period of 15 days is accounted for in case the permitting process is extended.

A preliminary cost estimate was prepared for the TRIP Phase 2 project. The estimate accounted for both engineering and construction services. The estimate was broken down into the following categories: transportation, structures, building foundation, drainage infrastructure, sanitary sewer, wetland mitigation, and engineering services. The final cost estimate for the project was $21.7 million, which includes a 10% contingency to account for additional items that were not considered in the preliminary cost estimate.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

1.1 PROJECT IDENTIFICATION AND LOCATION

1.1.1 Project Identification

In 2006 the Port of Portland purchased a 700 acre site in the Troutdale Reynolds Industrial Park (TRIP) for development. The Port of Portland has asked that both an industrial warehouse and an office building be constructed within Lot 6 of the purchased land.

In order to accommodate transportation needs for the new buildings, new roads must be built, existing roads must be changed to meet design codes, and both a parking lot and a loading zone must be created.

The site is contaminated with industrial waste from the Reynolds Metals aluminum plant and has been under remediation since 2000.

Approximately one quarter of the site is occupied by wetlands. Some of the wetlands will be modified. The EPA and the Oregon Division of State Lands have set ratios between 1:1 and 3:1 for wetland mitigation.

The Port has requested that the tasks listed in section 3.1 be addressed in this proposal.

1.1.2 Project Location

The TRIP site is bordered by the Columbia and Sandy Rivers and nearby to many landmarks such as Interstate 84, the Portland International Airport, the Troutdale Airport, and the Union Pacific rail line (Figure 1.4.1). By being in such close proximity to so many means of transportation the site is very well situated to serve future industrial and transportation needs of the area.

1.2 TEAM IDENTIFICATION AND ORGANIZATION

CA^{3}D's project team consists of five members, each bringing their own unique skill sets to the group. Along with each member's different specialty, the group was formed to mix different personality styles in hopes to maximize performance. The team members and their specialties are as follows:

Project Manager

Name: Chuck Williams
Specialty: General

Members

Name: Anthony Davies
Specialty: Structures

Name: Daniel Iliyn
Specialty: Transportation

Name: Adam Jourdonnais
Specialty: Geotech

Name: Andrew Kelley
Specialty: Structures

1.3 PROPOSED ACTION

A number of things will be required to complete the project at hand. In the early design phase, several of the plans will be drawn up to address project aspects ranging from site drainage to wetland mitigation.

Each item of the project will be handled by its respective specialist. Any non specialized item will be handled by group members with a lesser work load or multiple group members together to ensure no one person is carrying the project.

Lot 6 will be broken into three separate parcels labeled Lot 6, Lot 6a, and Lot 6b, which will be 15.2 acres, 4.4 acres, and 6.5 acres respectively. Lot 6a will be bounded by Swigert Road to the north and east and the high pressure gas line to the south, while lot 6b will be bounded by the high pressure gas line, Graham road on the south, and Swigert Road to the east. Both a 20,000 square foot office building and a 100,000 square foot industrial warehouse will be built within Lot 6.

In order to save time and simplify the process, the contaminated soil will be capped in order to be built on. The furthest south wetland, totaling 16 acres, will be filled and capped in anticipation of future development. To offset the capped wetlands, approximately 24 acres will be created elsewhere.

Swigert Way will be extended in order to connect to Gram Road with a stop-controlled intersection. Additionally, Graham Road will need to be improved in order to support forecasted volumes that will be generated by the TRIP development. After analyzing the Graham/Sundial intersection it was determined that a traffic signal is warranted to support forecasted peak hour volumes that will be generated by the TRIP sites.

1.4 CLIENT INFORMATION

This project has been proposed by the Port of Portland, a 120 year old public agency. The Port of Portland was originally chartered as the Commission of Public Docks with the purpose of preserving the navigation channel of the Columbia and Willamette rivers in 1891. The Port of Portland owns and operates many facilities around the Portland Metro area including PDX, marine terminals, and industrial land for development. Currently the Port of Portland works on a range of projects, from airport deicing systems to the Reynolds Industrial Site.

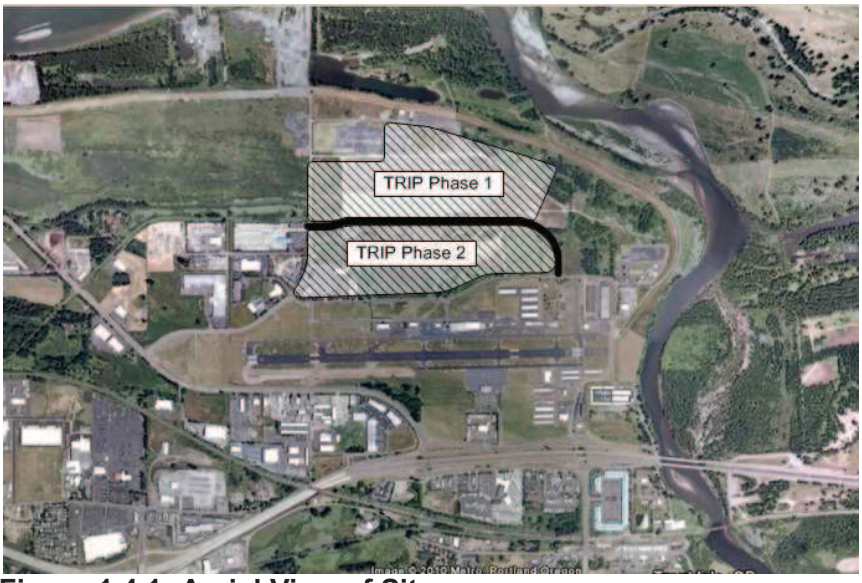


Figure 1.4.1: Aerial View of Site

2.0 PURPOSE AND NEED

2.1 PURPOSE

The TRIP site was recently purchased by the Port of Portland. The purpose of this project is to develop the TRIP site into a subdivision of lots readily available for development.

2.2 NEED

With Portland's constant urban growth, a decreasing amount of land is available for industrial use. This shortage of land requires that sites of marginal environmental quality be improved and remediated to the point where they can be used for industrial development. By improving the TRIP site, much needed industrial land will be available for development in a highly advantageous location. Additionally high local and national unemployment rates create a need for new job opportunities. It is projected that the TRIP site will be able to provide 10 to 15 jobs per acre of land, providing much needed employment opportunities.[1]

2.3 GOALS AND OBJECTIVES

The goal of this project is to develop an industrial Superfund site for both office and light industrial use. This will be achieved by preparing the site and building one 20,000 square foot office building and one 100,000 square foot light industrial warehouse. It is also the objective of this project to make sure both buildings will achieve a LEED silver certification and be as environmentally sustainable as possible. Other site developments will include an extension for Swigert Way and improvements to Graham Road in order to handle projected traffic volumes increases produced by improvements to the TRIP site.

3.0 GENERAL ANALYSIS

3.1 PROJECT REQUIREMENTS

The Port of Portland requires that the following project tasks are completed:

- Extension of Swigert Way to Graham Road.
- Evaluation of Graham/Sundial Road intersection.
- Evaluation of sustainable alternatives.
- Development of a manufacturing building and office space.
- Evaluation of a natural gas pipeline.
- Subdivision Plot.
- Survey, drainage, sanitary sewer, contaminated soils, wetlands mitigation, permitting, and natural space plans.
- Project design schedule and budget.

3.2 STANDARDS

The standards and regulations abided by in this document are listed below.

Federal:

- Manual on Uniform Traffic Control Devices (MUTCD)
- Federal Highway Administration (FHWA)
- Environmental Protection Agency, Section 404 Clean Water Act
- Army Corps of Engineers

State:

- Oregon Division of State Lands
- Oregon Structural Specialty Code
- Oregon Department of Environmental Quality

Local:

- City of Troutdale Development Code
- Sandy Drainage Improvement Company
- Multnomah County

Other:

- Leadership in Energy and Environmental Design

3.3 ASSUMPTIONS

Throughout the course of the proposal, various assumptions had to be made due to lack of data and information. Extensive research was done to ensure that all the assumptions were reasonable and worked within the scope of the project. All the assumptions were stated throughout the analysis section.

4.0 DETAILED ANALYSIS AND INDIVIDUAL DELIVERABLES

4.1 SUBDIVISION PLAN

Lot 6 in the Phase II development area will be subdivided into three separate parcels. The south boundary of Lot 6 consists of Graham road for the western portion and the centerline of the high pressure gas line easement extending northeast for the eastern side. The centerline of the high pressure gas line easement remains the common southern/northern boundaries for Lots 6A and 6B respectively. Swigert Way ROW is the northern and eastern boundary for Lot 6A and the eastern for Lot 6B.

Wetland K and the created wetlands on Lots 5 and 6 will remain as part of their respective parcels and not become a separate lot designated as open space.

See Appendix C for the Phase II Subdivision Plan.

4.2 SURVEY PLOT

Currently there are 18 days of surveying planned. The Swigert Way ROW, curbs, sidewalks and driveway accesses will be surveyed and staked first followed by Graham Road improvement surveys and staking. This will be succeeded by surveying the gas line easement and subdividing Lot 6 into three separate parcels, Lots 6, 6A and 6B. The Lot 6 building development survey needs can then proceed. The compensatory mitigation wetlands planned for Lots 5, 6 and west Sundial road will be addressed last. See Appendix B for schedule of the survey order and estimated time.

4.3 DRAINAGE PLAN

4.3.1 Drainage Routes and Basins

The Phase II improvement area includes five drainage basins and receives runoff from a sixth and seventh. The delineation of these basins is shown outlined in red in Figure 4.3-1**.** Basins D-1W, D-2W, D-2E, and D-3 have respective areas of 4.3, 8.8, 11.6, and 7.5 acres. Each of these basins generally drains north towards Swigert Way. Basin D-E and Basin GSA are 37.4 acres and 2.5 acres respectively and are not included in the Phase II improvement area. However, runoff from both basins drains in a southwestward manner towards the future intersection of the Swigert Way extension and Graham Road. Draining these two basins in this manner prevents conflicts between subsurface stormwater infrastructure and the existing high pressure gas line. Basin D-S is the largest drainage area in the Phase II area at 49.4 acres. Generally, it drains southwest to Graham Road. Runoff collected by both Swigert Way and

Graham Road is then conveyed westward to the Salmon Creek Ditch. Salmon Creek Ditch runs north parallel to Sundial Road and crosses under Swigert Way. Salmon Creek Ditch then exits the Phase II area when it diverts to the southwest and crosses under Sundial Road.[2]

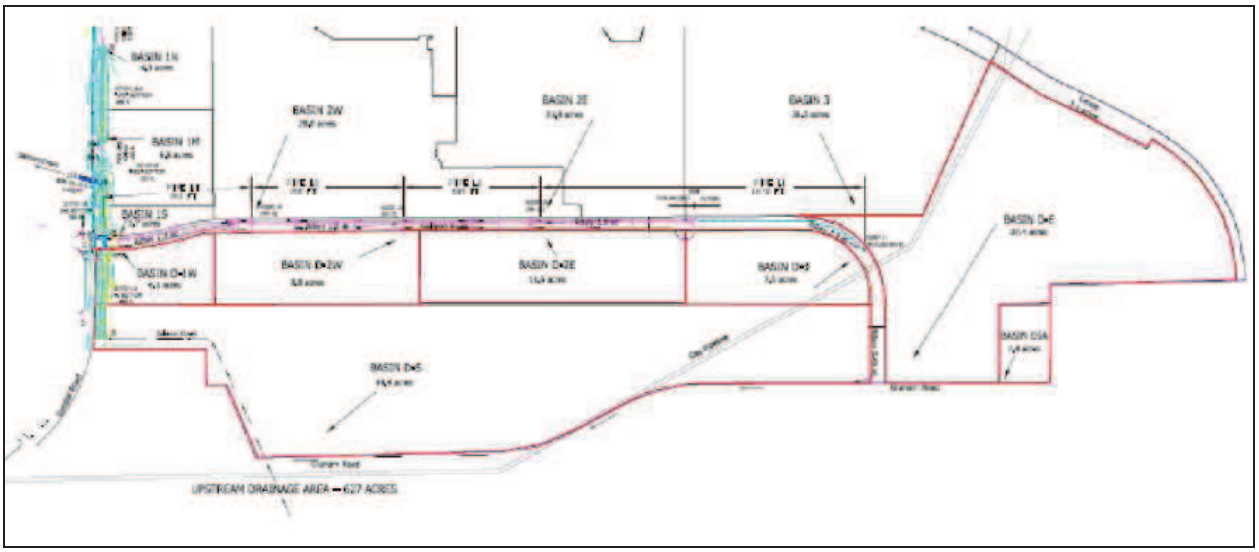


Figure 4.3.1: Delineation of Stormwater Basins

4.3.2 Impervious Areas

Current impervious areas in the Phase II improvement area include Sundial, Swigert, and Graham Roads and their appurtenances. Future impervious areas include a 100,000 square foot manufacturing building with a 20,000 square foot attached office building and up to 8.12 acres of parking area constructed of pervious or semipervious asphalt concrete or cement. Additionally, the extension of Swigert Way as well as improvements to Graham Road will add a small amount of impervious area. The structures and parking surface are split between Basins D-2E, D-3, and D-S. In order to retain the integrity of each basin, developed areas will be sloped to maintain existing drainage routes. The impact of the additional runoff load from impervious areas on existing and proposed stormwater infrastructure will be evaluated.

4.3.3 Existing Conveyance Infrastructure

Stormwater runoff from the seven defined drainage basins, including impervious area, will be collected and treated by a system of grassy swales running parallel to Swigert Way and Graham Road. A limited amount of runoff will likely enter the Salmon Creek Ditch directly. Swales along Swigert Way contain a system of catch basins that collect stormwater. Catch basins are connected to manholes that direct stormwater through 12-inch pipes to a main line running under Swigert Way. The main line running under Swigert Way consists of 66-inch to 48-inch concrete pipe and discharges to Salmon Creek Ditch through a 66-inch outlet in the east wingwall of a box culvert near the intersection of Sundial Road and Swigert Way. Little information is given on the existing stormwater conveyance infrastructure for Graham Road. It appears that a ditch or swale conveys stormwater westward into Salmon Creek Ditch.

Additionally, catch basins can be seen in site photos of Graham Road indicating that a stormwater mainline is present. This issue will be addressed in the design phase for Graham Road. Salmon Creek Ditch conveys stormwater north and off of the TRIP area after receiving outfall from the Swigert Way and Graham Road systems. A box culvert passes Salmon Creek Ditch under Swigert Way. Salmon Creek Ditch then exits the TRIP area after passing under Sundial Road through a second box culvert. A full evaluation of Salmon Creek Ditch conveyance infrastructure can be found in Section 4.4 of this report.[2]

4.3.4 Future Stormwater Infrastructure Development

The following are additions to be made to the existing stormwater system during Phase II developments. Grassy swales, catch basins, manholes, collector lines, and the stormwater mainline will be extended with Swigert Way eastward to the high pressure gas line easement boundary. Curb cuts in the parking surface proposed for Lot 6 will allow runoff from the building roof and the parking surface itself to discharge and be treated in the grassy swale system along Swigert Way. Finally, a grassy swale or ditch will be part of the Graham Road improvements to convey runoff westward into Salmon Creek Ditch.

4.4 SALMON CREEK RUNOFF EVALUATION

4.4.1 Overview

Salmon Creek Ditch enters the Phase II improvement area running northwest and crossing under Graham Road. It then turns west towards Sundial Road making another turn to the north and running parallel to Sundial Road. Salmon Creek Ditch passes under Swigert Way through a box culvert and exits the TRIP improvement area running northwest after passing under Sundial Road through another box culvert.

4.4.2 Phase I Improvements

In order to accommodate a greater volume of runoff, Salmon Creek Ditch underwent a series of improvements during Phase I improvement. The north running section south of Swigert Way was reconfigured into the “benched” cross section shown in Figure 4.4.1, and includes maintenance access roads on either side. North of Swigert Way prior to the Sundial Road Crossing the ditch was reconfigured to a “vee” cross section shown in Figure 4.4.2, and also includes maintenance access roads. Two concrete box culverts were constructed to pass Salmon Creek Ditch under Swigert Way and Sundial Road. Box culvert dimensions are eight feet by seven feet for the Swigert Way crossing, and twelve feet by seven feet for the Sundial Road crossing.[2]

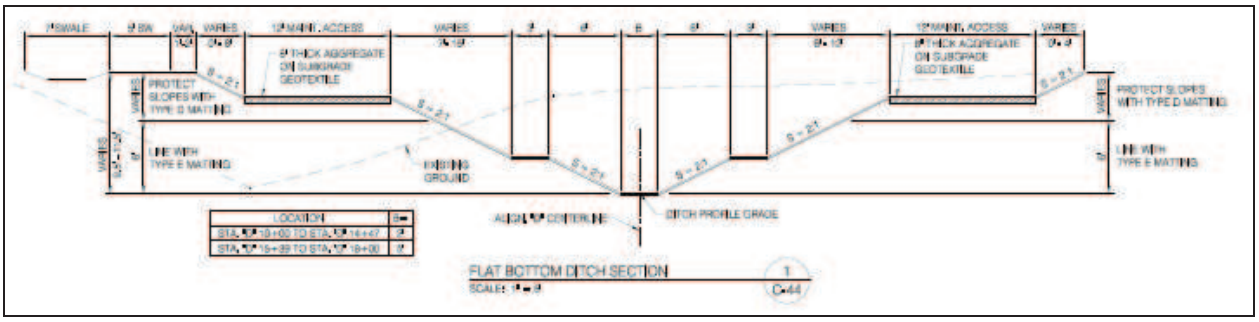


Figure 4.4.1: "Benched" Cross Section of Salmon Creek Ditch

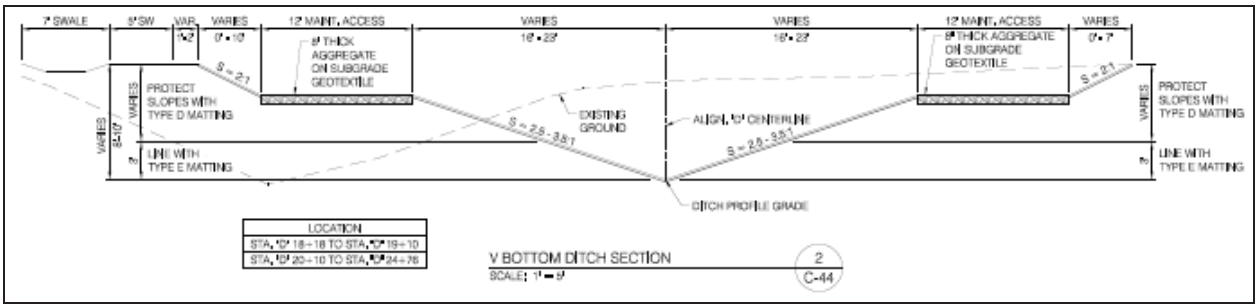


Figure 4.4.2: "Vee" Cross Section of Salmon Creek Ditch

4.4.3 Runoff Evaluation

Based on previous reports, the current configuration of Salmon Creek Ditch is capable of passing a 100-year storm event under full basin build out conditions.[2] To confirm the results in the referenced literature, the impact of proposed Phase II development on stormwater runoff entering Salmon Creek Ditch will be reevaluated.

4.5 SANITARY SEWER INFRASTRUCTURE ANALYSIS

In anticipation of the Phase II build out including the development of Lots 4, 5, 6, 6a and 6b shown in (Figure 4.5.1) the suggested sanitary sewer design for Area 2 serving the south half of Lots 4 and 5 (Figure 4.5.2) and Area 3 for Lots 6B, 7, 10 (Figure 4.5.3) by David Evans & Associates (DEA) will be implemented with minor modifications. While Lots 7 and 10 are not in the Phase II development area, the gravity system for these lots should be installed during the Phase II extension of Swigert Way.

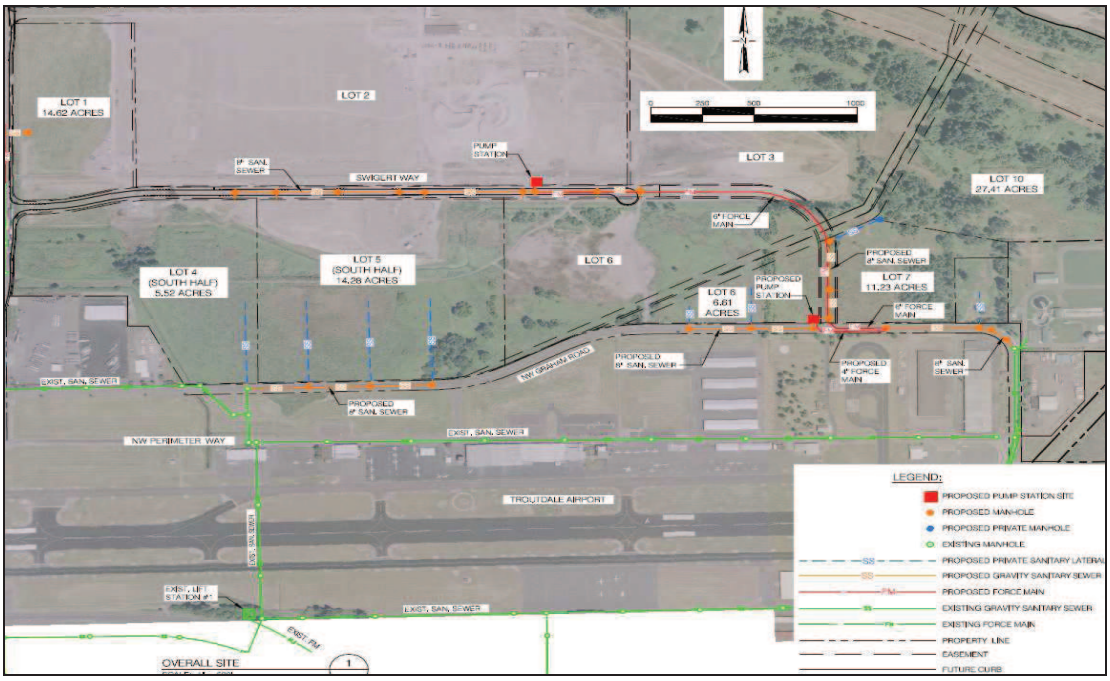


Figure 4.5.1: Proposed Sanitary Sewer Development

Phase I of the TRIP development saw the installation of an 8" gravity sanitary sewer main, pump station and force main to serve Lots 2, 3 and the north half of Lots 4, 5, 6, 6B. Our design creates an additional parcel at the east end of Phase II development, which is named Lot 6A. Lot 6A requires 375 feet of additional 8 inch sewer main and one manhole to be installed (Figure 4.5.3) at an estimated cost of $66,000. DEA calculations for the northern portion of Phase II development are still valid since the total acreage serviced has not changed, but has just been redistributed (Table 4.5.1).

Table 4.5.1: Phase I Swigert Estimated Wastewater Flow (Modified from DEA, 2008)

Lot	Type	Acres	Assumed 50% Coverage	Peak Flow 5,000 (gpad)	Infilitration 1,000 (gpad)	Total Estimated Flow (gpd)	Total Estimated Flow (gpm)
2	Industrial	77.90	38.95	194,750	38,950	233,700	162.3
3	Industrial	36.40	18.20	91,000	18,200	109,200	75.8
4	Industrial	16.44	8.22	41,100	8,220	49,320	34.3
5	Industrial	16.66	8.33	41,650	8,330	49,980	34.7
6	Industrial	15.20	7.60	38,000	7,600	45,600	31.67
6A	Industrial	4.40	2.20	11,000	2,200	13,200	9.17
	TOTALS	**167.00**	**83.50**	**417,500**	**83,500**	**501,000**	**347.9**

Table 4.5.2: Area 2 Estimated Wastewater Flow[3]

Lot	Type	Acres	Assumed 50% Coverage	Peak Flow 5,000 (gpad)	Infiltration 1,000 (gpad)	Total Estimated Flow (gpd)	Total Estimated Flow (gpm)
4	Industrial	5.52	2.76	13,800	2,760	16,560	11.5
5	Industrial	14.28	7.14	35,700	7,140	42,840	29.8
	TOTALS	**19.80**	**9.90**	**49,500**	**9,900**	**59,400**	**41.3**

Table 4.5.3: Area 3 Estimated Wastewater Flow[3]

Lot	Type	Acres	Assumed 50% Coverage	Peak Flow 5,000 (gpad)	Infiltration 1,000 (gpad)	Total Estimated Flow (gpd)	Total Estimated Flow (gpm)
6B	Industrial	6.50	3.25	16,250	3,250	19,500	13.5
7	Industrial	11.23	5.62	28,075	5,615	33,690	23.4
10	Industrial	27.41	13.71	68,525	13,705	82,230	57.1
	TOTALS	**45.14**	**22.58**	**112,850**	**22,570**	**135,420**	**94.0**

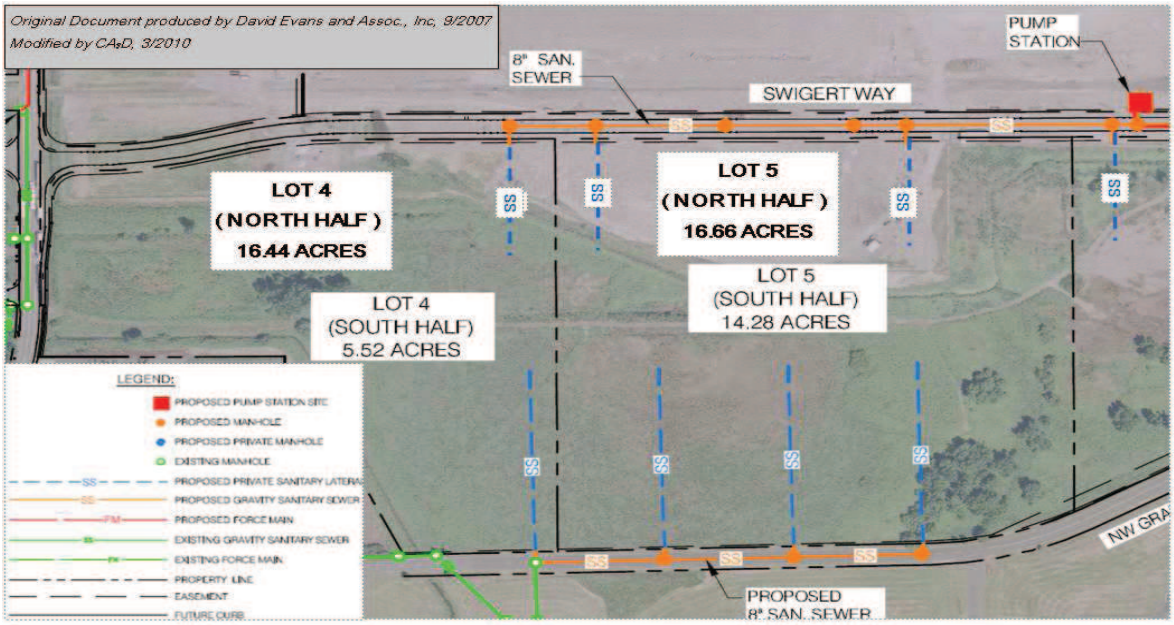


Figure 4.5.2: Lots 4 and 5 of the Phase II Sanitary Sewer Development

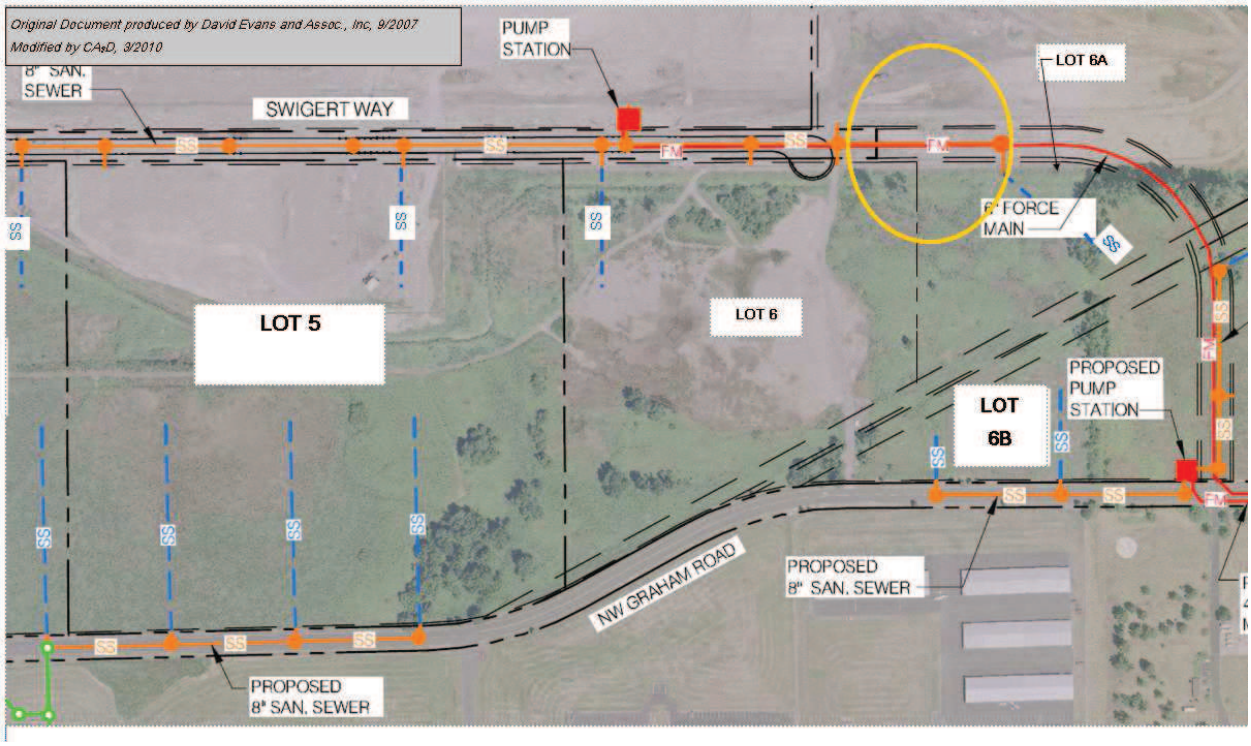


Figure 4.5.3: Proposed Sanitary Sewer East. (375 ft extension of 8" gravity sewer along Swigert Way and manhole to service Lot 6A)

4.6 CONTAMINATED SOIL CONSTRAINTS DEFINITION

4.6.1 General Soil Handling Considerations

All soil handling for the Phase II improvement area is governed by the Contaminated Media Management Plan (CMMP). The CMMP states that soil may be handled and reused on the facility in accordance with the restrictions imposed. The restrictions state that:[4]

- Soil shall not be placed or stockpiled outside the defined limits of construction as defined in Port construction specifications.
- Soil shall not be placed within 50 feet of site drainages or wetlands.
- Soil or any subsurface material may not be taken off-site for any reason without prior approval from the Port.
- Unanticipated contamination must be characterized through analytical testing by the Port to determine proper handling.

4.6.2 Unanticipated Contamination

Unanticipated contamination is defined by the CMMP as material that appears to be contaminated that is encountered in areas of the site where it was not anticipated.[5] The Property

Development Environmental Management Plan (PDEMP) provides detailed guidance for visual identification of potentially contaminated materials. If unanticipated contamination is encounteredc work should stop immediately and the area should be isolated, Port Environmental and Port Security should be notified, and an "Unanticipated Contaminated Material Form" should be completed and submitted to Port Environmental within 24 hours. Port Environmental will then evaluate the material to determine handling and disposal guidelines. A blank form can be found in Appendix D of the PDEMP.[4]

4.6.3 Lot 4

Lot 4 is 21.88 acres and is the westernmost lot in the Phase II improvement area. It is bordered by Swigert Way to the north, Graham Road to the south, Sundial Road to the west, and Lot 5 to the east. Lot 4 contains a portion of the South Wetlands, which have an area of approximately 16 acres, and have special soil handling considerations. These considerations are listed in Section 7.5 of the PDEMP.[4] Areas in Lot 4 outside of the South Wetlands are governed by the general soil handling considerations listed in section 4.6.1. The South Wetlands area will be stripped and grubbed free of vegetation. Grubbed and stripped material will be stockpiled and vegetation will be allowed to decompose at a finish grade no higher than 18 feet NGVD. Contaminated soil remaining after vegetation decomposition will then be regraded over the stripped area. A 1-foot layer of clean backfill or other backfill material from within the Phase II area or brought in from offsite will then be placed over the South Wetlands area. The capped area will then be covered with a layer of topsoil and seeded with native vegetation to provide an aesthetic look consistent with natural surroundings. The Oregon Department of Environmental Quality (DEQ) requires that they be notified of the source of backfill material prior to the backfilling of the South Wetlands. DEQ will then confirm that the backfill meets the requirements of the Record of Decision and CMMP.[4] Occupational use of the South Wetlands area is prohibited before the sand cap is in place. The cap must remain in place for occupational use to continue.[4] Future development in Lot 4 will be restricted to the western portion of the lot outside of the present delineation of the South Wetlands. Capped South Wetlands area can be used as open space or a possible parking surface area for future development. Utility cuts can be made north to Swigert Way to link up with existing utilities.

4.6.4 Lot 5

Lot 5 is 30.93 acres and is bordered by Lot 4 and Lot 6 to the west and east respectively, Swigert Way is to the north, and Graham Road borders to the south. Lot 5 contains a portion of the 13.96 acre South Wetlands. The South Wetlands contained in Lot 5 will be capped using the procedure described for Lot 4 in 4.6.3. Areas in Lot 5 outside of the South Wetlands are governed by the general soil handling considerations listed in section 4.6.1. Similar to Lot 4, future development in Lot 5 will be restricted to the northern and eastern portions of the lot outside of the present South Wetlands delineation, and the capped South Wetlands area can be used as open space or possible parking surface area. As with Lot 4, utility cuts can be performed north to Swigert Way.

4.6.5 Lot 6

Lot 6 is 15.20 acres and is bordered by Lot 5 to the west, Swigert Way to the north, Lot 6A to the east, Lot 6B to the southeast, and Graham Road to the south. Lot 6 contains no special soil handling or use restrictions. Soil handling and use is governed by the general soil handling considerations listed in section 4.6.1. Lot 6 does contain a portion of the high pressure gas line easement. No excavation or development will be permitted within the boundary of this easement. Lot 6 is also the site selected for a 100,000 square foot manufacturing building with an attached 20,000 square foot office building. Auger Pressure Grouted Displacement (APGD) piles have been chosen to support a slab-on-grade building foundation. APGD piles displace soil laterally during drilling therefore producing a negligible amount of spoils. Grout is injected through the hollow auger stem at a pressure higher than earth and hydrostatic pressures present in the shaft wall. Injecting grout at high pressure will prevent caving or bulging of the soil adjacent to the grout column while preventing vertical groundwater migration and transmission of contaminants.[6] Furthermore, use of a slab-on-grade foundation will require a minimal amount of excavation and soil handling, and limits opportunities to discover "unanticipated contamination." Since Lot 6 is subject only to general soil handling restrictions, excavations for utilities will only require that the excavated soil is used as backfill material.

4.6.6 Lot 6A and Lot 6B

Lot 6A and Lot 6B were newly delineated for Phase II improvement. Lot 6A is 4.4 acres and is located in the northeast corner of the Phase II improvement area. Lot 6B is 6.5 acres and is located in the southeast corner of the Phase II improvement area. Soil handling and use in both lots is subject to the general soil handling considerations outlined in section 4.6.1. Future development is permitted throughout the area of both lots with the exception of the high pressure gas line easement.

4.7 WETLANDS MITIGATION PLAN

4.7.1 Current Conditions

The Phase II development area currently contains 19.43 acres of palustrine emergent and scrub-shrub wetlands. The majority of these wetlands are located in the southern portion of Lots 4 and 5 known as the South Wetlands. The South Wetlands are in poor condition presently dominated by reed canary grass and an estimated 48, 000 cubic yards of industrial process residue composed of fluoride, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons PAHs, heavy metals (copper, mercury, vanadium) and cyanide[5] (Figure 4.7.1).

The northern portions of the Phase II area is bisected historic storm water ditch lines which are probably considered non-jurisdictional wetlands.[7]

Figure 4.7.1: South Wetland Looking Northeast From Graham Road

4.7.2 Proposed Actions

Due to the contamination, degraded condition and desire to maximize the industrially useable space in Phase II the South Wetland (~16 acres) will be filled and capped. The culvert connecting the north and south portions of the wetland will be removed and the railroad road bed will be graded to match the desired final profile.

Compensatory mitigation replacement wetlands will be created at 1.5:1 ratio per Oregon Division of State Lands requirements.[8] Approximately 20 acres of replacement wetlands, out of 24 acres, will be created in the open space west of Lots 8 and 9 off of Sundial road (Figure 4.7.2).

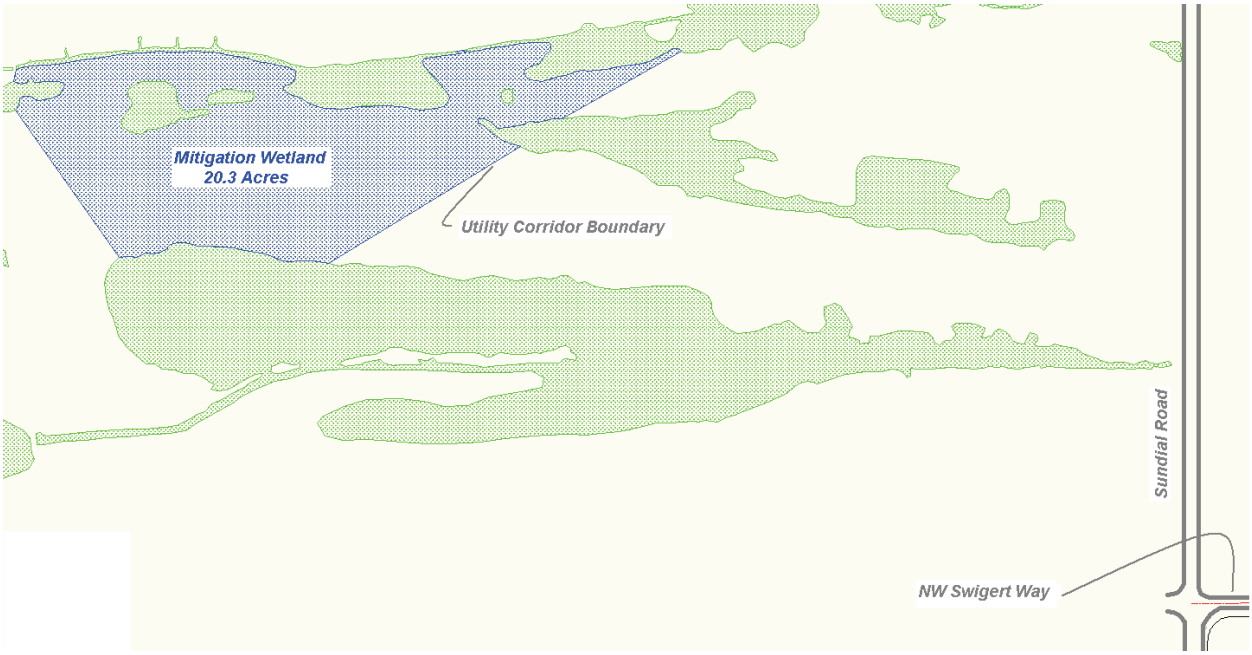


Figure 4.7.2: Wetland Mitigation West of Sundial Road

An additional four acres of replacement wetlands will be created immediately north and south of Wetland K which will act as a visual buffer between Lots 5 and 6 and hold excess storm water (Figure 4.7.3). All wetlands require a minimum fifty foot buffer from future activities as required by the City of Troutdale.

The storm water ditch lines in the Phase II area will also be filled and graded. Future storm water will drain to a new bioswale created along Graham road and eventually join Salmon Creek.

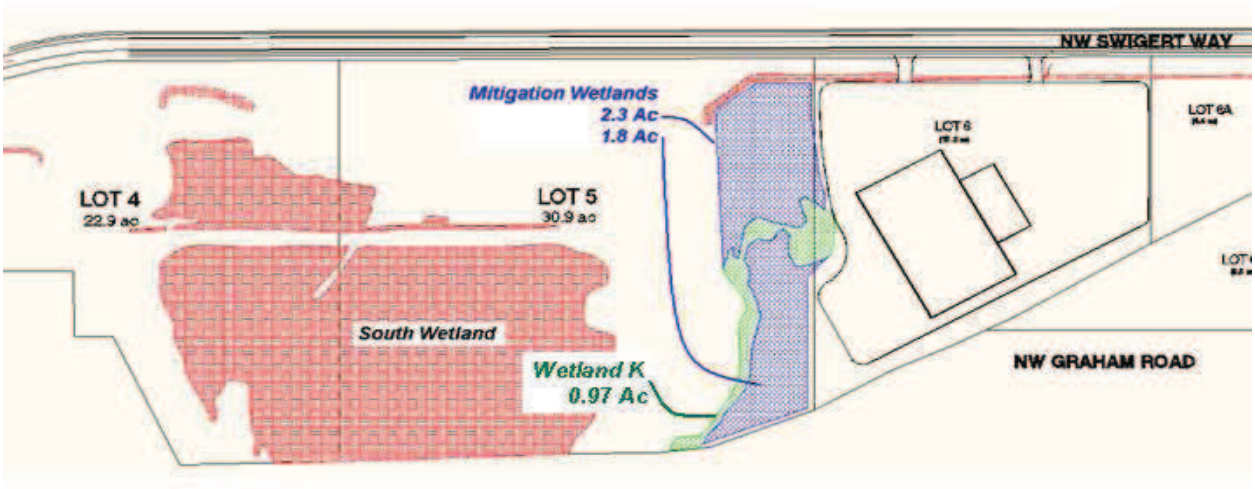


Figure 4.7.3: Wetland Mitigation in Lot 5

4.8A TRAFFIC IMPACT ANALYSIS

4.8A.1 Future Traffic Demands

This section will show the detailed approach used to forecast the future traffic demands to be generated along Sundial Rd, Graham Rd, and Swigert Way due to the current buildout of TRIP Phase 1 and the anticipated development of Phase 2. Included in the traffic analysis will be forecasted future volumes, trip generations, and trip distributions. The analysis will take into account traffic generated from existing conditions, traffic generated by TRIP Phase 1, and projected traffic for TRIP Phase 2.

A number of performance measures will be used to determine the quality and effectiveness of the existing and forecasted traffic systems. Although traffic volumes and flows are useful for analyzing and understanding the general behavior of traffic within the system, volumes alone are not capable of indicating a network's quality of service or ability to support additional traffic demands. In addition, rather than analyzing the overall network within the project area, the primary focus will be on the traffic performance at various intersections. For this reason, additional performance measures will be used to analyze several critical intersections within the project boundary. The PM peak hour was selected as the primary period of analysis for the TRIP Phase 1 Traffic Impact Analysis, and will also be used for this analysis since it provides the most critical volumes.[9]

The two most common performance measures used are level of service (LOS) and volume to capacity ratio (V/C). For the purposes of this analysis, the LOS performance measure will be used in order to conform to measures used by Multnomah County and the City of Troutdale. A LOS D or better during the peak hour of traffic is required at all intersections by Multnomah County and the City of Troutdale.[9]

4.8A.2 Trip Generation

In order to obtain the forecasted traffic volumes for the TRIP Phase 2 project, it is necessary to first analyze the trip generation produced by the development. The project region was divided up according to land use in order to effectively determine values for vehicle trips generated. FedEx provided vehicle trip rates based on monitoring of FedEx facility of similar size to the one put in during TRIP Phase 1. The FedEX Report from the DKS TRIP Phase 1 TIA Report is available in Appendix B. The Institute of Transportation Engineers (ITE) Trip Generation Informational Report, which can be seen in Appendix B, was used to forecast the trips generated by the remaining developments of TRIP Phase 1 and 2.[10] The desired land usage was determined and appropriate trip rates were applied along with acreage or building area to obtain the forecasted PM peak hour trips generated by each site. The following assumptions were made to obtain the project trip generation rates shown below in table 4.8A.1 and the existing traffic trip generation rates shown in table 4.8A.2:

- The 100,000 SF building to be constructed on lot 6 will be used for manufacturing.

- The 20,000 SF office building to be constructed on Lot 6 will be General Office Space.
- The remaining acres on Lots 4, 5, and 6 will be developed for heavy industrial use. The City of Troutdale Zoning District specifies the TRIP Phase 2 land as General Industrial **,** which is defined by the City of Troutdale in Section 3.170 of the Development Codes.[11]
- The equation (DHV = ADT * k * D) was used to estimate the existing peak hour traffic volumes along Graham Rd. and Sundial Rd. The ADT values were obtained from page 6 of the DKS TRIP Phase 1 Transportation Impact Analysis Report.[9]
- The value of k, the peak hour percentage of total daily hourly volume, was assumed to be 0.2, which is at the lower end of the range 0.2-0.3. This value was chosen due to the varied volume distribution and inconsistent peak hours present as a result of the FedEx, manufacturing, and industrial sites within the project region.
- The value for D was assumed to be 0.6, which is at the lower end of the normal range of 0.6-0.7.

Table 4.8A.1: TRIP Phase 1 & 2 PM Peak Hour Trip Generation

Land Use	Acres	Building Area (1000sf)	Trip Rate (trips/1000sf)	Trip Rate (trips/acre)	Total Trips Generated
FedEx Distribution	76	-	-	-	423
Manufacturing-Phase 1	51	666	0.73	-	486
Manufacturing-Phase 2	5	100	0.73	-	73
Class B Office Space	1	20	1.49	-	30
Heavy Industrial	76	-	-	2.16	164

Table 4.8A.2: Existing traffic PM Peak Hour Trip Generation

Road	ADT	k	D	Total Trips Generated
Sundial Rd.	1800	0.2	0.6	216
Graham Rd.	1700	0.2	0.6	204

4.8A.3 Trip Distribution

The traffic volumes to be generated by TRIP Phases 1 and 2 will primarily be distributed along Sundial Rd. and Graham Rd. via Swigert Way or I-84. In order to analyze the critical intersections within the project area, it is vital to determine how the trips are distributed throughout the network. The trip distribution analysis includes trips leaving and arriving at the project site. Data provided on the Trip Distrubution Map from DKS TRIP 1 TIA, which is available in Appendix B, was used to determine the trip distribution of the existing traffic. Additionally, the following assumptions were used along with data from the TRIP 1 TIA to distribute the forecasted project PM peak hour volumes:

- 90% of the traffic generated by FedEx during the PM peak hour will be arriving at the site during the PM peak hour. According to the Project PM Peak Hour Trip Assignment Figure (Appendix B) from the DKS TIA report, 188 vehicles are currently turning right

onto Sundial Rd. from Graham Rd. It is assumed that the majority of these vehicles are FedEx since they are arriving at the site, and all of this traffic will now access the site via the Swigert/Graham intersection. The remaining FedEx traffic arriving at the site will use Sundial Rd. The 10% of the FedEx traffic departing the site will pass south through the Graham and Sundial intersection.

- According to the page 13 of the DKS TIA report**,** approximately 65% of the traffic generated from Phase 1 manufacturing will leave the site during the PM peak hour and 35% will be arriving.[9] Two-thirds of the arriving traffic will access the site via Sundial Rd and Swigert Way and the remaining via the Swigert/Graham intersection. The traffic leaving the site will have a 2:1 split between Sundial Rd. and Graham Rd. These assumptions were made taking into account the internal and external project trip distribution generated in the DKS TIA report for TRIP Phase 1. (Appendix B)
- From looking at the DKS report Trip Distribution Map (Appendix B)**,** it will be assumed that a 2:1 split of traffic arriving/departing from the east versus the west.[9]
- It will be assumed that the traffic generated by TRIP Phase 2 during the PM peak hour will have a 2:1 split between leaving versus arriving traffic due to the peak hour variability of manufacturing and industrial land and from analyzing the arrival/departure split of the current manufacturing land.
- All of the traffic generated from lots 4 and 5 will use Sundial Rd. as their access point due to their proximity to Sundial.
- Traffic generated from the office space and the Phase 2 manufacturing building will all depart via the Graham/Swigert intersection, with 65% heading west and 35% heading east. This is due to the proximity of the site access to the Graham/Swigert intersection.
- 65% of the existing traffic will pass through the Graham and Sundial intersection. The traffic will be distributed as shown in the Existing & Project PM Peak Hour Traffic Volumes figure in Appendix B, which was generated based on the values obtained from Figure 5 in the DKS TIA Report**.**[9] The remaining traffic will occur elsewhere along Graham and Sundial Rd but will not affect the critical intersections with the project area.

The traffic volume trip generations and trip distributions were obtained using the data provided in the DKS TIA Report for TRIP Phase 1 along with the stated assumptions above, and these volumes will be used to analyze the roads and intersections within the project area. In order to more precisely forecast the traffic generated due to the TRIP Phase 2 development, additional traffic counts and data of the existing traffic flows of the roads surrounding the project area would be required.

4.8B PRELIMINARY LAYOUT OF SWIGERT WAY EXTENSION

4.8B.1 Introduction

Swigert Way was constructed during TRIP Phase 1 in order to provide access to the TRIP 1 developments, which include a FedEX building and additional manufacturing buildings. Swigert Way currently runs parallel to Graham Rd. and can only be accessed from the west via NE

Sundial Rd. In order to accommodate the TRIP Phase 2 development, the existing alignment of Swigert Rd. must be extended to connect to Graham Rd. This extension is required to minimize the traffic impacts to Sundial Rd. and Graham Rd. by providing an additional access point to accommodate increased traffic volumes generated by the TRIP Phase 2 development. The location of Swigert Way and the proposed extension are shown in Figure 4.8.1 below.

Figure 4.8B.1: Swigert Way Site Map

4.8B.2 Existing Conditions

Swigert Way is the primary access road for the developments of TRIP Phase 1, which include the FedEx site and additional manufacturing buildings on Lot 3. The road was constructed within the past couple years and was built to the City of Troutdale commercial/industrial street cross section construction standards.[12] The typical section is 36 ft. from face of curb to face of curb with a minimum cross slope of 2.5%. The north side of the road has a 9-ft. wide landscaping strip that separates the back of curb from a 7-ft. wide concrete sidewalk. Water quality swales were constructed along the north and south sides of Swigert Way every couple hundred feet along with curb cuts to allow stormwater to drain into the swales. Since the street was just recently constructed, it is still in excellent condition. Figure 4.8B.2 shows the existing conditions of Swigert Way.

Figure 4.8B.2: Existing Swigert Way Conditions

4.8B.3 Preliminary Layout

The extension of Swigert Way will essentially follow the existing alignment. It will include approximately 570 ft. of tangent roadway directly east, a horizontal curve with approximate radius and length of 371 ft. and 584 ft. respectively, and 460 ft. of tangent roadway leading into the intersection with Graham Rd. The approximate alignment and location of the extension can be seen in Figure 4.8B.1 above, and the preliminary layout of the horizontal alignment is available in Appendix C. The alignment of the Swigert Way extension was chosen for several reasons. For one, it provided an approximately perpendicular crossing of Swigert Way over the existing gas lines. It also lined up the Swigert/Graham intersection with an airport access road along the south side of Graham Rd. And Finally, the location of the intersection also provided sufficient distance from the horizontal curve to the east along Graham Road, which could have potentially presented sight distance problems.

The Swigert Way extension will maintain the same typical cross section as the existing road. The typical cross-section of Swigert Way will conform to the City of Troutdale construction standard for a commercial/industrial street cross section.[12] The typical road section will be 36 ft. wide from face of curb to face of curb with a minimum 2.5% cross slope. The depths of asphalt and aggregate base will be as shown on the preliminary typical cross-section of Swigert Way provided in Appendix C. Along the north side of Swigert Way, the existing 9-ft. landscape strip and 7-ft. concrete sidewalk will be extended along the entire length of the road extension. Additional water quality swales will be constructed along both sides of the road approximately every 200 ft. or at obvious low points in the Swigert Way vertical alignment. Curb cuts matching the existing swale curb cuts will be placed along the swales to allow rainwater to transfer from the gutter into the water quality swales. These swales will be designed to similar standards and specifications as the existing swales.

In order to support the increase in pedestrian traffic along Swigert Way due to the TRIP Phase 2 developments, a 7-ft. wide sidewalk will be installed along the south side of Swigert Way for its entire length. According to Section 7.200 of the City of Troutdale Development Codes, sidewalk is required along the frontage of all new developments.[11] The sidewalk will be offset 9 ft from the back of curb to match the north side, and it will run from the Swigert/Sundial intersection to the Swigert/Graham intersection. The sidewalk will be designed and constructed to the City of Troutdale construction standards and specifications.[12] Additional ROW easements may need to be acquired for the sidewalk along the south side of Swigert Way.

The existing street lights located along Swigert Way will be continued through the extension with spacing of 100 ft. To accommodate for the construction of sidewalk along the south side of Siwgert Way, additional street lights will be installed in the landscaping strip with pole spacing of 100 ft and staggered with the lights along the north side of Swigert Way, as required in Section 7.200.E of the City of Troutdale Development Code.[11] All street lights will be designed and installed according to the City of Troutdale construction standards.[12] All plants and trees to be planted in the landscaping strip shall match the existing Swigert Way landscaping.

All existing utilities under Swigert Way, which include sanitary sewer, natural gas, electric power, and telecommunications, shall be extended underground along the Swigert Way extension to serve Lots 6, 6A, and 6B. All underground utilities shall conform to Section 7.180.C of the City of Troutdale Development Code.[11]

Two driveway accesses for lot 6 will be installed on the Swigert Way extension at approximately Sta 27+45.00 and Sta. 30+85.00. The driveways will provide access to both the manufacturing building and the office space to be developed in lot 6. The locations of the driveways are shown on the preliminary layout map in Appendix C.

4.8B.4 Swigert Way/Graham Rd. Intersection

The 3-way intersection of Swigert Way and Graham Rd. will be stop-controlled at the Swigert Way approach. Due to the fairly low projected PM peak hour volumes at the intersection, a separate left-turn lane will not be required at the Swigert Way approach. A crosswalk will be designed to provide connectivity of the proposed sidewalks to be constructed along the north side of Graham Rd. ADA accessible ramps will provided at both entrances to the crosswalk.

Combining the existing traffic volumes, the Phase 1 traffic yields, and the forecasted traffic for Phase 2 yields the total projected future traffic. The distribution of the total projected traffic at the intersections of Graham/Swigert is shown on the Existing & Project PM Peak Hour Traffic Volumes figure in Appendix B, and in Table 4.8B.1 below. For additional data on the trip distribution at the intersections, see Traffic Distribution Calculations in Appendix A.

Table 4.8B.1: Swigert Way & Graham Rd. Intersection Trip Distribution

	Total	Right Turn	Left Turn	Through
Graham EB	60	-	0	60
Graham WB	359	267	-	92
Swigert SB	182	119	63	-

4.9 GRAHAM ROAD IMPROVEMENTS

4.9.1 Introduction

Graham Rd. is a collector road that provides direct access to the TRIP project area via the westbound I-84 off-ramp. The road is under the jurisdiction of the City of Troutdale. Graham Rd. is a significant access road for the TRIP area, and it will become more significant with the extension of Swigert Way. It is critical that Graham Rd. is capable of carrying the traffic volumes and types of vehicles that will be generated by the TRIP Phase 1 and 2 development. Figure 4.9.1 shows the location of Graham Rd. along with the TRIP sites.

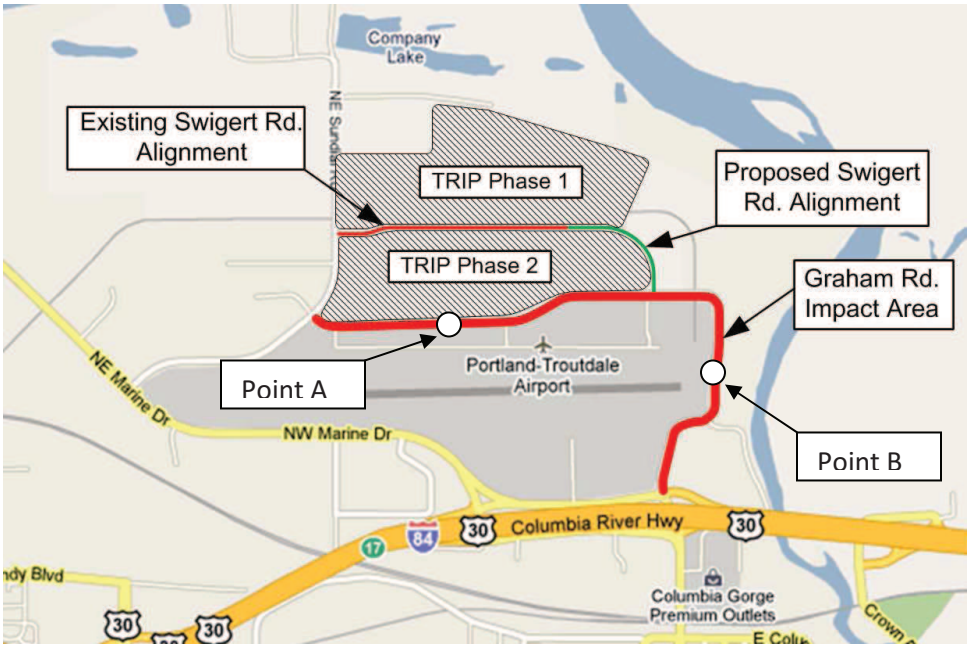


Figure 4.9.1: Map of Graham Rd.

4.9.2 Existing Conditions

Graham Rd. is a collector road that currently carries low traffic volumes due to poor design and minimal connectivity to the TRIP sites. The road is a two-way asphalt road with a striped centerline. There is no sidewalk except for approximately 800 ft along the east side of Graham Rd. beginning immediately north of the I-84 off-ramp. The width of Graham Rd. varies along the length of the road. The south end of Graham Rd. starts out at a 22 ft wide section from fog line

to fog line with no curb and minimal shoulder. Figure 4.9.2 below displays the 22 ft. wide section of Graham Rd., which is located at point B on Figure 4.9.1 above. This section continues until the road widens approximately 900 ft. prior to the 90-degree horizontal curve to the west. This new section of Graham Rd. was constructed with curbs along both sides, no fog lines, and a width of 34 ft. from face of curb to face of curb. Figure 4.9.3 below displays the 34 ft. wide section of Graham Rd., which is located at point A on Figure 4.9.1. The 34-ft. wide section continues until Graham Rd. intersects Sundial Rd. The asphalt along the length of Graham Rd. is in fair condition with multiple locations where alligator cracking has occurred.

Figure 4.9.2: Graham Section @ Pt. B

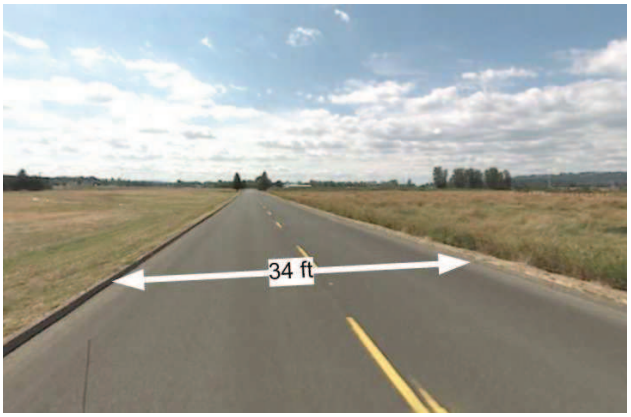


Figure 4.9.3: Graham Section @ Pt. A

4.9.3 Roadway Improvements

The current condition of Graham Rd. does not conform to the City of Troutdale construction standards for a commercial/industrial street. The 22-ft. wide section of Graham Rd. does not meet the minimum allowable standards for the City of Troutdale.[12] The narrow lanes combined with sharp curves in the alignment make it difficult for large vehicles to maneuver along Graham Rd. This is especially critical now that Graham Rd. will experience a sharp increase in vehicular volumes due to the Swigert Way extension and the TRIP developments. As shown previously in the forecasted volumes section, the Swigert Way extension will most likely cause a shift in a percentage of the FedEx vehicles from Sundial Rd. to Graham Rd. In addition to FedEx vehicles, Graham Rd. will also carry transit vehicles in the near future. The existing road must be improved to support the likely vehicular loads and provide sufficient access to the TRIP sites.

The improvements to Graham Rd. will include widening the 22-ft section to match the 34-ft section to the north. Standard curb and gutter will be put in along the east side of Graham Rd. and will tie-in to the 800 ft. of existing curb and gutter. The existing asphalt along the section of road to be widened will receive 3” of cold plane pavement removal. The 3” asphalt grind and inlay is necessary to maintain a centerline crown with the required cross slopes of at least 2.5%. In order to widen Graham Rd., a slight realignment of the centerline may be required in the curves to avoid encroaching on airport property. A number of properties along the southeast side of Graham Rd. must be contacted for possible easements and notifications of the expected improvements.

Sidewalk will be installed along the north side of Graham to accommodate the development occurring at the TRIP Phase 2 site. In order to provide connectivity, this sidewalk will be installed along the entire length of the Graham Rd. improvement and will connect into the existing sidewalk located along the east side of Graham Rd. just north of the I-84 off-ramp. The sidewalk will be 6-ft wide and will include a 9-ft landscape buffer. The landscape buffer will be designed as a swale along the entire length of Graham Rd. to provide adequate drainage. Curb cuts will used every couple hundred feet to carry stromwater from the street into the swales. All swales and sidewalk will be designed and constructed according to City of Troutdale construction standards.[12] Additional ROW easements will need to be obtained in order to construct the 9-ft swale and the 6-ft sidewalk along Graham Rd. Sidewalk will not be installed along the airport side of Graham Rd. due to space limitations.

Street lights will be installed along Graham Rd. to provide lighting for the new sidewalk, as required in Section 7.200.E of the City of Troutdale Development Code.[11] A pole spacing of 100-ft. will be used to maintain consistency with the Swigert Way design. All street lights will be designed and installed according to the City of Troutdale construction standards.[12]

4.9.4 Proposed Transit Route

Transit services in the City of Troutdale are provided by the Tri-County Metropolitan District of Oregon (TriMet). A Transit Facilities map showing the existing transit routes was provided in the City of Troutdale Transportation System Plan and can be referenced in Appendix B.[13] The existing transit routes only reach as far north as I-84, and do not currently provide services to the TRIP sites. The City of Troutdale Transportation System Plan provides a transit master plan map that includes a potential future transit route extending north along Graham Rd. and looping around the airport via Sundial Rd. and Marine Dr. The Transit Master Plan map from the City of Troutdale Transportation System Plan is available in Appendix B.

With the improvements made to Graham Rd. and the installation of a traffic signal at the Sundial/Graham intersection, this would be an ideal situation for TriMet to extend the transit route along the proposed path. The addition of a transit route would promote an alternative mode of transportation to the TRIP sites while also providing sustainability by reducing the required parking area. The widening of Graham Rd. and the extension of the existing sidewalk would provide sufficient support for transit services to operate along Graham Rd. A bus stop will be proposed along the north side of Graham Rd. adjacent to the proposed building location on lot 6. Public sidewalks along Graham Rd. and a minimum of one building entrance oriented toward the transit street will be provided for direct access to the building in accordance with Sections 8.056 and 8.058 of the City of Troutdale Development Codes.[11]

4.10 GRAHAM AND SUNDIAL ROAD INTERSECTION TRAFFIC STUDY

4.10.1 Introduction

The development of TRIP Phase 2, which includes the extension of Swigert Way to Graham Rd., will have a significant impact on traffic volumes along Sundial Rd. and Graham Rd. The addition of industrial and manufacturing buildings in TRIP Phase 2 will generate a significant amount of vehicular traffic, which will affect the capacity and level of service of the Graham and Sundial intersection located at the southwest corner of Lot 4. Due to the potential traffic impacts, a detailed traffic study is necessary to determine the capacity of the intersection based on projected demands and whether or not a traffic signal is warranted at this intersection. A site map of the TRIP project and the Graham/Sundial intersection is shown in Figure 4.10.1 below.

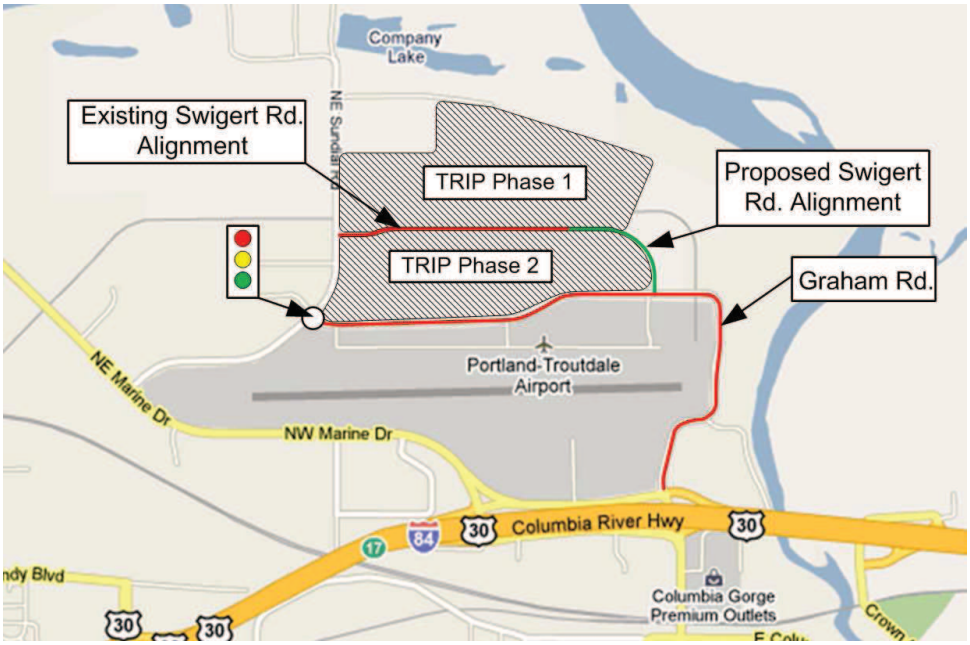


Figure 4.10.1: Graham & Sundial Intersection Site Map

4.10.2 Existing Conditions

The intersection of Graham Rd. and Sundial Rd. is currently 2-way stop controlled with stop signs located at the eastbound and westbound approaches of Graham Rd. The northbound and southbound approaches of Sundial Rd. were recently re-configured to include left-turn pockets to improve safety and to accommodate heavy left-turn traffic during peak hours. The northeast corner of the intersection is the only portion of the intersection that's fitted with sidewalk and an ADA accessible ramp. According to the 2007 Transportation Impact Analysis compiled by the Port of Portland for TRIP Phase 1, the FedEx and full TRIP Phase 1 developments were projected to cause a LOS D for traffic turning from Graham Rd. onto Sundial Rd. during the PM peak hour, resulting in 34.7 seconds of average vehicle delay along Graham Rd.[9]

4.10.3 Trip Distribution

Table 4.10.1 below shows the forecasted volume PM peak hour trip distribution around the project site. The trips were distributed according to whether they arriving at the site or departing. The values were obtained utilizing the analysis and assumptions made in section 4.8A.

Table 4.10.1: Forecasted Volume PM Peak Hour Trip Distribution

Land Use	Total Trips	Trips in	Trips Out
FedEx Distribution	423	361	62
Manufacturing-Phase 1	486	175	311
Manufacturing-Phase 2	73	25	49
Class B Office Space	30	0	30
Heavy Industrial	164	56	108

Combining the existing traffic volumes, the Phase 1 traffic yields, and the forecasted traffic for Phase 2 yields the total projected future traffic. The turning distribution at the intersection is determined by utilizing the project PM peak hour trip assignments provided in the DKS report.[9] The distribution of the total projected traffic at the intersections of Graham/Sundial is shown on the Existing & Project PM Peak Hour Traffic Volumes figure in Appendix B, and in Table 4.10.2 below. For additional data on the trip distribution at the intersections, see Intersection Volume Calculations in Appendix A.

Table 4.10.2: Sundial Rd. & Graham Rd. Forecasted Intersection Volumes

	Total	Right Turn	Left Turn	Through
Graham Eastbound (EB)	35	30	0	5
Graham WB	181	15	161	5
Sundial SB	487	0	10	477
Sundial NB	425	15	10	390

4.10.4 Traffic Signal Warrant Analysis

The intersection of Sundial Rd. and Graham Rd. was checked for all warrants to determine the necessity of a traffic signal.[14] The written warrants can be found in Appendix C.

Warrant 1 – 8-Hour Vehicular Volume

We do not have enough data to perform this warrant at the Graham/Sundial intersection. However, the peak hour volume for the highest approach of the minor street (Graham Rd.) is 181 vehicles, which is below the minimum requirement of 200 vehicles for 100% and barely above the 160-vehicle requirement for 80%. It can be assumed that the intersection will not produce 8 consecutive hours with volumes surpassing the minimum requirement. This warrant does **NOT PASS.**

Warrant 2 – 4-Hour Vehicular Volume

We do not have enough data to perform this warrant at the Graham/Sundial intersection. As with Warrant 1, we will assume that 4 consecutive hours will not surpass the minimum volume requirements due to the low volumes along the approach road during the PM peak hour. This warrant does **NOT PASS.**

Warrant 3 – Peak Hour

The peak hour volume at this intersection occurs from 5-6pm. An actual delay in vehicle-hours on the minor approach was not obtained, but due to the heavy left turn volumes it can be assumed that the delay will surpass the minimum criteria of 4.0 vehicle-hours for one approach lane. Therefore, this warrant **DOES PASS.**

Warrant 4 – Pedestrian Volume

We do not have enough data to perform this warrant at the Graham/Sundial intersection. However, the DKS TIA report provides an intersection traffic count from 4-5pm where one pedestrian and zero bikes passed through the intersection within the hour.[9] Although the pedestrian level will certainly increase with the implementation of sidewalk connectivity, we will assume pedestrian volume will not reach the 190 ped/hr required to pass this warrant. This warrant does **NOT PASS.**

Warrant 5 – School Crossing

This warrant is not applicable at this intersection since there are no school crossings present.

Warrant 6 – Coordinated Signal System

The traffic signal located at Sundial Rd. and Marine Dr. provides a sufficient degree of platooning, and a signal at the Sundial/Graham intersection would not provide a progressive operation. This warrant does **NOT PASS.**

Warrant 7 – Crash Experience

Since Warrants 1 and 4 were not met, this warrant did not meet all the criteria. This warrant does **NOT PASS.**

Warrant 8 – Roadway Network

This warrant is not applicable since we do not have major routes with exceptionally high peak hour volumes on weekends. This warrant does **NOT PASS.**

Warrant 9 – Intersection Near a Grade Crossing

Warrant 9 was just recently added in the 2009 edition of MUTCD. It applies to intersections that are within 140ft of a rail grade crossing.[14] Our intersection does fall under this criteria; therefore it does not apply. This warrant does **NOT PASS.**

Warrant Analysis Conclusion

Only one of the nine required traffic signal warrants passed for the Graham/Sundial intersection. Warrant 3, the Peak Hour, passed the analysis for our intersection. According to the MUTCD, "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."[14] Additional analysis is necessary to back up the warrant analysis and justify the installation of a traffic signal at the Graham Rd. and Sundial Rd. intersection.

4.10.5 Synchro Analysis

In order to more effectively determine the necessity of a traffic signal at the Graham/Sundial intersection, a Synchro analysis was performed on the intersection using the forecasted PM peak hour traffic volumes and the known heavy vehicle percentages due to the FedEx site. The intersection was analyzed for the following three scenarios:

- A 2-way stop-controlled intersection with stop signs at the eastbound and westbound approaches of Graham Rd., and free movement through the intersection along Sundial Rd.
- A 4-way stop-controlled intersection.
- An actuated-uncoordinated traffic signal controlled intersection with all left turns permitted.

The same PM peak hour traffic data was used for all three scenarios, and the Synchro analysis was performed to determine the LOS of the intersection during each scenario. The 2-way stop-controlled intersection fared well in the northbound, southbound, and eastbound approaches with a LOS no lower than B; however, the westbound approach on Graham Rd. received an overall LOS F. This is due to the high left-turn volumes present at the westbound approach and the heavy north and southbound volumes providing minimal turning gaps. The resultant data for this scenario is available in Figure 1 of the Synchro Outputs sheet in Appendix C A LOS F during the PM peak hour is not acceptable; therefore, a 2-way stop-control cannot be implemented at this intersection.

The 4-way stop-controlled intersection produced better results than the 2-way stop-controlled intersection, but it still did not meet the City of Troutdale LOS requirements. The overall LOS for this intersection is E, which is unacceptable. The LOS E is mostly likely a result of the high percentage of heavy vehicles passing through the intersection due to the FedEx facility. The resultant data for this scenario is available in Figure 2 of the Synchro Outputs sheet in Appendix C. A 4-way stop-controlled intersection cannot be implemented at this intersection.

The actuated-uncoordinated traffic signal controlled intersection with all left turns permitted produced an intersection LOS B. This is an acceptable intersection LOS for the City of Troutdale. The resultant data for this scenario is available in Figure 3 of the Synchro Outputs sheet in Appendix C

4.10.6 Graham/Sundial Intersection Conclusion

The intersection of Graham Rd. and Sundial Rd. will see a significant increase in traffic volumes as a result of the development occurring at the TRIP sites. The traffic signal warrant analysis of the intersection passed one of the nine warrants, which provides justification for implementing a traffic signal. Warrant 3, the peak hour warrant, passed due to fairly high forecasted PM peak hour volumes to be produced by FedEx, the manufacturing buildings, and industrial complexes. In addition to passing a signal warrant, the synchro analysis of the intersection produced an unacceptable LOS for the unsignalized intersection. From the analysis provided above, a conclusion has been reached that a traffic signal is both warranted and necessary at the Graham/Sundial intersection to support the forecasted PM peak hour volumes and provide necessary levels of safety for vehicles and pedestrians.

4.11 SUSTAINABLE DESIGN

4.11.1 Introduction

A large number of sustainable design options were investigated in the design of the lot and both buildings. For each item cost and benefits, including LEED certification, were thoroughly investigated in order to determine which options should or should not be incorporated into the project.

4.11.2 Green Roofing: Extensive and Intensive

Green roofing is generally split into two types of green roofs; extensive and intensive. Extensive green roofs are mainly composed of grass and smaller plants such as prairie flowers for their small height and easy maintenance.[15] Intensive green roofs use a much larger variety of larger plants and require more maintenance.[15] It has been decided that only the office building will include a green roof and it will be an extensive green roof.

Although the start up costs are much greater to install a green roof over a standard roof, the long term savings end up making a green roof save money overall. Green roofing will only be incorporated onto the small office building, 20,000 square feet, and costs an average of $10 per square foot with a maintenance cost of $0.75 per square foot per year.[16] For the office building, this comes out to be an upfront cost of $200,000 with a yearly maintenance cost of $15,000. It is estimated that a 20,000 square foot roof will end up saving a total of $200,000 over the course of its lifetime[15] even with those additional costs.

Besides costs there are many other benefits of green roofing ranging from purely aesthetic to reducing air pollution and greenhouse gas emissions. One study showed that by having a green roof, temperatures within the roof membrane were decreased by more than 35° F. [16] Another added benefit of green roofing is enhanced storm water management and water quality. Green roofs are able to reduce storm water runoff and filter pollutants from rainfall.[16]

4.11.3 Black Water and Stormwater Collection

Water reuse is a simple and environmentally friendly way to save money on utilities. Various methods of water reuse were explored, and a storm water collection system was decided to be the best choice with such a large roof available for use.

With a 100,000 square foot roof still available and rainy climate of Oregon, storm water collection looked very promising. Collected storm water could be used to irrigate surrounding landscape, reduce runoff contributing to the municipal stormwater system, and be filtered into grey water to be used for toilet flushing. Because the two buildings are connected, the stormwater collection can be used throughout both buildings.

A very similarly sized system as the one that will be built for the 100,000 square foot warehouse building was recently installed in the Kelley Engineering building at Oregon State University. The total cost was $90,000 greater than that of a conventional roof[17] for a $153,000 square foot, four story building. With those costs in mind, installing a stormwater collection system on the 100,000 square foot building and proper plumbing to both buildings would cost $75,000.

While regulations allow the reuse of blackwater in Oregon, blackwater treatment is both highly expensive and requires a special permit to incorporate. In order treat the raw sewage in blackwater, a special machine is required such as a living machine or a membrane bioreactor.[18] Installing one of these machines would not be cost effective in such a sparsely populated zone, and thus blackwater was not incorporated into the project.

4.11.4 Recycled Concrete Aggregates

Another option for sustainability that will be incorporated into the project is the use of recycled concrete aggregates. Recycled concrete aggregates are composed from byproducts of other industrial processes rather than mined concrete aggregate. By using recycled concrete aggregates, many materials are kept out of landfill, and the environmental impact of obtaining virgin resources is greatly decreased. Another added benefit of recycled concrete aggregates are that they cost less than mined concrete aggregates, costing $3.50 to $7.00 a cubic yard compared to $13.00 a cubic yard for regular concrete aggregates.[19]

4.11.5 Pervious Concrete

Pervious concrete cannot be used the same as regular concrete in many areas. However, when used in the parking lot provided for the office and industrial buildings, it provides many environmental and economic benefits.

Regular concrete collects oil, anti-freeze, and other automobile fluids to later be washed into nearby bodies of water. By implementing pervious concrete, 97.6 to over 99 percent of those oils are trapped and biodegraded.[20] Pervious concrete also greatly reduces the amount of stormwater runoff that must be collected and treated at plants. Another added benefit of pervious concrete is its lighter color. Unlike darker pavements, the light color and open pore structure of pervious concrete stores less heat, reducing heat island effects.[20]

Pervious concrete generally costs 15% more than regular concrete but has a few added economic benefits as well.[21] Stormwater runoff has become much more expensive to deal with, and due to the impact on the amount of stormwater running off of the site, much smaller runoff fees will result. Additionally, the stormwater management system that must be built will be smaller and cheaper in terms of materials and labor to build. After weighing the costs and benefits, it was decided that pervious concrete will be used in the parking lot within Lot 6.

4.11.6 Porous Asphalt

Where pervious concrete is adequate to use due to its smaller compressive strength, porous asphalt can be substituted in as an equally environmentally sustainable alternative to its non-porous counterpart.

Just like pervious concrete, the initial costs of porous asphalt are slightly higher. However, studies have shown that, in the long run, the cost of porous asphalt becomes less than if it was not used due to its reduction in stormwater processing.[22]

4.12 OFFICE BUILDING SITE PLAN

4.12.1 Introduction

The west side of lot 6 will be developed to incorporate both manufacturing space and office space. Preliminary design considerations have determined construction of a 100,000 square foot manufacturing building and a 20,000 square foot class B office building adjacent to the manufacturing structure. The manufacturing building will incorporate tilt-up concrete construction with 30 foot high manufacturing space with a 10 ton bridge crane. Special design considerations of the structure will be made to obtain a LEED Silver rating.

4.12.2 Building Site Characteristics

Project site analysis determined that the optimal location for the manufacturing/office facility would be located in the Southwest corner and aligned with the high pressure gas line. The building site location provides physical separation from Swigert Way and allows nearby access to the natural gas line for maintenance purposes by Williams Gas. Additionally, orienting the building to match the gas line alignment allows the footprint to be less imposing and allows a more efficient use land within Lot 6.

According to Section 9.190.C of the Troutdale Development Code, loading areas must be screened from view from the street and adjacent properties.[23] As a result, a fence will be utilized to obscure the area from adjacent areas. The fence will run the entire perimeter of the parking lot to provide security and to obscure parked vehicles.

4.12.3 Parking Areas

The minimum parking area has been determined using guidelines set forth by the Troutdale Development Code and the Oregon Structural Specialty Code. According to Section 9.190 of the Troutdale Development Code, manufacturing facilities with a footprint of 50,000 square feet or more are required to have at least 750 square feet established for docking bays. Individual docking bays must be at least 10 feet wide, 25 feet long, and 14 feet high.[23.32] Additionally, analysis determined that 61,698 square feet (1.41 acres) of parking area must be designated to accommodate the occupancy of both buildings. The required parking area took into account peak occupancy of the structures, accommodations for compact cars, and accessibility concerns. Supporting calculations can be found in Appendix A that were used to determine the amount of parking required.

4.12.4 Conclusion

Project analysis determined that the required parking area could be reduced by 10 percent if accommodations are made for public transportation. Further discussion of utilizing alternative modes of transportation to reduce parking and promote sustainability can be found in Section 4.9.4. Preliminary site development plans for the building footprint and potential parking areas can be found in the design drawings in Appendix C.

4.13 PRESERVATION OF WETLANDS AND HABITAT

4.13.1 Preservation of Wetlands

In order to provide a natural feel to the site and a visual buffer between Lots 5 and 6, existing wetlands were expanded and enhanced. Approximately 4.1 acres of wetland will be added to the existing 0.97 acre Wetland K. Additionally, 20.3 acres of compensatory wetlands will be added west of Sundial Road to mitigate the South Wetlands capping.

4.13.2 Multi-Use Path on Levee

In order to improve aesthetics and preserve the natural area surrounding the site, the existing dirt multi-use path that runs along the top of the levee will be improved and include an access point off of the newly constructed Graham Rd. sidewalk. The multi-use path will be improved to a 10-ft. wide path of firmly packed crushed aggregate. According to the Federal Highway Administration (FHWA), a minimum width of 8 ft. should be used on multi-paths with limited use.[24] An additional access to the multi-use path will be provided off of the Graham Rd.

sidewalk as shown in Figure 4.13.1. The path will be designed and constructed according to City of Troutdale construction standards and the FHWA standards for shared use path design.

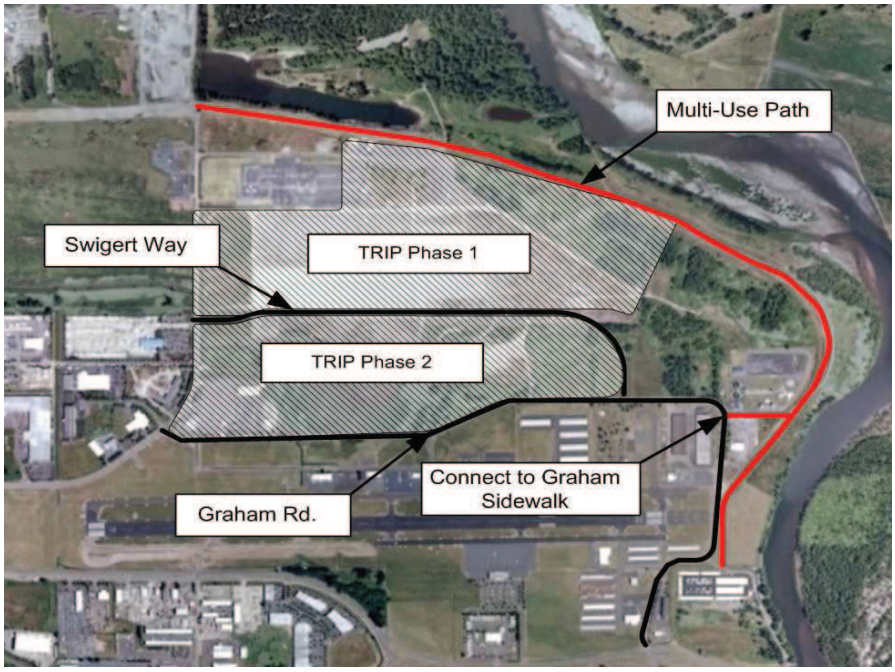


Figure 4.13.1: Multi-Use Path Vicinity Map

4.14 EVALUATION OF GAS PIPELINE

4.14.1 Introduction

Current site conditions include a fifty foot easement for a high pressure natural gas line that runs through Lot 6. The easement includes two lines that run in parallel through the site. The gas lines are owned and maintained by Williams Gas and are estimated to be 18" and 20" in diameter. Williams Gas is the 10th largest U.S. producer of natural gas and is responsible for 12% of the nation's gas consumption. Any considerable construction activities and changes to site conditions within the gas easement will require prior approval from Williams Gas and on-site inspection from a certified technician.[25]

The scope of the Port of Portland TRIP-II project includes improvement and extension of NW Swigert Way to NW Graham Road. Therefore, the gas line location will provide a hindrance to the roadway construction as the pipeline must pass under the roadway. As a result, Williams Gas must be notified and a permit must be filed prior to the roadway construction. Approval for the proposed roadway extension by Williams Gas could take up to several months and must be accounted for in the project schedule. For the proposed roadway alignment, site conditions have determined that there are gas line markers located at the current pipeline position. Therefore, the reduced cost of installing gas markers if the gas line is to remain in place will be considered in evaluating alternatives.

4.14.2 Land Development Constraints

Williams Gas prohibits specific activities within the easement area as agreed upon by the property owner. Regulations ensure that the gas line is accessible for maintenance purposes and in cases of emergency. Violation of these agreements is a form of encroachment and is considered trespass and enforceable by law. In general terms, all activities that pose no threat or accessibility issues to the pipeline are allowed under the guidelines. Within the easement area, there are to be no permanent structures constructed at any time. These guidelines specifically include buildings, fences, roads, driveways, and utilities. Likewise, trees are not allowed to be planted within the easement due to roots potentially affecting the long-term integrity of the pipeline. However, landscaping within the area is permitted, provided that the existing soil cover over the lines is maintained and that the facilities remain accessible.

4.14.3 Evaluation of Alternatives

When considering the high pressure natural gas line, there are two options to consider: keeping the pipeline in place or relocating the line to minimize development impacts in Lot 6. The advantage to keeping the pipeline in place is that the cost and timeline of relocating the pipeline could be avoided. However, the pipeline would provide a large area of land that could not be developed under Williams Gas guidelines. Likewise, the pipeline runs through the contaminated groundwater region and the contractor would potentially run into contaminated soil during the excavation of the pipeline.

At the current pipeline location, there are gas markers located on the alignment of the proposed Swigert Way extension to accommodate future construction. If the pipeline is relocated and crosses Swigert Way at a different location, there will be increased costs to relocate the gas markers. When considering the relocation of the pipeline, two proposed alignments were determined to be the most advantageous due to the total length of relocated pipe and minimal impact to Lot 6. The two proposed alignments are shown in Figure 4.14.1 below.

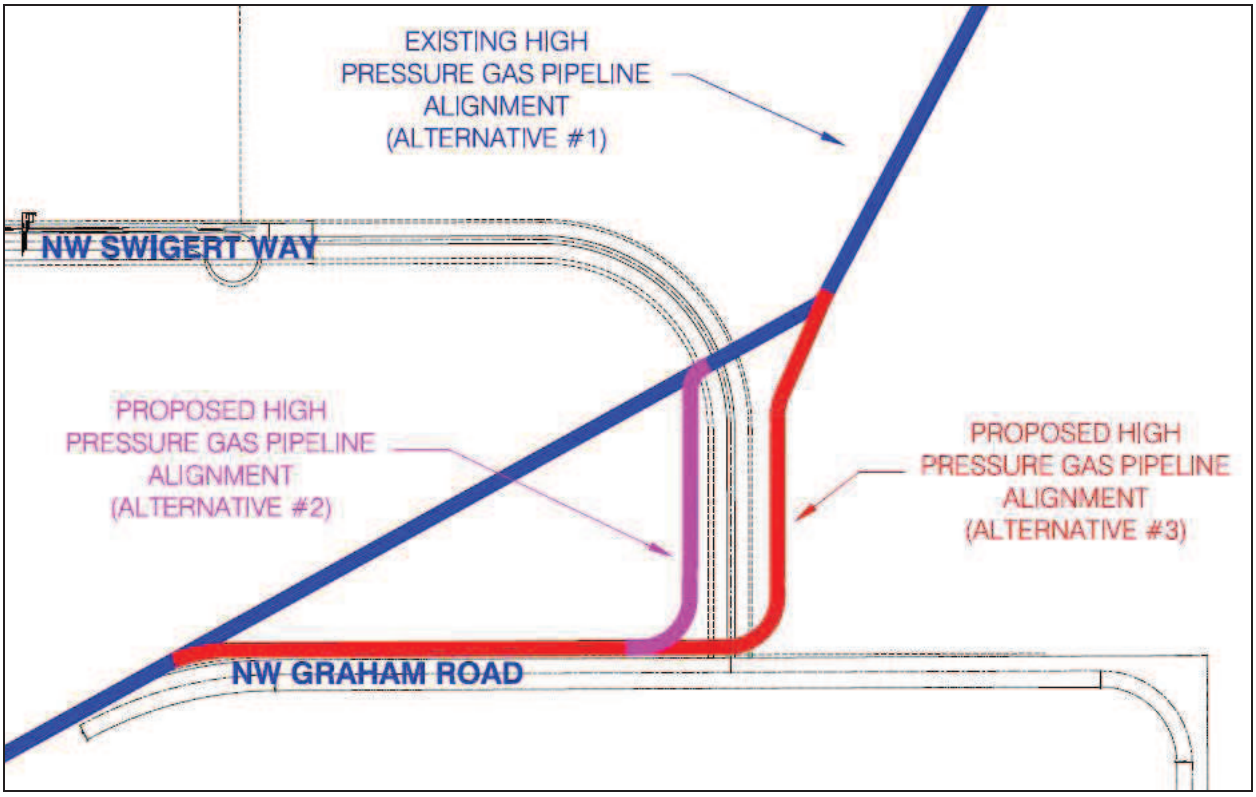


Figure 4.14.1: Gas Line Relocation

Alternative #2 would be advantageous since the gas markers would not need to be relocated. However, there would still be impedance in Lot 6 along the Swigert Way extension and along Graham Road. Alternative #3 has the advantage of having minimal impact to the lot, but would require relocating the gas markers.

Determining the best alternative was done on a cost basis only, with each facet having a cost associated with it. First, the fifty foot easement provides a loss in money since this area is unable to be developed for any purpose. The cost was determined to be $1,500 per foot of pipeline that impedes development. The cost takes into account the current market value of unused land per square foot with subtracted costs for construction/development activities, land taxes, and miscellaneous overhead costs. Previous studies done at the University of California determined that the cost to remove a natural gas pipeline costs approximately $165 per foot for 18" diameter pipe and $185 per foot for 20" diameter pipe.[26] Therefore, to remove both pipes the cost would be $350 per foot, taking into account materials, labor, and overhead costs. Based on a cost increase of 10% for placing pipeline (longer labor time and new materials), the cost to place pipe was determined to be $385 per foot. Finally, an approximate unit cost of $25,000 was associated with relocating the Swigert Way crossing (gas marker relocation) due to approval from Williams Gas and labor/material costs. Table 4.14.1 shown below breaks down the cost associated with all three alternatives. For calculations used to determine costs, see Appendix A.

Table 4.14.1: Pipeline Alternative Evaluation

ALTERNATIVE	#1	#2	#3
LOT IMPEDENCE (FT)	1,675	1,150	1,050
PIPE REMOVAL (FT)	---	1,200	1,475
PIPE PLACEMENT (FT)	---	1,550	1,860
LOT IMPEDANCE COST	$2,512,500	$1,725,000	$1,575,000
PIPE REMOVAL COST	---	$420,000	$516,250
PIPE PLACEMENT COST	---	$596,750	$716,100
GAS MARKER RELOCATION COST	---	---	$25,000
TOTAL COST	**$2,512,500**	**$2,741,750**	**$2,832,350**

4.14.4 Conclusion

On the basis of overall costs alone, keeping the high pressure natural gas line in its current location and alignment was determined to be the optimal solution. Keeping the pipeline at its current location, costs associated with seeking approval from Williams Gas and moving the pipeline would be avoided. The current pipeline location provides a large hindrance to Lot 6. However, the costs associated with moving the pipeline far outweighed any consequential benefits. Finally, the gas line location was utilized as a lot boundary line to provide optimum land development area. Revised subdivision plot and discussion can be found in Section 4.1.

4.15 PERMITTING PLAN

4.15.1 Introduction

Current site conditions and anticipated scope of work will require various permits from multiple agencies and jurisdictions. Scope of work will include filling wetlands and modifying ditches/watercourses which requires permits from the Corps of Engineers and Department of State Lands. The Port will prepare a detailed Joint Permit Application to both agencies which will require 20% design plans that detail site drainage systems, impervious areas, water quality facilities, and mitigation design. Construction activities include constructing new roadway over a high pressure natural gas line which will require an encroachment permit from Williams Gas. Cooperation and submission of applicable permits will also be required for the City of Troutdale, Multnomah County, and the Sandy Drainage Improvement Company.

4.15.2 Corps of Engineers Permit

Nature of work includes modifications to existing wetlands and alterations to watercourses (to take into account additional runoff from impervious areas). The Corps of Engineers (COE) requires that an individual permit be issued prior to any construction activities taking place. The permitting process includes a consultation from COE prior to the application and a formal review process of the application and design documents. The review process includes a public notice that allows 30 days for comment by the public, local agencies, special interest groups, and state/federal agencies.

Additionally, COE is required to investigate the project location and scope of work in accordance with various federal laws. For every construction project, COE must investigate the scope of work in accordance with the Endangered Species Act, Clean Water Act, and National Historic Preservation Act. Due to the project's proximity to the Columbia River and Sandy River, COE will also investigate accordance with the Wild and Scenic Rivers Act and Sediment Evaluation Framework. COE may also decide to require consultation with NOAA Fisheries to ensure compliance with potential issues.[27]

4.15.3 Department of State Lands Permit

The department of State Lands requires a permit for activities that impact existing wetlands and waterways under the Removal-Fill Guidelines. Scope of work includes commercial development and mitigation of existing wetlands, requiring application for an individual permit. Application process includes 30 days for review of application completeness, 30 days for public review and comment, and 60 days for final/technical review and issuance. Comments and concerns issued by the public and the Department of State Lands (DSL) must be identified and corrected in design documents. Therefore, the application may take up to five months prior to a permit being issued.[28]

The application must describe any wetlands and/or waterways that may be impacted through any anticipated activities. Additionally, the application must ensure mitigation of filled wetlands/waterways through improvement of existing wetlands/waterways and/or facilitation of new wetlands/waterways. Failure to minimize environmental impact and proper mitigation could result in a denial of an individual permit.

4.15.4 Williams Gas Permit

Construction activities include the construction of a new roadway (extension of Swigert Way to Graham Road) through a high pressure natural gas line easement. Regulations set forth by Williams Gas and the Office of Pipeline Safety defines such construction activity as an encroachment to the easement. Therefore, a formal encroachment agreement must be made between Williams Gas and the Port of Portland. Regulations require that the road must cross the pipeline at a 90 degree angle and that a minimum of 3.5 feet of soil cover is maintained.

Preliminary design plans must be included in the application and 90 days are required for project review and approval.[25]

4.15.5 City of Troutdale Permits

Following local jurisdiction guidelines, a variety of permits must be acquired from the City of Troutdale. A conditional use permit must be applied for under the anticipated construction activities under the project. The application must include a submittal of the final design documents that clearly show compliance with local standards and procedures. The permit must be acquired prior to site development and will specify any conditions, limitations, or restrictions imposed by the governing authority. Conditions may include increasing street width, improving public facilities, and controlling the number of vehicular access points.

Additionally, permits must also be acquired for standard construction procedures, including building, development, electrical, and plumbing permits. Acquisition of these permits requires that design documentation and site development follows any local regulations and standards. There are no established timeframes for the review process for any of the applicable permits provided by the City of Troutdale. However, ten days are given to make any corrections issued by the agency to the design documents.[29]

4.15.6 Other Applicable Permits

The project location falls within the Sandy Drainage Improvement Company (SDIC) district. Operating under federal guidelines, state statutes, and local regulations, SDIC takes a proactive approach in ensuring protection of levees along the Columbia River and to control flooding/storm water. Partnership and cooperation with the SDIC will be expected throughout the duration of the project. Design documents will be submitted to ensure that the project will provide sustainability and improvement to the existing region.[30]

In partnership with Multnomah County and the Environmental Protection Agency (EPA), permits must be acquired to ensure compliance with the National Pollutant Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer Systems (MS4). The process for an NPDES permit requires a description of all facilities/operations and amount of effluent discharge. After a 90-day review process, Multnomah County will issue a permit that limits the amount of discharge allowed for the facility. Additionally, design documents must be submitted to Multnomah County that complies with MS4 regulations. The regulations require that storm water and sewage discharge are treated separately and that storm water is conveyed properly into existing municipal conveyance systems.[31]

4.15.7 Impacts on Project Schedule

Acquiring permits can take many months and will dictate the direction and course of action for the design process. Preliminary review and comments will take up to 30 days for most agencies and organizations. Additionally, for many of the public agencies, the permitting process requires

a 30 days for the public to view and comment on the application documents. An extra 30 days is typically given for the agency to compile all the comments and submit a final document that describes corrections to be made. In most cases, the permit is issued within 15 days of receiving the revised application.

As shown above, three to four months is the typical timeframe that is required between the initial permit application and issuance. In most cases, permit applications also require design documents that are at 30 percent design completion. Depending on the agency and impact of the project, submission of design documents for 60, 90, and 100 percent design completion may also be required for permit issuance. As a result, five to six months must be factored into the design schedule to accommodate the review process and potential revisions.

4.16 PRELIMINARY DESIGN SCHEDULE

The preliminary design schedule for the TRIP-II project includes milestones for 30, 60, and 90 percent completion of the design plans. Applying for permits and beginning the process for LEED certification will not begin until preliminary drawings are created for the 30 percent design completion. The assumption was made that the permitting agencies will use the entire duration to review the documents and to issue the permits. However, the permitting process could potentially be extended if a permitting agency requires further revisions to the design documents and resubmittals. Since the project completion date is heavily dictated by the permitting process, any delays in acquiring permits will affect the completion date. In the current schedule, fifteen business days of float are induced between the permit issuance and design completion, allowing for minor delays.

Various assumptions and design considerations/simplifications were made when constructing the design schedule. The assumption is made that the entire design will be put on hold for one day when 30/60/90 percent design plans are submitted. Therefore, schedule breaks occur at tasks that occur during the submittal milestone. Likewise, considerations were made in determine the sequencing of designs. Design is typically integrative and iterative, but simplicity was required to create accurate schedule durations. Design of the roadways and the office/manufacturing building will be conducted at the very beginning of the project. Intersection design will be controlled by the roadway design and will not begin until the design of Graham Road is completed. Additionally, storm drainage design and wetland mitigation must wait until preliminary structural designs are completed since they are dictated by the building and parking area footprints. The utility plan will be designed after the completion of storm drainage designs since the design is dictated by the placement of drainage utilities.

Based upon the preliminary design schedule, assuming optimum and efficient completion and review schedules, the design phase will have a final duration of approximately six months. The design schedule will be continuously updated to reflect changes to the scope of work and unforeseen delays that may occur. The preliminary design schedule can be found in Appendix E.

4.17 PRELIMINARY COST ESTIMATE

4.17.1 Introduction

Based on costs associated with transportation, structures, stormwater conveyance, wetland mitigation, building foundation, and sanitary sewer, the total cost of the project has been estimated to be $21.7 million. The final cost takes into account a 10 percent engineering cost and a 10 percent contingency amount. Supporting calculations for the cost estimate can be found in Appendix D.

4.17.2 Cost/Quantity Determinations

The preliminary cost estimate for the transportation subsection was determined to be $2.7 million. For this estimate we only took into account big ticket items such as aggregate base, concrete, curb and gutter, HMAC, and street lighting. The approximate quantities for each item were determined from preliminary cross-sections and the CAD drawings. Unit costs were determined using the average unit costs from the TRIP Phase 1 bid tabs.[33] A lump sum for the traffic signal was also determined from the bid tabs.

The preliminary cost estimate for the structural subsection was determined to be $11.6 million. Items included within the cost estimate include a 10-ton crane, construction for the manufacturing facility and office building, utilities, parking lot, and LEED certification. The cost estimate for both buildings was determined using RSMeans software, using square footage and project location to determine a lump sum cost. The average cost was used to determine a per square foot cost basis, the RSMeans cost results can be found in Appendix B. Additionally, the parking lot was calculated using a 14 inch aggregate base and 3 inch asphalt course. The costs were based off the bid tab values for TRIP Phase I, with a 15% cost increase for porous asphalt considerations. Additionally, LEED certification includes the cost to register the project, design review for sustainability, and final certification processing.[34]

The preliminary cost estimate for stormwater conveyance infrastructure was determined to be $596,580. This includes the cost of extending the Swigert way system and constructing a swale along Graham Road. Material quantities were taken from site drawings and unit costs were derived from the Phase I bid tab. A lump sum miscellaneous quantity is roughly 10% of the task cost covering unexpected costs.

The preliminary cost estimate for the building foundation amounts to $1,285,384. Included in the cost estimate are an estimated 250 piles, the foundation slab, general excavation, dust and erosion control, and mobilization, demobilization, and cleanup. Pile costs were taken from Federal Highway Administration data found on the web.[35] Concrete work for the foundation slab was taken from RS Means. Costs for excavation, dust and erosion control, and mobilization, demobilization, and cleanup were determined by applying areal factors to the lump sum amount for each found in the Phase I bid tab.

The preliminary cost estimate for capping the South Wetlands is $1,029,519. This includes the cost of stripping and grubbing, placing fill material, placing topsoil, seeding, mobilization, demobilization, cleanup, and surveying. Quantities for stripping and grubbing, fill material, topsoil, and seeding were taken from project drawings. Costs for each item were taken from the Phase I bid tab. A lump sum for mobilization, demobilization, cleanup, and surveying was determined by applied areal factors to the lump sum amount for a similar task listed in the Phase I bid tab.

5.0 REFERENCES

1. Reynolds Industrial Site. 2010, Port of Portland http://www.portofportland.com/Reynolds_Home.aspx

2. Scholl, L.D. David Evans & Associates. *Stormwater Public Infrastructure Report: Troutdale Reynolds Industrial Park (TRIP),* March 2008.

3. Gilmer, J.A. David Evans & Associates. *Troutdale Reynolds Industrial Park: Sanitary Sewer System Evaluation,* May 2008.

4. Clough, H.F. and Stevens, M.W. Ash Creek Associates, Inc. *Property Development Environmental Management Plan,* January 25, 2008.

5. CH2MHill and Alcoa, Inc. *Contaminated Materials Management Plan for the Former Reynolds Metals Company Facility,* October 2007.

6. Brettman, T. Berkel & Company Contractors, Inc. *New Trends in Auger Pressure Grouted Piles.* 2004. Print.

7. Hart Crowser, Inc. August 16, 2005. Page 85. *Environmental Site Assessment RMC/Alcoa Facility Troutdale, Oregon.*

8. Oregon Department of State Lands, Revised 2004, http://www.oregon.gov/DSL/WETLAND/docs/fact6.pdf

9. DKS Transportation Impact Analysis Report

10. "ITE Trip Generation Rate (PM Peak Hour)" *Trip Generation Manual, 8th Edition* Accessed Feb. 15, 2010 <http://www.ci.troutdale.or.us/publicworks/documents/itelanduselist.pdf>

11. (City of Troutdale Development Code) http://www.ci.troutdale.or.us/documents/developmentcode/11.pdf

12. (City of Troutdale Construction Standards) http://www.ci.troutdale.or.us/publicworks/documents/constructionstandards.pdf

13. "Chapter 4: Future Needs & Improvements." *Troutdale Transportation System Plan.* DKS Associates. Accessed Feb. 25, 2010. *http://www.ci.troutdale.or.us/planning/documents/tsr200508.pdf*

14. "2009 Edition Chapter 4C. Traffic Control Signal Needs Studies." *Manual on Uniform Traffic Control Devices (MUTCD)* Modified Jan. 22, 2010. Accessed Mar. 3, 2010. <*http://mutcd.fhwa.dot.gov/htm/2009/part4/part4c.htm*>

15. *GLWI | Green Roof | Installation*. 2010, University of Wisconsin - Milwaukee http://www.glwi.uwm.edu/research/genomics/ecoli/greenroof/roofinstall.php#determinetype

16. *Evaluating Green Roof Energy Performance*. 2010, ASHRAE. http://www.fsec.ucf.edu/en/media/newsletters/brpost/winter2006/ASHRAEJeffSonne.pdf

17. *CASE STUDY: OSU Rainwater Reclamation*. 2010, John Gremmels <http://www.oeconline.org/our-work/rivers/rivers-files/stormwater-case-studies/LID_CaseStudy_OSU_KelleyEC.pdf>

18. *Multifamily Water Systems: Although Still emerging, the market for innovative water harvesting and reuse systems holds strong potential*. 2010, PNW Publishing, Inc. http://buildernewsmag.com/index.php?option=com_content&view=article&id=2390:multifamily-water-systems-although-still-emerging-the-market-for-innovative-water-harvesting-and-reuse-systems-holds-strong-potential-&catid=34:feature&Itemid=65

19. *Concrete Aggregate Substitues*. 2010, NAHB Research Center http://www.toolbase.org/Technology-Inventory/Foundations/concrete-aggregate-substitutes

20. *Pervious, Porous Concrete Pavement Benefits*. 2010, National Ready Mixed Concrete Association <http://www.perviouspavement.org/benefits.htm>

21. *Pervious Concrete – Frequently Asked Questions*. 2010, Auburn University https://fp.auburn.edu/heinmic/PerviousConcrete/faqs.html

22. *Porous Asphalt*. 2010, National Asphalt Pavement Association http://www.hotmix.org/index.php?option=com_content&task=view&id=359&Itemid=863

23. *Troutdale Development Code: Chapter 9 – Off-Street Parking and Loading*. 2010. City of Troutdale. http://www.ci.troutdale.or.us/documents/developmentcode/13.pdf

24. "Chapter 14. Shared Use Path Design" U.S. Department of Transportation: Federal Highway Administration Accessed Mar. 9, 2010. http://www.fhwa.dot.gov/environment/sidewalk2/sidewalks214.htm

25. *Encroachment Specifications*. 2007. The Williams Companies, Inc. http://www.northwest.williams.com

26. *Using Natural Gas Transmission Pipeline Costs to Estimate Hydrogen Pipeline Costs*. Parker, Nathan. 2004. Institute of Transportation Studies, University of California. http://hydrogen.its.ucdavis.edu/publications/publications2004.html

27. *Permit Process*. 2010. US Army Corps of Engineers: Portland District. http://www.nwp.usace.army.mil/op/g/docs/documents/Permit_Process.pdf

28. *Removal-Fill Guidelines: Permits and Authorizations*. March 4, 2009. Oregon Department of State Lands. http://oregonstatelands.us/DSL/PERMITS/docs/RFG_Permitting_draft.doc

29. *Troutdale Development Code: Chapter 6 – Permits and Procedures*. 2010. City of Troutdale. http://www.ci.troutdale.or.us/documents/developmentcode/10.pdf

30. *District Authority*. 2007. Multnomah County Drainage District No 1. http://www.mcdd.org/DistrictAuthority.html

31. *Water Permitting 101*. 2009. Office of Wastewater Management. http://www.epa.gov/npdes/pubs/101pape.pdf

32. *2007 Oregon Structural Specialty Code*. October 2008. International Code Council, Inc. http://www2.iccsafe.org/states/oregon/07_Structural/Building07_Frameset.htm\

33. *Summary Tabulation of Price Proposals.* Troutdale Reynolds Industrial Park Phase I Improvements. April 2008.

34. *LEED Project Registration and Certification Fees*. January 11, 2010. Green Building Certification Institute. http://www.gbci.org/DisplayPage.aspx?CMSPageID=127

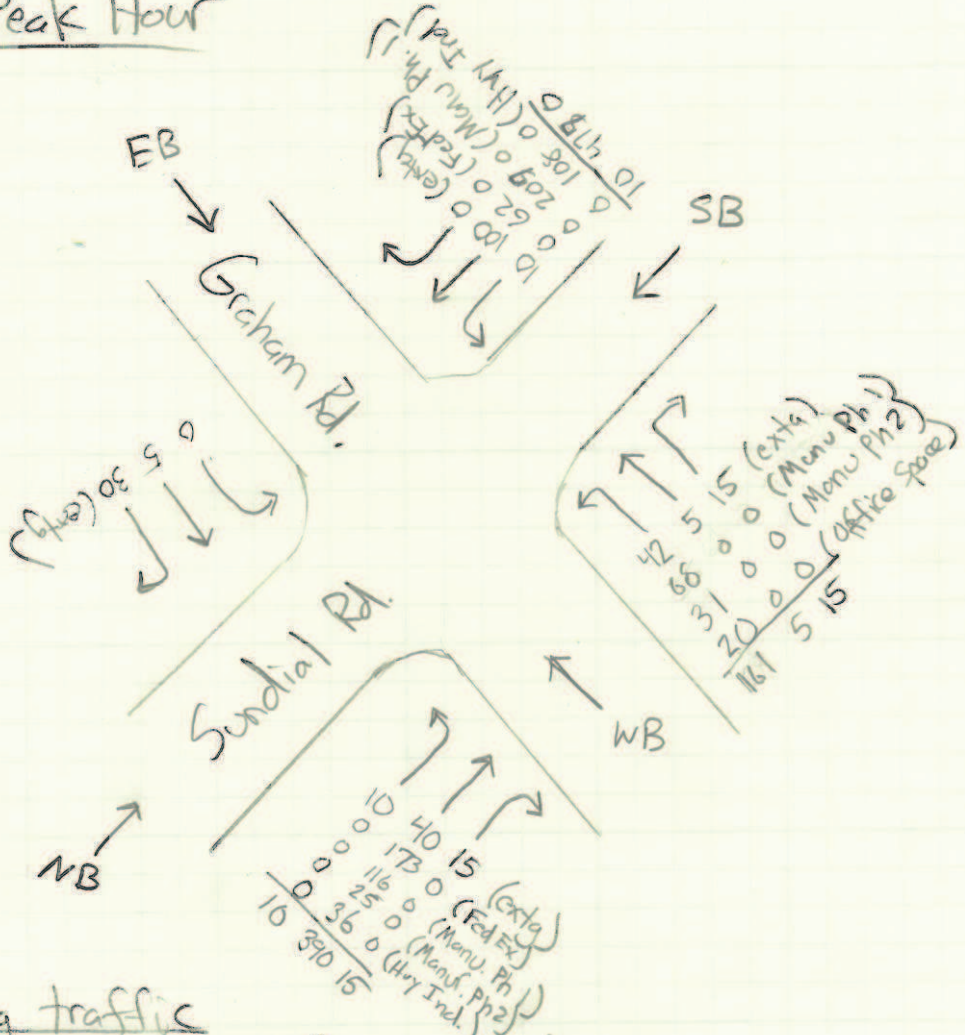
35. Henderson, Gary L. *Cost Data of Driven Piles.* 2005. Federal Highway Administration. http://www.fhwa.dot.gov/engineering/geotech/pubs/05159/index.cfm

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A
CALCULATIONS

Graham Rd./Sundial Rd. Intersection Trip Distribution

PM Peak Hour



- Existing traffic

  Total trips = 420

  at intersection = 420 (.65) = 273 trips (distribution based on DKS background PM PHV's in Appendix X)

- FedEx (Total trips = 423)

  - 188 vehicles using Swiggert/Graham int. to access site
  - Remaining arriving vehicles go NB: 361 - 188 = 173 trips
  - Departing vehicles travel SB: 62 trips

- Phase 1 Manuf. (Total trips = 486)

  - Arriving trips: 0.66 (175) = 116 trips
  - Departing trips: 0.66 (311) = 207 trips

Graham/Sundial Trip Dist. continued

Manuf Phase 2 (total trips = 73)

- Arriving trips: 25 NB through
- Departing trips: 0.65(48) = 31 trips NB

Office Space (total trips = 30)

- Departing: 30(0.65) = 20 trips WB

Heavy Industrial (total trips = 164)

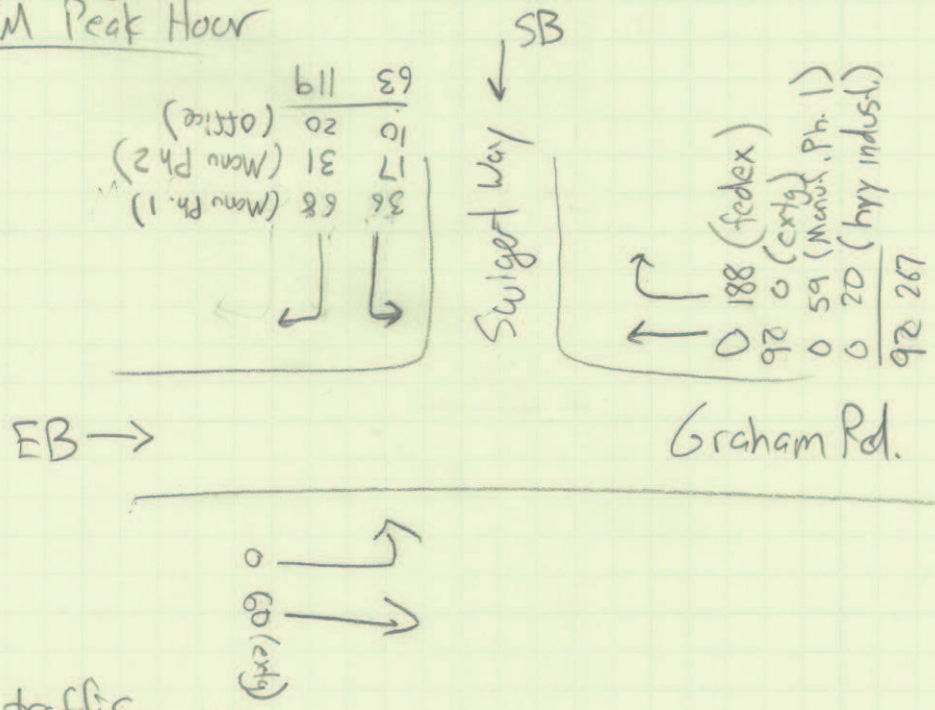
- Arriving: 56 trips, assume 65% coming from west outside of project area ∴ will go NB.

  = 56(.65) = 36 trips

- Departing: 108 trips SB

Swigert Way & Graham Rd. Intersection

PM Peak Hour



Extg traffic

- Assume 60 trips generated by Airport, 30 EB & 30 WB
- Trips EB = 30+15+10+15 = 60 trips ∴ Trips WB = 42+15+15+30 = 92 trips

Fedex

- 188 veh's arriving that previously turned Rt. on Sundial will now use Swigert Way

Phase I Manuf.

- Arriving: 0.33(175) = 59 trips
- Departing: 0.33(311) = 104 trips
  - 65% WB: 0.65(104) = 68 trips
  - 35% EB: 0.35(104) = 36 trips

Phase 2 Manuf.

- Departing: 48 trips (65% WB + 35% EB)

Office

- Departing: 30 trips (65% WB + 35% EB)

Heavy Industrial

- Arriving 35% from the east: 0.35(56) = 20 trips

CALCULATIONS FOR REQUIRED PARKING AREA

DETERMINE PEAK OCCUPANCY

Office occupancy:

Assume a required area of 310 square feet per employee; square foot breakdown is as follows:

- 200 square feet for cubicle space
- 25 square feet for adjusted executive/administrative space
- 15 square feet for adjusted secretarial space
- 30 square feet for conference room space
- 10 square feet for reception space
- 30 square feet for miscellaneous space (storage, filing cabinets, bathrooms, etc)

Occupancy: 20,000 SF ÷ 310 SF/employee = 64.5 → **65 peak employees**

Manufacturing occupancy:

Assume that manufacturing employees have a work space three times that of office employees

310 SF/employee X 3 = 930 SF/employee

Occupancy: 100,000 SF ÷ 930 SF/employee = 107.5 → **110 peak employees**

Total occupancy:

65 employees + 110 employees = **175 peak employees**

DETERMINE REQUIRED NUMBER OF SPACES

Under Section 9.040 of the Troutdale Development Code (TDC), the number of parking spaces must accommodate 1.0 – 1.5 of the number of employees under peak operations.

To provide accommodations for visitors and future growth, a factor of 1.2 is used:

No. of spaces required: 1.2 X 175 = **210 parking spaces**

Under Section 9.180.A.2 of the TDC, up to 35% of the spaces can be utilized for compact cars.

A value of 20% is used to provide reasonable accommodations:

No. of compact spaces: 0.20 X 210 = **42 compact spaces**

Under Section 1104.1 of the Oregon Structural Specialty Code, for 201-300 total spaces, 7 must be utilized as accessibility parking: **7 accessibility spaces**

Final parking space breakdown: **161 standard spaces, 42 compact spaces, 7 accessibility spaces**

DETERMINE SQUARE FOOTAGE OF PARKING AREA

Standard parking spaces

Under Section 9.180.A.1 of the TDC, standard parking sizes are 9 ft x 18 ft (162 SF)

Standard Parking Area: 162 SF X 161 spaces = **26,082 SF**

Compact parking spaces

Under Section 9.180.A.2 of the TDC, compact parking sizes are 8 ft x 16 ft (128 SF)

Compact Parking Area: 128 SF X 42 spaces = **5,376 SF**

Accessibility parking spaces

Under section 1104.1 of the Oregon Structural Specialty Code, accessibility parking sizes are 9 ft x 18 ft with a 6 ft wide striped aisle for accessibility.

Accessibility Parking Area: (9 + 6 ft) X 18 ft X 7 spaces = **1,890 SF**

Driving Aisles

Under section 9.180.B.1 of the TDC, a minimum of 25 foot aisle width must be utilized for 90 degree parking spaces. To provide sufficient maneuverability, a 30 foot aisle width is used. Since parking spaces will be located on both sides of the aisle, the total linear feet of spaces will be divided by 2.

Aisle Area: $\frac{161 \times 9\ ft + 42 \times 8\ ft + 7 \times (9\ ft + 6\ ft)}{2} \times 30\ ft =$ **28,350 SF**

TOTAL PARKING AREA:

26,082 SF + 5,376 SF + 1,890 SF + 28,350 SF = **61,698 SF or 1.41 acres**

With 10% reduction if public transit is utilized

0.90 X 61,698 SF = **55,528 SF or 1.27 acres**

CALCULATIONS FOR GAS PIPELINE RELOCATION COSTS

COST OF UNDEVELOPED LAND

Approximate Value of Land	=	$80	per square foot
Construction/Development Costs	=	- $25	per square foot
Land Tax Costs	=	- $15	per square foot
Misc. Overhead Costs	=	- $10	per square foot
TOTAL VALUE OF LAND	=	$30	per square foot

50 foot easement for gas pipeline

TOTAL VALUE PER LINEAL FOOT OF PIPELINE = ($30 per square foot) x (50 feet) = **$1500 per foot**

COST OF REMOVING PIPELINE

All dollar values acquired from the study conducted at the University of California

For a 16" diameter pipe, relocation costs are $772,869 per mile

For a 20" diameter pipe, relocation costs are $974,429 per mile

To determine the approximate cost for removing 18" diameter pipe, take the average of the two values

($772,869 + $974,429) ÷ 2 = $873,649 per mile

Convert per mile costs to a per foot basis

18" pipe:	($873,649 / mile) ÷ (5,280 ft / mile)	=	$165 per foot
20" pipe:	($974,429 / mile) ÷ (5,280 ft / mile)	=	+ $185 per foot
TOTAL COST:			**$350 per foot**

COST OF PLACING PIPELINE

Assume that the cost will experience a 10% increase from removing pipe due to increased labor time and purchasing of any pipeline material that goes beyond the length removed.

TOTAL COST: ($350 per foot) x (1.10) = **$385 per foot**

APPENDIX B
REFERENCE MATERIAL

SURVEY ORDER AND ESTIMATED TIME

Swigert Road Extension	5 days
Road cross section and ROW	
Utilities (Storm, SS, Power)	
Parcel access (driveways)	
Graham Road Improvement	7 days
Cross section ROW widening	
Sidewalks and landscape buffers (bioswale)	
Storm and SS upgrade/extension	
Parcel access (driveways)	
Signal Location	
Gas Pipeline Easement	1 day
New Lot 6 Boundaries	
Terminate lot at gas pipeline and create eastern boundary	0.5 day
Driveway access off of Swigert	0.5 day
New Lot 6A Boundaries & Driveway access off of Swigert	1 day
New Lot 6B Boundaries, Access and Pump Station Easement	1 day
Wetland Boundaries	
Wetland creation on west side of Lot 6, ~4 Ac	0.5 day
Wetland creation in area west of Sundial Road, ~20 Ac	1.5 day
TOTAL DAYS SURVEYING	**18 DAYS**

Garth Appanaitis

From: McCaffrey, Robin [Robin.McCaffrey@portofportland.com]
Sent: Friday, April 13, 2007 2:55 PM
To: Garth Appanaitis
Subject: FW: FW: FedEx Trip Rates

Garth, please see below for FedEx's response to our request for traffic data backup. It's pretty much what we figured. Please call me when you get this. Thanks.
Robin

From: bryan.smith@fedex.com [mailto:bryan.smith@fedex.com]
Sent: Friday, April 13, 2007 1:48 PM
To: Mollusky, Joseph (Joe)
Cc: Laubenthal, James M. (Jim); Pat Esquino ; McCaffrey, Robin
Subject: Re: FW: FedEx Trip Rates

Joe,

Here's an explanation of our traffic data as requested. Hopefully this answers you questions and satisfies the City and County's concerns. Please contact me if you need any additional information or require additional clarification.

We have systems in place at our facilities that monitor the vehicles as they enter and exit the site, which gives us a realistic snapshot of the traffic flows when the requirements are prepared. We look at actual arrival and departure times throughout the day at facilities of similar size and use this as a basis for forecasting traffic flow based on the projected package volume for this particular facility.

The new hub facility is projected to have 4 sorts: 12:30PM - 4:30PM, 6:00PM - 9:30PM, 10:30PM - 1:30AM, and 3:00AM - 6:30AM. In addition, our local city delivery operation has a sort from 2:30AM - 8:00AM. At the beginning of each sort, there will be an influx of traffic flow as the management and package handlers arrive. At the end of the sort, personnel depart and the cycle continues. Please note that there are essentially two separate sorts between the hours of 2:30AM and 8:00AM that are staffed independently of each other, therefore there is a higher volume of traffic at the beginning and ends of this shift. In addition, there is staff that work normal business hours and independent contractors that arrive around 6:00AM and leave in the evening (5:30PM - 7:30PM).

In summary to answer Robin's specific questions:

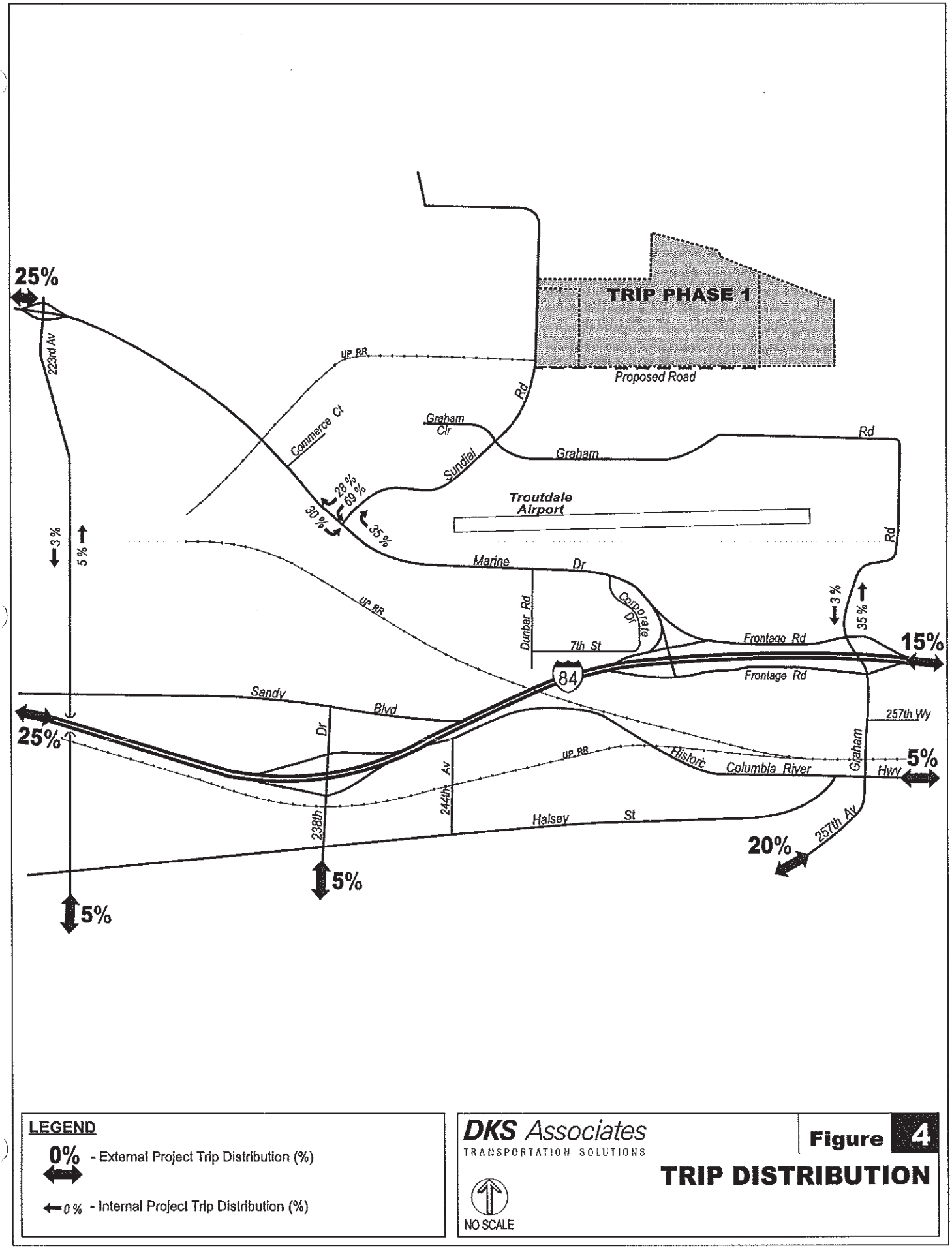
- Ideally, it would be an e-mail from someone at FedEx that says the trip gen comes from their planning model and is consistent with what they've seen at their other sites of similar size. --> The hub requirements do come from our planning model, and they are consistent with what we have seen at other hubs.
- why aren't there more AM or PM peak hour trips? --> Because our sorts run at "odd" times throughout the day, we don't have our highest traffic flows at the normal rush hour times
- are the surges in autos related to shift changes (and how many shifts to they plan to have)? --> Yes, the surges are related to the 4 hub sorts that are planned for the PORT hub

Bryan Smith
Project Engineer - F&MHS
FedEx Ground
1000 FedEx Drive
Moon Township, PA 15108

Attachment V

FedEx Ground
Full Phase Expected Traffic Flows for the Portland, OR Hub

	Automobile Full Phase		P&D Van Full Phase		Spot Trailer Full Phase		Linehaul Full Phase		Total Vehicle Flow Full Phase		
	Arrive	Depart	Arrive	Depart	Arrive	Depart	Arrive	Depart	Arrive	Depart	
00:01 - 01:00	102						16	18	118	18	00:01 - 01:00
01:01 - 02:00	5	84					18	14	23	98	01:01 - 02:00
02:01 - 03:00	251	5					22	7	273	12	02:01 - 03:00
03:01 - 04:00	156						16	7	172	7	03:01 - 04:00
04:01 - 05:00	5	9					7	31	12	40	04:01 - 05:00
05:01 - 06:00		5					5	11	5	16	05:01 - 06:00
06:01 - 07:00	223	255		83			7	11	230	349	06:01 - 07:00
07:01 - 08:00	40	238		82			5	7	45	327	07:01 - 08:00
08:01 - 09:00	5	14					11	24	16	38	08:01 - 09:00
09:01 - 10:00	5	3							5	3	09:01 - 10:00
10:01 - 11:00	14	12					5	29	19	41	10:01 - 11:00
11:01 - 12:00	325	5					5	5	330	10	11:01 - 12:00
12:01 - 13:00	5							5	5	5	12:01 - 13:00
13:01 - 14:00		14					11	7	11	21	13:01 - 14:00
14:01 - 15:00	90	5					7	5	97	10	14:01 - 15:00
15:01 - 16:00							7		7		15:01 - 16:00
16:01 - 17:00	5	307	83			18	7		95	325	16:01 - 17:00
17:01 - 18:00	241	40	82		18	18	20	4	361	62	17:01 - 18:00
18:01 - 19:00	9	226			18	18	7	7	34	251	18:01 - 19:00
19:01 - 20:00	5	6			18	17	20	7	43	30	19:01 - 20:00
20:01 - 21:00	5	14			17		16	18	38	32	20:01 - 21:00
21:01 - 22:00	5	261					16	13	21	274	21:01 - 22:00
22:01 - 23:00	98	6					11	18	109	24	22:01 - 23:00
23:01 - 24:00	5	90					16	7	21	97	23:01 - 24:00
Total	1599	1599	165	165	71	71	255	255	2090	2090	Total



LEGEND

0% - External Project Trip Distribution (%)

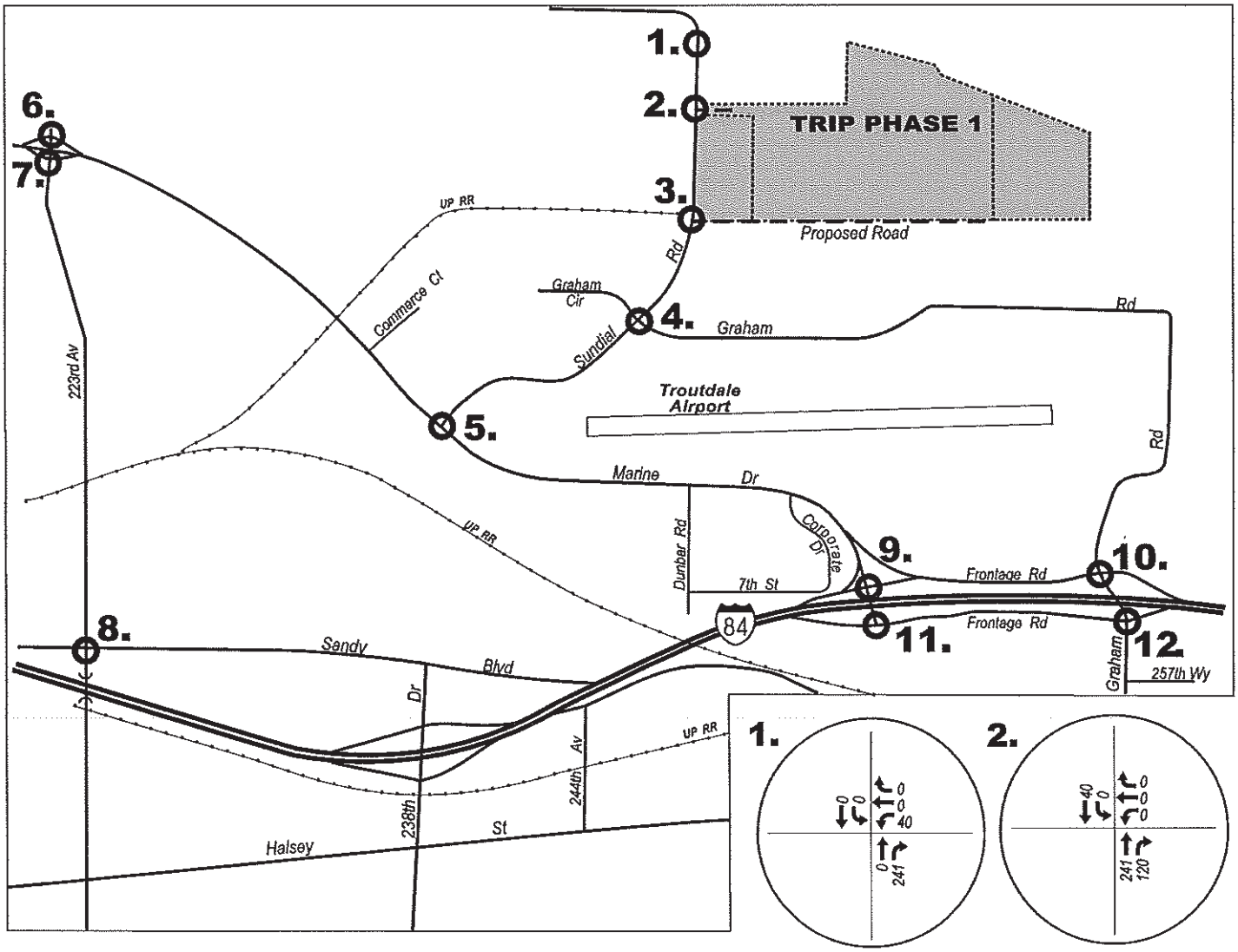
0 % - Internal Project Trip Distribution (%)

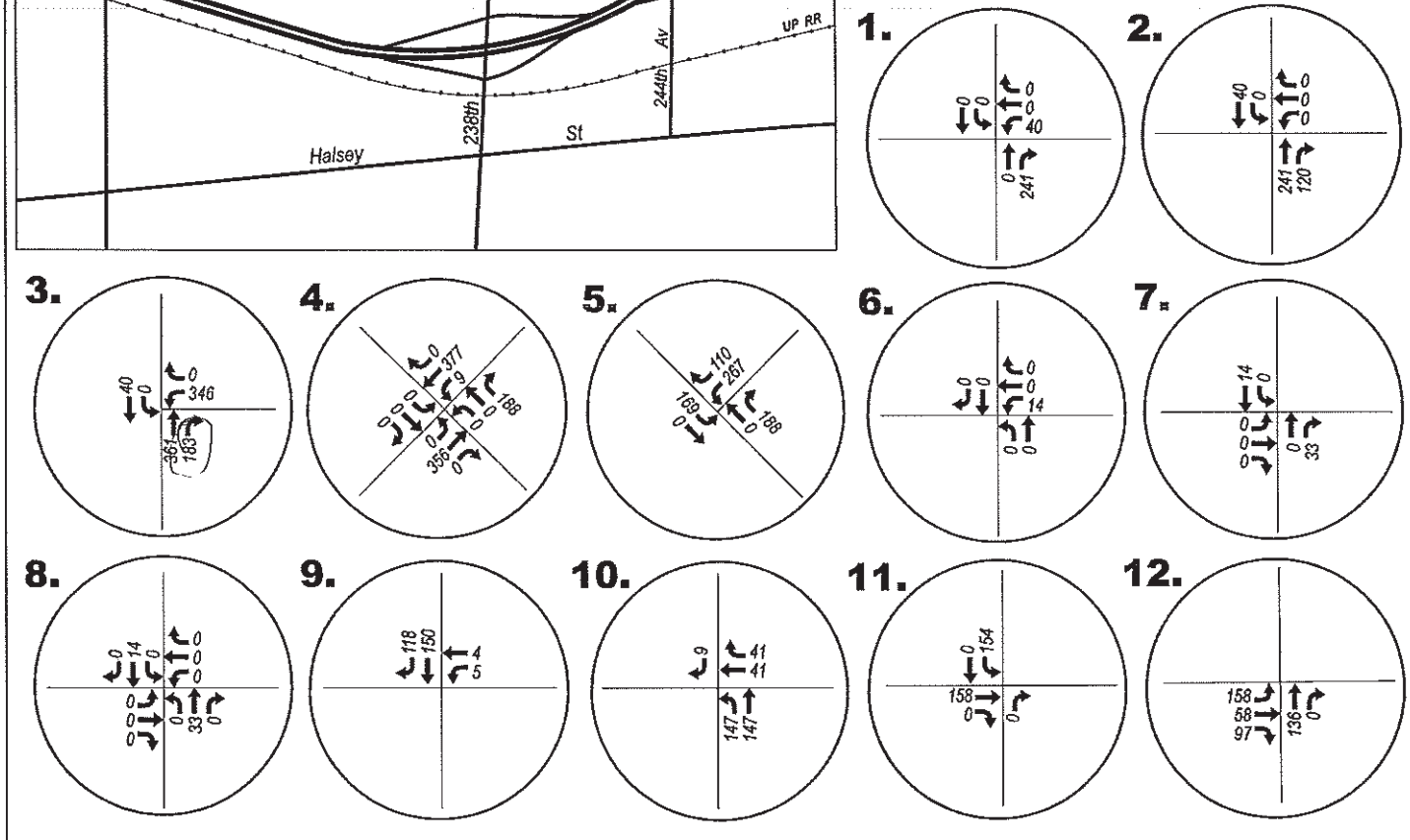
DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

Figure 4

TRIP DISTRIBUTION





LEGEND

O - Study Intersection

- PM Peak Hour Traffic Volumes

DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

Figure 5

PROJECT PM PEAK HOUR TRIP ASSIGNMENT

INSTITUTE OF TRANSPORTATION ENGINEERS
TRIP GENERATION RATE (PM Peak Hour)

(Trip Generation Manual, 8th Edition)

Code	Description	Unit of Measure	Trips Per Unit	
PORT AND TERMINAL				
30	Truck Terminal	Acres	6.55	
90	Park and Ride Lot with Bus Service	Parking Spaces	0.62	
INDUSTRIAL				
110	General Light Industrial	1,000 SF	0.97	
120	General Heavy Industrial	Acres	2.16	
130	Industrial Park	1,000 SF	0.86	
140	Manufacturing	1,000 SF	0.73	
150	Warehousing	1,000 SF	0.32	
151	Mini-Warehouse	1,000 SF	0.26	
152	High-Cube Warehouse	1,000 SF	0.10	
170	Utilities	1,000 SF	0.76	
RESIDENTIAL				
210	Single-Family Detached Housing	Dwelling Units	1.01	
220	Apartment	Dwelling Units	0.62	
230	Residential Condominium / Townhouse	Dwelling Units	0.52	
240	Mobile Home Park	Dwelling Units	0.59	
251	Senior Adult Housing - Detached	Dwelling Units	0.27	
252	Senior Adult Housing - Attached	Dwelling Units	0.16	
253	Congregate Care Facility	Dwelling Units	0.17	
254	Assisted Living	Beds	0.22	
255	Continuing Care Retirement Community	Dwelling Units	0.29	
LODGING				
310	Hotel	Rooms	0.59	
320	Motel	Rooms	0.47	
330	Resort Hotel	Rooms	0.42	
RECREATIONAL				
411	City Park	Acres	0.16	*
412	County Park	Acres	0.06	
413	State Park	Acres	0.07	*
415	Beach Park	Acres	1.30	
416	Campground / Recreation Vehicle Park	Camp Sites	0.37	
417	Regional Park	Acres	0.20	
420	Marina	Berths	0.19	
430	Golf Course	Acres	0.30	
431	Miniature Golf Course	Holes	0.33	
432	Golf Driving Range	Tees / Driving Positions	1.25	
433	Batting Cages	Cages	2.22	
435	Multi-Purpose Recreational Facility	Acres	5.77	
437	Bowling Alley	1,000 SF	3.54	
441	Live Theater	Seats	0.02	
443	Movie Theater without Matinee	1,000 SF	6.16	
444	Movie Theater with Matinee	1,000 SF	3.80	
445	Multiplex Movie Theater	1,000 SF	4.91	
452	Horse Race Track	Acres	4.30	*
454	Dog Race Track	Attendance Capacity	0.15	
460	Arena	Acres	3.33	*
473	Casino / Video Lottery Establishment	1,000 SF	13.43	
480	Amusement Park	Acres	3.95	
488	Soccer Complex	Fields	20.67	
490	Tennis Courts	Courts	3.88	
491	Racquet / Tennis Club	Courts	3.35	
492	Health / Fitness Club	1,000 SF	3.53	
493	Athletic Club	1,000 SF	5.96	
495	Recreational Community Center	1,000 SF	1.45	
INSTITUTIONAL				
520	Elementary School	1,000 SF	1.21	
522	Middle School / Junior High School	1,000 SF	1.19	
530	High School	1,000 SF	0.97	
536	Private School (K-12)	Students	0.17	
540	Junior / Community College	1,000 SF	2.54	
560	Church	1,000 SF	0.55	
565	Daycare Center	1,000 SF	12.46	
566	Cemetery	Acres	0.84	
571	Prison	1,000 SF	2.91	
590	Library	1,000 SF	7.30	
591	Lodge / Fraternal Organization	Members	0.03	
MEDICAL				
610	Hospital	1,000 SF	1.14	
620	Nursing Home	1,000 SF	0.74	
630	Clinic	1,000 SF	5.18	
640	Animal Hospital / Veterinary Clinic	1,000 SF	4.72	

Code	Description	Unit of Measure	Trips Per Unit
OFFICE			
710	General Office Building	1,000 SF	1.49
714	Corporate Headquarters Building	1,000 SF	1.40
715	Single Tenant Office Building	1,000 SF	1.73
720	Medical-Dental Office Building	1,000 SF	3.46
730	Government Office Building	1,000 SF	1.21
732	United States Post Office	1,000 SF	11.12
733	Government Office Complex	1,000 SF	2.85
750	Office Park	1,000 SF	1.48
760	Research and Development Center	1,000 SF	1.07
770	Business Park	1,000 SF	1.29
RETAIL			
812	Building Materials and Lumber Store	1,000 SF	4.49
813	Free-Standing Discount Superstore	1,000 SF	4.61
814	Specialty Retail Center	1,000 SF	2.71
815	Free Standing Discount Store	1,000 SF	5.00
816	Hardware / Paint Store	1,000 SF	4.84
817	Nursery (Garden Center)	1,000 SF	3.80
818	Nursery (Wholesale)	1,000 SF	5.17
820	Shopping Center	1,000 SF	3.73
823	Factory Outlet Center	1,000 SF	2.29
841	New Car Sales	1,000 SF	2.59
843	Automobile Parts Sales	1,000 SF	5.98
848	Tire Store	1,000 SF	4.15
850	Supermarket	1,000 SF	10.50
851	Convenience Market (Open 24 Hours)	1,000 SF	52.41
852	Convenience Market (Open 15-16 Hours)	1,000 SF	34.57
853	Convenience Market with Gasoline Pumps	1,000 SF	59.69
854	Discount Supermarket	1,000 SF	8.90
857	Discount Club	1,000 SF	4.24
860	Wholesale Market	1,000 SF	0.88
861	Sporting Goods Superstore	1,000 SF	3.10
862	Home Improvement Superstore	1,000 SF	2.37
863	Electronics Superstore	1,000 SF	4.50
864	Toy / Children's Superstore	1,000 SF	4.99
866	Pet Supply Superstore	1,000 SF	3.38
867	Office Supply Superstore	1,000 SF	3.40
875	Department Store	1,000 SF	1.78
876	Apparel Store	1,000 SF	3.83
879	Arts and Craft Store	1,000 SF	6.21
880	Pharmacy / Drugstore without Drive-Through Window	1,000 SF	8.42
881	Pharmacy / Drugstore with Drive-Through Window	1,000 SF	10.35
890	Furniture Store	1,000 SF	0.45
896	Video Rental Store	1,000 SF	13.60
SERVICES			
911	Walk-In Bank	1,000 SF	12.13
912	Drive-In Bank	1,000 SF	25.82
925	Drinking Place	1,000 SF	11.34
931	Quality Restaurant	1,000 SF	7.49
932	High-Turnover (Sit-Down) Restaurant	1,000 SF	11.15
933	Fast Food Restaurant without Drive-Through Window	1,000 SF	26.15
934	Fast Food Restaurant with Drive-Through Window	1,000 SF	33.84
935	Fast Food Restaurant with Drive-Through Window and No Indoor Seating	1,000 SF	153.85
936	Coffee / Donut Shop without Drive-Through Window	1,000 SF	40.75
937	Coffee / Donut Shop with Drive-Through Window	1,000 SF	42.93
938	Coffee / Donut Shop with Drive-Through Window and No Indoor Seating	1,000 SF	75
940	Bread / Donut / Bagel Shop with Drive-Through Window	1,000 SF	19.56
941	Quick Lubrication Vehicle Shop	Service Bays	5.19
942	Automobile Care Center	1,000 SF	3.38
943	Automobile Parts and Service Center	1,000 SF	4.46
944	Gasoline / Service Station	Fueling Positions	13.87
945	Gasoline / Service Station with Convenience Market	Fueling Positions	13.38
946	Gasoline / Service Station with Convenience Market and Car Wash	Fueling Positions	13.94
947	Self Service Car Wash	Stalls	5.54
948	Automated Car Wash	1,000 SF	14.12

Note: All land uses in the 800 and 900 series are entitled to a "passby" trip reduction of 60% if less than 50,000 ft^2 or a reduction of 40% if equal to or greater than 50,000 ft^2.

* Approximated by 10% of Weekday average rate.

DKS Associates
TRANSPORTATION SOLUTIONS

City of Troutdale
Transportation System Plan

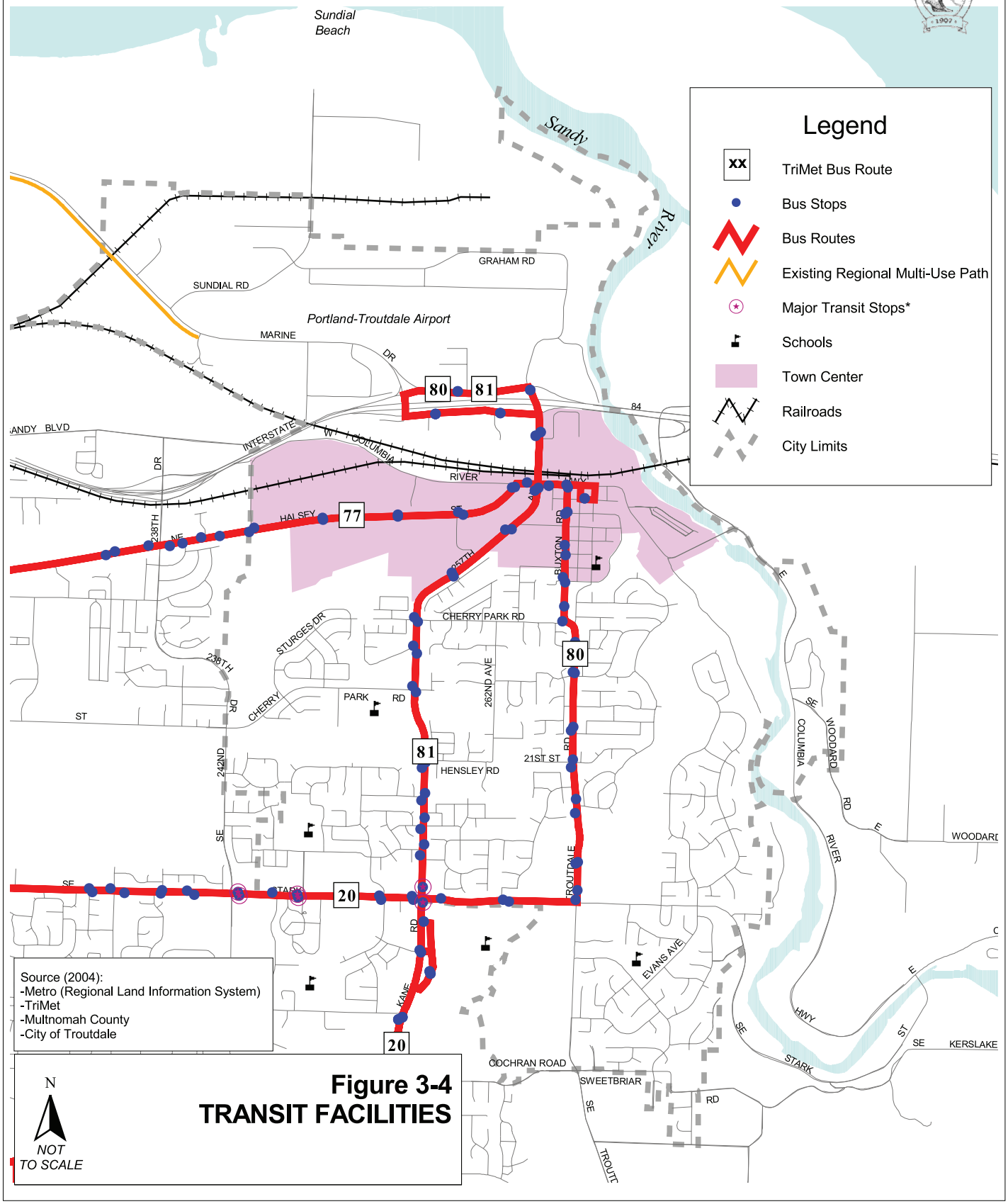


Figure 3-4
TRANSIT FACILITIES

* Major Transit Stops are defined as major bus stops, transit centers and light-rail stations on the regional transit network. They provide schedule information, lighting, benches, shelters and trash cans.

DKS Associates
TRANSPORTATION SOLUTIONS

City of Troutdale
Transportation System Plan

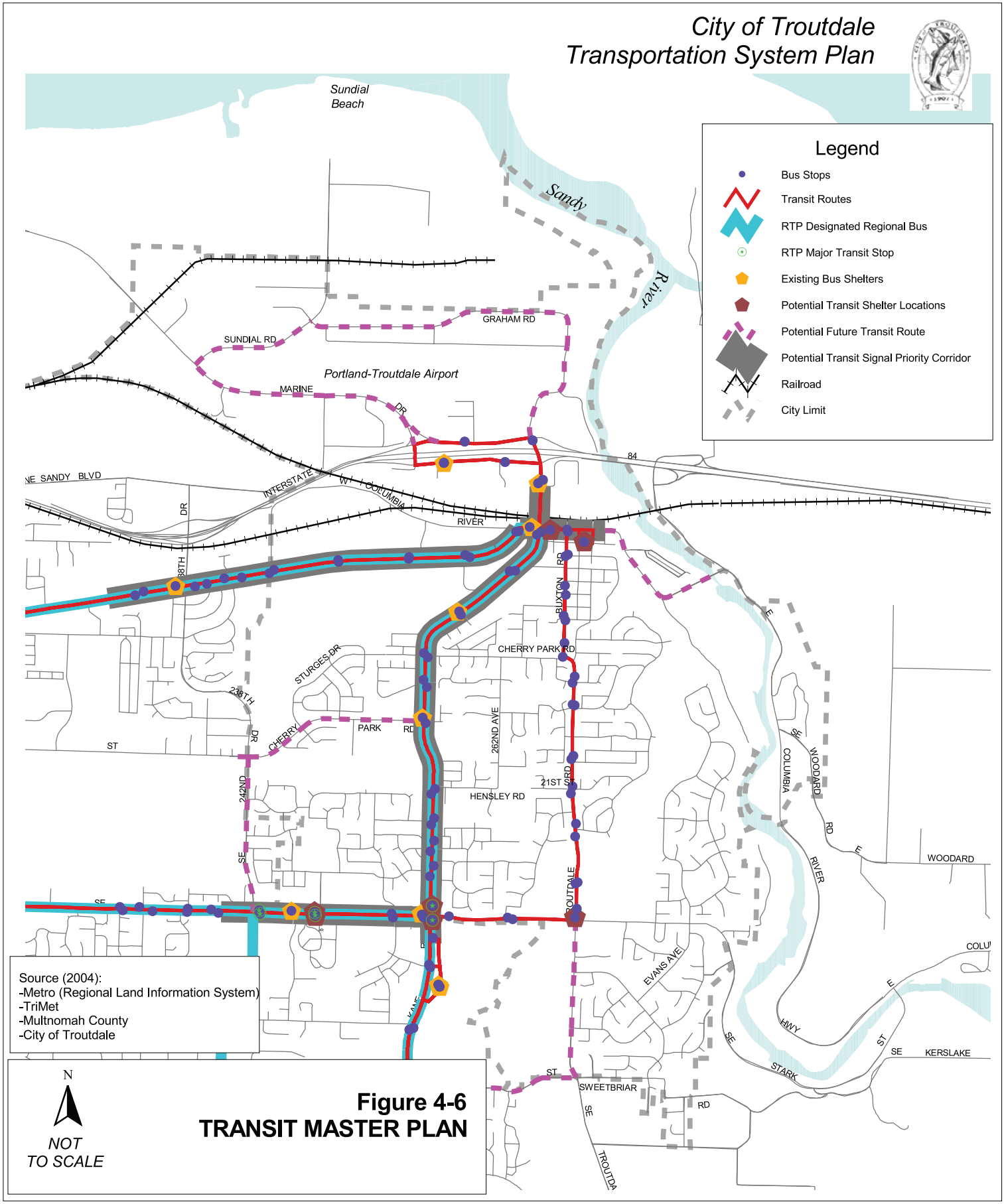


Figure 4-6
TRANSIT MASTER PLAN

RS MEANS COSTS FOR STRUCTURES

RSMeans QuickCost Estimator

Project Title:	TRIP
Model:	Warehouse
Construction:	Tiltup Concrete Panels / Steel Frame
Location:	PORTLAND, OR
Stories:	1
Story Height (l.f.):	24
Floor Area (s.f.):	100,000
Data Release:	Year 2010 Quarter 1
Wage Rate:	Union
Basement:	Not included

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

Cost Ranges	Low	Med	High
Total:	$4,927,050	$5,474,500	$6,843,125
Contractor's Overhead & Profit:	$1,231,650	$1,368,500	$1,710,625
Architectural Fees:	$431,100	$479,000	$598,750
Total Building Cost:	**$6,589,800**	**$7,322,000**	**$9,152,500**

RSMeans QuickCost Estimator

Project Title:	TRIP
Model:	Office 1 Story
Construction:	Wood Siding / Wood Truss
Location:	PORTLAND, OR
Stories:	1
Story Height (l.f.):	12
Floor Area (s.f.):	20,000
Data Release:	Year 2010 Quarter 1
Wage Rate:	Union
Basement:	Not included

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

Cost Ranges	Low	Med	High
Total:	$1,820,700	$2,023,000	$2,528,750
Contractor's Overhead & Profit:	$455,400	$506,000	$632,500
Architectural Fees:	$159,300	$177,000	$221,250
Total Building Cost:	**$2,435,400**	**$2,706,000**	**$3,382,500**

APPENDIX C
DESIGN DOCUMENTS

APPENDIX D
PRELIMINARY COST ESTIMATE

TRIP Phase 2 Cost Estimate

Transportation

Item No.	Item Description	Quantity	Unit	Unit Price	Item Total
1.01	Aggregate Base	4817	CY	$32.00	$154,144.00
1.02	Level 3 & 2, 1/2-inch, Dense Graded HMAC	3944	TON	$68.00	$268,192.00
1.03	Concrete Sidewalk	113885	SF	$3.25	$370,126.25
1.04	Concrete Curb and Gutter	14085	LF	$12.00	$169,020.00
1.05	Traffic Signal	1	LS	$200,000.00	$200,000.00
1.06	Swale/Landscaping	1	LS	$150,000.00	$150,000.00
1.07	3" Cold Plane Pavement Removal	5028	SY	$10.00	$50,280.00
1.08	General Excavation	20111	CY	$7.00	$140,777.00
1.09	Street Lighting	1	LS	$966,000.00	$966,000.00
1.10	Traffic Control	1	LS	$200,000.00	$200,000.00
				Transportation Subtotal =	$2,668,539

Structures

Item No.	Item Description	Quantity	Unit	Unit Price	Item Total
2.01	10 Ton Crane	1	EA	$65,000.00	$65,000.00
2.02	Tilt-Up Concrete Construction	100000	SF	$75.00	$7,500,000.00
2.03	Office Building	20000	SF	$140.00	$2,800,000.00
2.04	HVAC	1	LS	$50,000.00	$50,000.00
2.05	Mechanical, plumbing, etc	1	LS	$65,000.00	$65,000.00
2.06	Roofing Materials	120000	SF	$8.00	$960,000.00
2.07	LEED Certification	1	LS	$8,700.00	$8,700.00
2.08	Parking Lot - Pervious Asphalt (HMAC Type D)	1679	TON	$78.20	$131,297.80
2.09	Parking Lot - Recycled Aggregate Base	3859	CY	$5.50	$21,224.50
				Structures Subtotal =	$11,601,222

Stormwater Conveyance Infrastructure

Item No.	Item Description	Quantity	Unit	Unit Price	Item Total
3.01	48" Concrete Pipe	905	LF	$250.00	$226,250.00
3.02	Catch Basin	14	EA	$1,500.00	$21,000.00
3.03	Manhole	1	EA	$5,000.00	$5,000.00
3.04	12" RCP Sewer Pipe	150	LF	$75.00	$11,250.00
3.05	Drain Rock, 12" Depth	6230	SY	$5.00	$31,150.00
3.06	Swale Topsoil, 12" Depth	6230	SY	$30.00	$186,900.00
3.07	6" Perf PVC Pipe	6230	LF	$9.00	$56,070.00
3.08	Drainage Geotextile	2800	SY	$3.20	$8,960.00
3.09	Miscellaneaous	1	LS	$50,000.00	$50,000.00
				Stormwater Infrastructure Subtotal =	$596,580

Wetland Mitigation

Item No.	Item Description	Quantity	Unit	Unit Price	Item Total
4.01	Mobilization, Surveying, Cleanup, & Demobilization	1	LS	$100,000.00	$100,000.00
4.02	Area Seeding	16	ACRE	$2,000.00	$32,000.00
4.03	Fill Material, Sand	25813	CY	$20.27	$523,229.51
4.04	Stripping and Grubbing	12907	CY	$15.00	$193,605.00
4.05	Topsoil	6453	SY	$28.00	$180,684.00
				Wetland Mitigation Subtotal =	$1,029,519

Building Foundation

Item No.	Item Description	Quantity	Unit	Unit Price	Item Total
5.01	APGD Piles	11250	FT	$70.00	$787,500.00
5.02	Slab-on-Grade 1-foot thick	13350	CY	$13.54	$180,759.00
5.03	General Excavation	6675	CY	$15.00	$100,125.00
5.04	Dust/Erosion Control	1	LS	$17,000.00	$17,000.00
5.05	Mobilization, Cleanup, & Demobilization	1	LS	$200,000.00	$200,000.00
				Building Foundation Subtotal =	$1,285,384

Sanitary Sewer					
Item No.	**Item Description**	**Quantity**	**Unit**	**Unit Price**	**Item Total**
6.01	Pump Station	1	EA	$500,000.00	$500,000.00
6.02	8" Gravity Sewer	2375	FT	$144.00	$342,000.00
6.03	Manholes	10	EA	$6,000.00	$60,000.00
6.04	4" Force Main	370	LF	$50.00	$18,500.00
6.05	Connect to Existing	1	EA	$2,500.00	$2,500.00
				Building Foundation Subtotal =	$923,000

Subtotal TOTAL =	$18,104,244
10% for Engineering Services =	$1,810,424
10% Contingency =	$1,810,424
GRAND TOTAL =	$21,725,093

Transportation Cost Estimate Calculations

Swigert Way

ITEM	width (ft)	Length (ft)	Area (ft^2)	NOTES
Sidewalk/Curb	7	2975	43925	South side of Extg Swigert Way
	7	2 sides x 1650	23100	Both sides of Swigert extension
	Total =	6275	67025	

ITEM	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Tons	NOTES
Asphalt	1650	33	0.58	31762.5	2382	Swigert Way extension

ITEM	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Volume (yd^3)	NOTES
Aggregate Base	1650	38	0.67	41758.2	1546.6	Under Swigert Way
	6275	7	0.17	7320.8	271.1	Under Sidewalk
				Total=	1818	

ITEM	Quantity	NOTES
Lighting	57 light poles	(located 1 every 100 ft along both sidse of Siwgert)

ITEM	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Volume (yd^3)	NOTES
General Excavation	1650	70	2.5	288750	10694	Swigert Extenstion (Assume 2.5 ft deep)
	2975	16	2.5	119000	4407	Sidewalk/Landscape along Extg Swigert
				Total =	15102	

Graham Rd.

ITEM	width (ft)	Length (ft)	Area (ft^2)	NOTES
Sidewalk/Curb	6	1810	10860	Graham Rd Widening
	6	6000	36000	Graham Rd Extg 34' Section
	Total =	7810	46860	

ITEM	Length (ft)	Width (ft)	Area (ft^2)	Area (yd^2)	NOTES
3" Cold Plane Pavement Removal	1810	25	45250	5028	22ft wide section of Graham Rd

ITEM	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Tons	NOTES
Asphalt	1810	9	0.58	9497	713	Widening 22ft section of Graham Rd
	1810	25	0.25	11313	849	Extg asphalt from edge to edge is approx. 25-ft wide
				Total=	1562	

ITEM	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Volume (yd^3)	NOTES
Aggregate Base	1810	11.5	0.67	13863	513	Under Graham Rd widening
	7810	5	0.17	6506	241	Under Sidewalk
				Total=	754	

ITEM	Length (ft)	# Light Poles	NOTES
Lighting	6000	60	Light pole every 100ft.

ITEM	Length (ft)	Width (ft)	Depth (ft)	Volume (ft^3)	Volume (yd^3)	NOTES
General Excavation	1810	10	2.5	45250	1676	Graham widening (Assume 2.5 ft deep)
	6000	6	2.5	90000	3333	Extg Graham Sidewalk (Assume 2.5 ft deep)
				Total =	5009	

Street Lighting Lump Sum Estimate	
Phase 1 estimate for 27 Light Poles=	$223,000
Phase 2 for 117 poles = 223000*(117/27)=	$966,333

Multi-Use Path on Levee

ITEM	width (ft)	Depth (ft)	Length (ft)	Volume (ft3)	Volume (yd3)	NOTES
Aggregate Base	10	0.666	9100	60606	2245	South side of Extg Swigert Wa
				Total=	2245	

	TOTAL QTY	Unit
Curb	14085	LF
Sidewalk	113885	SF
Asphalt	3944	TON
Aggregate Base	4817	CY
Cold Plane Pvmt Rmvl	5028	SY
Light Poles	117	EA
General Excavation	20111	CY

Structures Cost Estimate Calculations

ITEM	Area (acres)	Area (sq. ft)	Depth (ft)	Volume (ft^3)	Tons
2.08- Pervious Asphalt	2.05	89298	0.25	22324.5	1679

Cost is 15% greater than regular asphalt.
From bid tabs for Phase I: BI #0082 = $68.00 / ton
$68.00 x 1.15 = **$78.20 / ton**

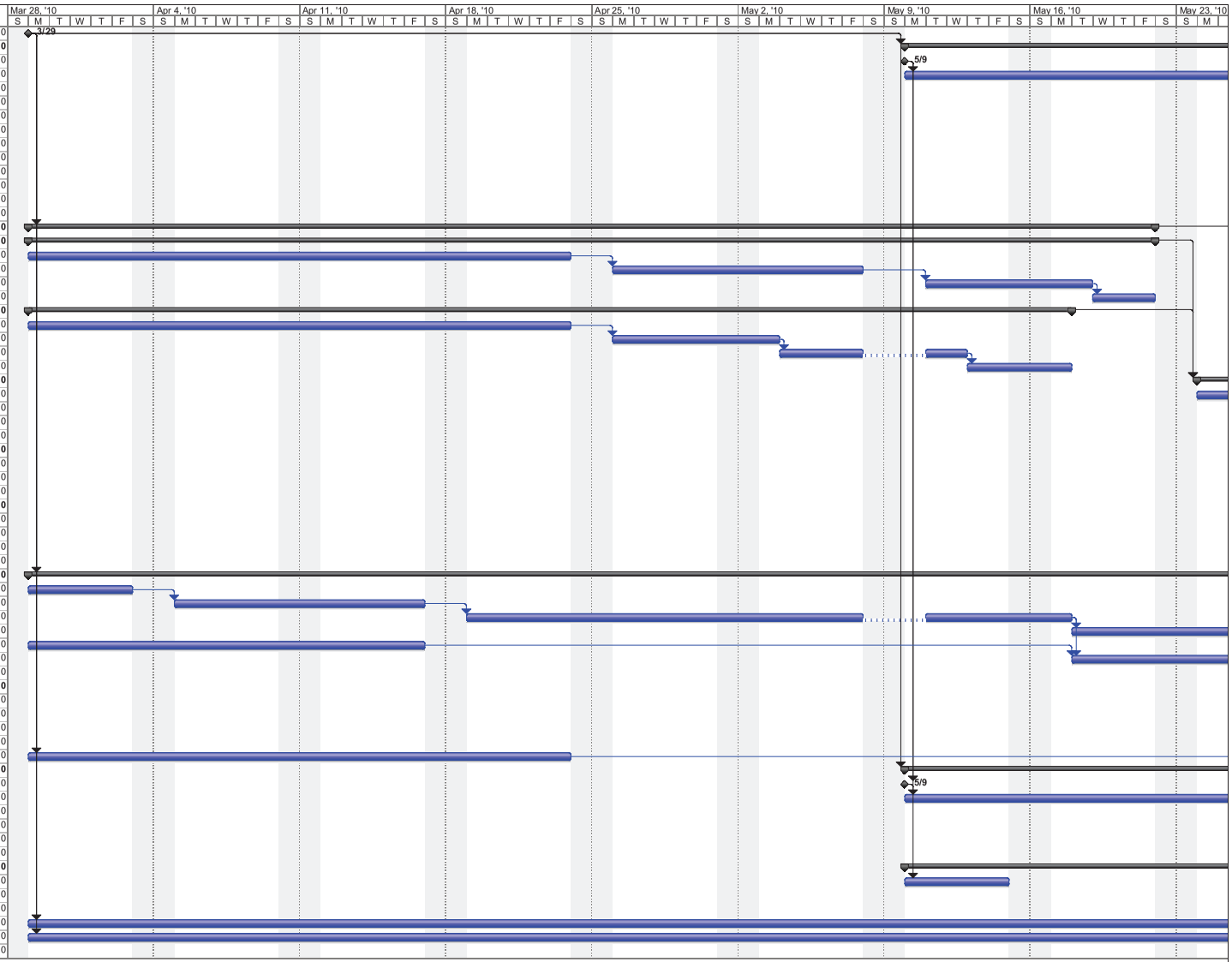
ITEM	Area (acres)	Area (sq. ft)	Depth (ft)	Volume (ft^3)	Volume (yd^3)
2.09- Recycled Aggregate	2.05	89298	1.17	104181	3858.6

Estimated Sanitary Sewer Construction Costs

Extension of Phase I Swigert System.			
8” Gravity Sewer	375 ft @ $160/ft	=	60,000
Manhole	1 @ $6,000	=	6,000
			$ 66,000
Area 2 (South half Lots 4 & 5).			
8” Gravity Sewer	900 ft @ $130/ft	=	117,000
Manholes	3 @ $6,000/each	=	18,000
Connect to existing	1 @ 2,500	=	2,500
			$ 137,500
Area 3 (Lots 6B, 7 & 10).			
Pump Station	1 @ $500,000	=	500, 000
8” Gravity Sewer	1,100 ft @ $150/ft	=	165,000
Manholes	6 @ $6,000/ea	=	36,000
4“ Force Main	370 LF @ $50/ft	=	18,500
			$ 719,500
		TOTAL	**$ 923, 000**

APPENDIX E
PRELIMINARY PROJECT SCHEDULE

ID	Task Name	Duration	Start	Finish
1	Begin Design	0 days	Mon 3/29/10	Mon 3/29/10
2	**Plan Review**	**93 days**	**Sun 5/9/10**	**Wed 9/15/10**
3	Submit 30% plans	0 days	Sun 5/9/10	Sun 5/9/10
4	Client & agent review of 30% plans	15 days	Mon 5/10/10	Fri 5/28/10
5	Submit 60% plans	0 days	Mon 6/21/10	Mon 6/21/10
6	Client & agent review	15 days	Mon 6/21/10	Fri 7/9/10
7	Make corrections to plans	5 days	Mon 7/12/10	Fri 7/16/10
8	Submit 90% plans	0 days	Mon 8/2/10	Mon 8/2/10
9	Client & agent review of 90% plans	10 days	Mon 8/2/10	Fri 8/13/10
10	Make corrections to plans	5 days	Mon 8/16/10	Fri 8/20/10
11	Submit 100% plans	0 days	Wed 9/8/10	Wed 9/8/10
12	Final corrections	3 days	Thu 9/9/10	Mon 9/13/10
13	Final approval	2 days	Tue 9/14/10	Wed 9/15/10
14	Submit final design	0 days	Wed 9/15/10	Wed 9/15/10
15	**Roadway Design**	**40 days**	**Mon 3/29/10**	**Fri 5/21/10**
16	**Swigert Way**	**40 days**	**Mon 3/29/10**	**Fri 5/21/10**
17	Scope development	20 days	Mon 3/29/10	Fri 4/23/10
18	Finalize horizontal & vertical alignments	10 days	Mon 4/26/10	Fri 5/7/10
19	Provide sustainable design features	6 days	Tue 5/11/10	Tue 5/18/10
20	Finalize roadway design	3 days	Wed 5/19/10	Fri 5/21/10
21	**Graham Road**	**36 days**	**Mon 3/29/10**	**Mon 5/17/10**
22	Scope development	20 days	Mon 3/29/10	Fri 4/23/10
23	Finalize horizontal & vertical alignments	6 days	Mon 4/26/10	Mon 5/3/10
24	Provide sustainable design features	6 days	Tue 5/4/10	Wed 5/12/10
25	Finalize roadway design	3 days	Thu 5/13/10	Mon 5/17/10
26	**Intersection Design: Graham & Sundial**	**48 days**	**Mon 5/24/10**	**Wed 7/28/10**
27	Turning movement design/analysis	10 days	Mon 5/24/10	Fri 6/4/10
28	Traffic signal design	15 days	Mon 6/7/10	Mon 6/28/10
29	Pedestrian facility design	15 days	Tue 6/29/10	Mon 7/26/10
30	Finalize intersection design	2 days	Tue 7/27/10	Wed 7/28/10
31	**Storm Drainage Design**	**23 days**	**Tue 6/8/10**	**Thu 7/8/10**
32	Determine capacity for drainage from new impervious sur	15 days	Tue 6/8/10	Tue 6/29/10
33	Determine treatment facility location	5 days	Wed 6/30/10	Tue 7/6/10
34	Finalize drainage design	2 days	Wed 7/7/10	Thu 7/8/10
35	**Wetland Replacement Project**	**37 days**	**Tue 6/8/10**	**Wed 7/28/10**
36	Determine acres of lost wetland	5 days	Tue 6/8/10	Mon 6/14/10
37	Design appropriate wetland mitigation and site	5 days	Tue 6/15/10	Tue 6/22/10
38	Contact EPA about wetland mitigation	20 days	Wed 6/23/10	Tue 7/27/10
39	Finalize plans	1 day	Wed 7/28/10	Wed 7/28/10
40	**Manufacturing and office building design**	**51 days**	**Mon 3/29/10**	**Mon 6/7/10**
41	Address LEED requirements	5 days	Mon 3/29/10	Fri 4/2/10
42	Calculate crane loads	10 days	Mon 4/5/10	Fri 4/16/10
43	Design structure foundation	20 days	Mon 4/19/10	Mon 5/17/10
44	Parking/street access design	15 days	Tue 5/18/10	Mon 6/7/10
45	Office space design	15 days	Mon 3/29/10	Fri 4/16/10
46	Provide sustainable design features	10 days	Tue 5/18/10	Mon 5/31/10
47	Finalize structural designs	4 days	Tue 6/1/10	Fri 6/4/10
48	**Utility Plan**	**44 days**	**Fri 7/9/10**	**Wed 9/8/10**
49	Design storm plan	15 days	Fri 7/9/10	Fri 8/6/10
50	Design sanitary sewer system plan	10 days	Mon 8/9/10	Fri 8/27/10
51	Design electrical utility plan	6 days	Mon 8/30/10	Mon 9/6/10
52	Finalize utility plan	2 days	Tue 9/7/10	Wed 9/8/10
53	Contaminated Soil Construction Practices Design Detail	20 days	Mon 3/29/10	Fri 4/23/10
54	**Permitting**	**96 days**	**Sun 5/9/10**	**Mon 9/20/10**
55	Apply for permits	0 days	Sun 5/9/10	Sun 5/9/10
56	Agency review	15 days	Mon 5/10/10	Fri 5/28/10
57	Public review	30 days	Mon 5/31/10	Fri 7/9/10
58	Final review	15 days	Mon 7/12/10	Fri 7/30/10
59	Permit issuance	15 days	Tue 8/3/10	Mon 8/23/10
60	Final design drawing submittal	3 days	Thu 9/16/10	Mon 9/20/10
61	**LEED**	**90 days**	**Mon 5/10/10**	**Fri 9/10/10**
62	Register project for LEED certification	5 days	Mon 5/10/10	Fri 5/14/10
63	Submit preliminary design documentation	15 days	Mon 8/2/10	Fri 8/20/10
64	LEED approval	15 days	Mon 8/23/10	Fri 9/10/10
65	Update Schedule (ongoing)	130 days	Mon 3/29/10	Fri 9/24/10
66	Update Construction Cost Estimate (ongoing)	130 days	Mon 3/29/10	Fri 9/24/10
67	Complete Design	0 days	Mon 9/27/10	Mon 9/27/10

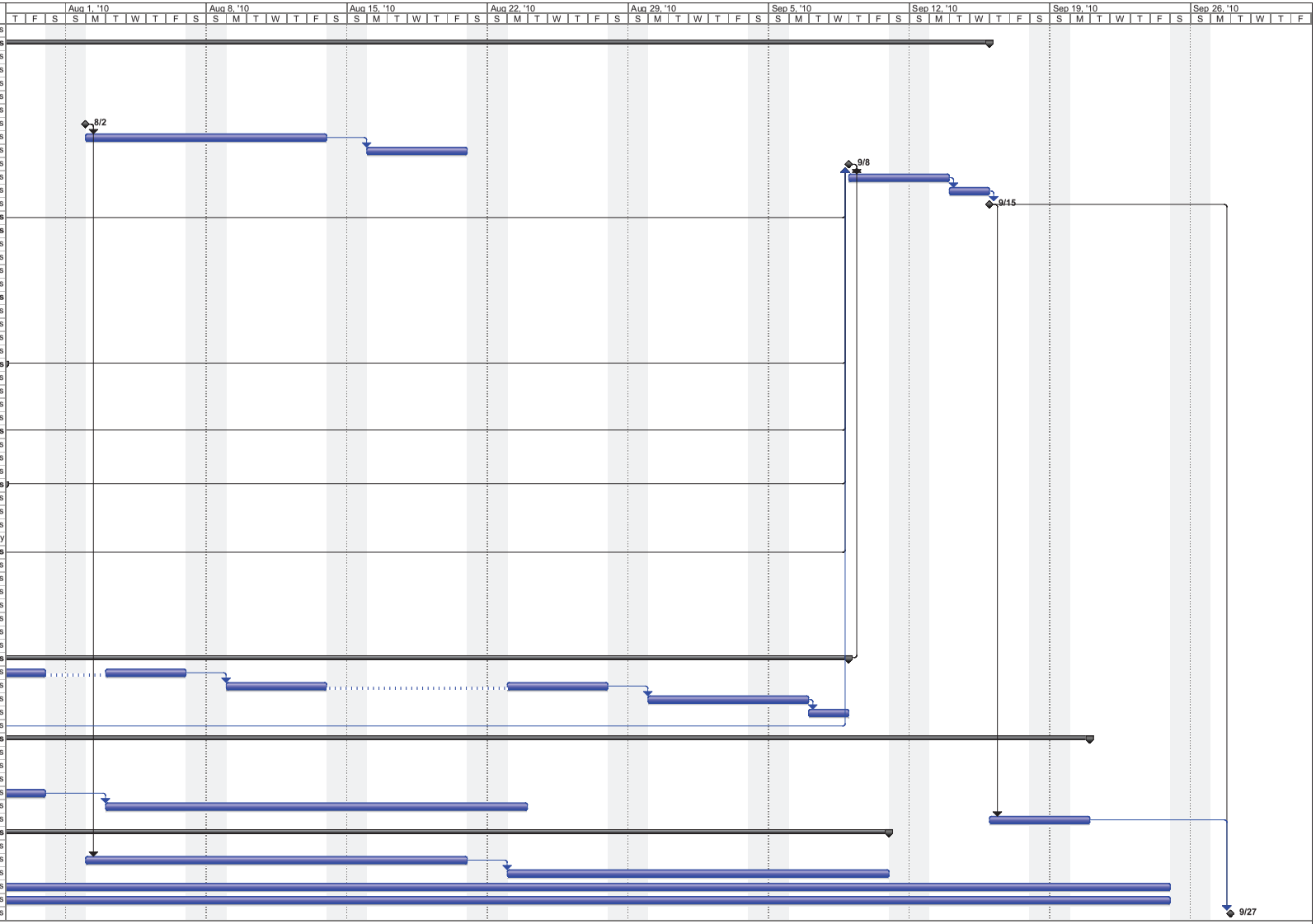


Project: Troutdale Reynolds Industrial
Date: Tue 3/9/10

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone


ID
Task Name
Duration
0
May 30, '10
Jun 6, '10
Jun 13, '10
Jun 20, '10
Jun 27, '10
Jul 4, '10
Jul 11, '10
Jul 18, '10
Jul 25, '10
T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W
1 Begin Design 0 days
2 Plan Review 93 days
3 Submit 30% plans 0 days
4 Client & agent review of 30% plans 15 days
5 Submit 60% plans 0 days
6 Client & agent review 15 days
7 Make corrections to plans 5 days
8 Submit 90% plans 0 days
9 Client & agent review of 90% plans 10 days
10 Make corrections to plans 5 days
11 Submit 100% plans 0 days
12 Final corrections 3 days
13 Final approval 2 days
14 Submit final design 0 days
15 Roadway Design 40 days
16 Swigert Way 40 days
17 Scope development 20 days
18 Finalize horizontal & vertical alignments 10 days
19 Provide sustainable design features 6 days
20 Finalize roadway design 3 days
21 Graham Road 36 days
22 Scope development 20 days
23 Finalize horizontal & vertical alignments 6 days
24 Provide sustainable design features 6 days
25 Finalize roadway design 3 days
26 Intersection Design: Graham & Sundial 48 days
27 Turning movement design/analysis 10 days
28 Traffic signal design 15 days
29 Pedestrian facility design 15 days
30 Finalize intersection design 2 days
31 Storm Drainage Design 23 days
32 Determine capacity for drainage from new impervious su 15 days
33 Determine treatment facility location 5 days
34 Finalize drainage design 2 days
35 Wetland Replacement Project 37 days
36 Determine acres of lost wetland 5 days
37 Design appropriate wetland mitigation and site 5 days
38 Contact EPA about wetland mitigation 20 days
39 Finalize plans 1 day
40 Manufacturing and office building design 51 days
41 Address LEED requirements 5 days
42 Calculate crane loads 10 days
43 Design structure foundation 20 days
44 Parking/street access design 15 days
45 Office space design 15 days
46 Provide sustainable design features 10 days
47 Finalize structural designs 4 days
48 Utility Plan 44 days
49 Design storm plan 15 days
50 Design sanitary sewer system plan 10 days
51 Design electrical utility plan 6 days
52 Finalize utility plan 2 days
53 Contaminated Soil Construction Practices Design Detail 20 days
54 Permitting 96 days
55 Apply for permits 0 days
56 Agency review 15 days
57 Public review 30 days
58 Final review 15 days
59 Permit issuance 15 days
60 Final design drawing submittal 3 days
61 LEED 90 days
62 Register project for LEED certification 5 days
63 Submit preliminary design documentation 15 days
64 LEED approval 15 days
65 Update Schedule (ongoing) 130 days
66 Update Construction Cost Estimate (ongoing) 130 days
67 Complete Design 0 days
6/21
Project: Troutdale Reynolds Industrial
Date: Tue 3/9/10
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

ID	Task Name	Duration
1	Begin Design	0 days
2	**Plan Review**	**93 days**
3	Submit 30% plans	0 days
4	Client & agent review of 30% plans	15 days
5	Submit 60% plans	0 days
6	Client & agent review	15 days
7	Make corrections to plans	5 days
8	Submit 90% plans	0 days
9	Client & agent review of 90% plans	10 days
10	Make corrections to plans	5 days
11	Submit 100% plans	0 days
12	Final corrections	3 days
13	Final approval	2 days
14	Submit final design	0 days
15	**Roadway Design**	**40 days**
16	**Swigert Way**	**40 days**
17	Scope development	20 days
18	Finalize horizontal & vertical alignments	10 days
19	Provide sustainable design features	6 days
20	Finalize roadway design	3 days
21	**Graham Road**	**36 days**
22	Scope development	20 days
23	Finalize horizontal & vertical alignments	6 days
24	Provide sustainable design features	6 days
25	Finalize roadway design	3 days
26	**Intersection Design: Graham & Sundial**	**48 days**
27	Turning movement design/analysis	10 days
28	Traffic signal design	15 days
29	Pedestrian facility design	15 days
30	Finalize intersection design	2 days
31	**Storm Drainage Design**	**23 days**
32	Determine capacity for drainage from new impervious su	15 days
33	Determine treatment facility location	5 days
34	Finalize drainage design	2 days
35	**Wetland Replacement Project**	**37 days**
36	Determine acres of lost wetland	5 days
37	Design appropriate wetland mitigation and site	5 days
38	Contact EPA about wetland mitigation	20 days
39	Finalize plans	1 day
40	**Manufacturing and office building design**	**51 days**
41	Address LEED requirements	5 days
42	Calculate crane loads	10 days
43	Design structure foundation	20 days
44	Parking/street access design	15 days
45	Office space design	15 days
46	Provide sustainable design features	10 days
47	Finalize structural designs	4 days
48	**Utility Plan**	**44 days**
49	Design storm plan	15 days
50	Design sanitary sewer system plan	10 days
51	Design electrical utility plan	6 days
52	Finalize utility plan	2 days
53	Contaminated Soil Construction Practices Design Detail	20 days
54	**Permitting**	**96 days**
55	Apply for permits	0 days
56	Agency review	15 days
57	Public review	30 days
58	Final review	15 days
59	Permit issuance	15 days
60	Final design drawing submittal	3 days
61	**LEED**	**90 days**
62	Register project for LEED certification	5 days
63	Submit preliminary design documentation	15 days
64	LEED approval	15 days
65	Update Schedule (ongoing)	130 days
66	Update Construction Cost Estimate (ongoing)	130 days
67	Complete Design	0 days



Project: Troutdale Reynolds Industrial
Date: Tue 3/9/10

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone