

September 15, 1995

Mayor Katz and Commissioners

REGARDING THE SE WATER AVENUE EXTENSION ALTERNATIVE ALIGNMENT ANALYSIS

STAFF REPORT

The Bureau of Transportation Engineering & Development, Office of Transportation Planning, Bureau of Traffic Management and the Portland Development Commission have cooperatively managed the SE Water Avenue extension alternative alignment analysis. April 13, 1995 Council directed staff to perform this work as part of the decision on the Station L zone change and subdivision land use decision which allowed for the KPTV development on the eastbank of the Willamette River.

BACKGROUND

Several land use decisions including the OMSI Conditional Use Permit, the Portland Community College zone change and the Station L zone change and land partition have resulted in the dedication of a significant portion of the required right-of-way for the Water Avenue extension from the current cul-de-sac at OMSI to the intersection at Caruthers. Therefore the alternative alignment analysis focused on the area south and east of the proposed Water Avenue on the Station L site.

The Portland Development Commission hired KPFF, a local engineering firm with an extensive background in the Central Eastside Industrial District to conduct the study. The City management team directed the Consultant to examine four alternative alignments south of the Station L site: a No Build Option, Option One, the alignment through the Lone Star site to connect Water Avenue at Division Place east to the intersection at Grand; Option Two, an alignment east on Caruthers to Fourth, south on Fourth to Division Place and east on Division Place to the intersection at Grand; Option Three, east on Caruthers to Grand and south on Grand to the intersection at Division Place.

Three public meetings were held and several interviews with existing property owners and business operators were conducted in an effort to determine current loading and parking operations. This activity was coupled with on site visits and observation. In addition there was an examination of existing traffic patterns and traffic movement in the area for all types of vehicles. Rail operation for both mainline and spur routes were identified and finally, estimated costs for the three build options were developed. The extensive land use and planning history of the area was also examined.

The Water Avenue extension is addressed in several policy and planning documents.

previously adopted by Council including the Portland Comprehensive Plan, the Central City Transportation Management Plan and the Central Eastside Transportation Study. In addition the extension of Water Avenue is significant to several agencies and organizations that have planning, operational or regulatory concerns in the study area, these include Oregon Department of Transportation (ODOT), the Metropolitan Service District (METRO), the Tri-County Metropolitan Transit District (TRI MET), and the Oregon Public Utilities Commission (PUC). The concerns of each are discussed in the analysis. Notable concerns include

- *Metro's two alternative alignments for the South/North Light Rail line pass through the project area. Each of the Water Avenue alignments accommodates the Light Rail alignment alternatives.

- *PUC desires to close the grade-crossing of the Southern Pacific Railroad mainline tracks at the intersection of Division Street and Grand Avenue. The PUC has supported closure for years and has proposed that it be implemented with the extension of Water Avenue.

- *Several additional alignments for future transportation or public access facilities have been proposed in the study area and accounted for in the study.

 - *Water Avenue extension is designated as a minor transit street, and a pedestrian and bicycle route.

 - *Willamette Greenway Trail alignment runs along the east bank of the Willamette River through the study area to Caruthers Street, east on Caruthers and south on Fourth Avenue until it connects with the Springwater Trail.

 - *ODOT has proposed the renovation and widening of the McLoughlin Boulevard/99E viaduct, the construction of elevated ramp connections from the viaduct to the I-5 Marquam Bridge, and the construction of a southbound access ramp to I-5.

ALIGNMENT ANALYSIS

The alignment of the Water Avenue extension from OMSI south to Caruthers Street is common to all three alternatives. Under all three alternatives, Caruthers Street will be improved at least to Local Street standards. Since Caruthers is the designated pedestrian connection from the Willamette Greenway Trail to the Springwater Trail, it will be improved for the purpose under each of the alternatives.

NO BUILD ALTERNATIVE

The area would remain in its current underdeveloped state. No additional development could occur without the provision of adequate transportation services in the area.

ALTERNATIVE ONE

Cost estimate is \$3,496,900.

Alternative One is superior with regard to alignment, traffic operations and minimal rail conflicts. However it requires the greatest extent of construction and is the most

disruptive to private property and to existing loading operations. Right-of-way acquisition is also required for this option. Alternative One is the most expensive alignment but could offer the greatest long term benefit.

ALTERNATIVE TWO

Cost estimate is \$3,167,300

Alternative Two is similar to Three in most respects except it avoids the Grand Street viaduct column relocation. However it is the second most expensive and the most difficult with respect to rail conflicts. It presents potential safety problems as roadway traffic would parallel an active rail line on Fourth Avenue.

ALTERNATIVE THREE

Cost estimate is \$2,929,300

Alternative Three is superior to One in that it requires no right-of-way acquisition and is less disruptive to private property and existing loading operations. It is the least expensive alternative. Cooperation between the project design team, contractor and ODOT will be required related to the relocation of the viaduct column at Grand and Caruthers.

STAFF RECOMMENDATION

Based upon the Consultants study, both Alternatives One and Three provide for adequate accessibility to properties in the area by providing an improved street network between Clay Street and Division Place.

Alternative One provides the best connectivity and operational performance for the extension of Water Avenue. Alternative One also meets policy role and functional standards for a Collector Street. It is questionable that Alternative Three will meet the policy role and functional requirements of a Collector Street.

However, Alternative One has also been found through this study to be the most disruptive, requires the most extensive of construction and property acquisition and is not supported by the existing business owners and operators.

Based in part, on the assessment of impacts to the business operations in the Industrial Sanctuary and the viability of relocation of the Grand Street viaduct column, Staff recommends the construction of Alternative Three as a Local Street. However, Staff recommends that Alternative One continue to be identified as the preferred route for the Collector Street serving the Southern Triangle in the long term.

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Consulting Engineers

SE Water Avenue Alignment Study

Prepared by **KPFF Consulting Engineers**

Civil Engineering

David Evans and Associates

Traffic Engineering

The J.D. White Company

Planning

Prepared for **Portland Development Commission**

and

**City of Portland Bureau of Transportation and
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TABLE OF CONTENTS

CHAPTER 1 EXECUTIVE SUMMARY.	3
1 1 PROJECT DESCRIPTION	3
<i>Purpose of Project</i>	3
<i>Historical Background</i>	3
<i>Policy and Planning Context</i>	3
<i>Public Involvement</i>	4
1 2 ANALYSIS	5
<i>Alternatives One, Two and Three / Water Avenue North of Caruthers Street</i>	5
<i>Alternative One</i>	5
<i>Alternative Two</i>	6
<i>Alternative Three</i>	6
<i>Estimated Project Cost per Alignment</i>	7
CHAPTER 2 PROJECT DESCRIPTION	10
2 1 PURPOSE OF PROJECT	10
2 2 HISTORICAL BACKGROUND	11
2 3 POLICY AND PLANNING CONTEXT	12
<i>Central Eastside Transportation Study</i>	12
<i>Portland Comprehensive Plan</i>	12
<i>Central City Plan</i>	12
<i>Central City Transportation Management Plan</i>	13
2 4 LAND USE ACTIONS	14
<i>Oregon Museum of Science and Industry</i>	14
<i>Portland Community College, Central Work Force Training Center</i>	14
<i>Station L</i>	15
2 5 PUBLIC INVOLVEMENT	17
2 6 ALTERNATIVES CONSIDERED	18
CHAPTER 3 ANALYSIS	19
3 1 LAND USE AND ALIGNMENT CONSTRAINTS	19
<i>Existing Conditions in the Study Area</i>	19
<i>Existing Conditions Along the Alignments</i>	19
<i>Alternatives Analysis</i>	23
3 2 TRAFFIC OPERATIONS	27
<i>Existing Conditions</i>	27
<i>Traffic Volumes and Level of Service at Key Intersections</i>	29
<i>Alternatives Analysis</i>	31
3 3 LOADING AND PARKING	41
<i>Existing Conditions</i>	41
<i>Alternatives Analysis</i>	43
3 4 RAIL FACILITIES	46
<i>Existing Conditions</i>	46
<i>Alternatives Analysis</i>	48
3 5 ESTIMATED PROJECT COST PER ALIGNMENT	51
<i>Alternative Analysis</i>	51
CHAPTER 4 CONCLUSION COMPARISON OF ALTERNATIVE ALIGNMENTS	58
4 1 ALTERNATIVE ANALYSIS	58
4 2 CONCLUSION	60
CHAPTER 5 REFERENCES	61

LIST OF FIGURES

FIGURE 1 SE WATER AVENUE ALIGNMENT STUDY AREA	9
FIGURE 2 ALIGNMENT CONSTRAINTS	21
FIGURE 3 ACCESS ROUTES	22
FIGURE 4 TRAFFIC COUNTS	28
FIGURE 5 LOADING & PARKING OPERATIONS	42
FIGURE 6 RAIL MAIN & SPURS	47

LIST OF TABLES

TABLE 1 COMPARISON OF ALTERNATIVE ALIGNMENTS	8
TABLE 2 SUMMARY OF PREDOMINANT TRAFFIC MOVEMENTS	40
TABLE 3 BASE PROJECT	53
TABLE 4 ALTERNATIVE 1	54
TABLE 5 ALTERNATIVE 2	55
TABLE 6 ALTERNATIVE 3	56
TABLE 7 SUMMARY OF COSTS	57

LIST OF ATTACHMENTS

ATTACHMENT 1 STAKEHOLDER LIST	62
ATTACHMENT 2 ODOT INTEROFFICE MEMO	63
ATTACHMENT 3 OREGON PUBLIC UTILITY COMMISSION	64

CHAPTER 1 EXECUTIVE SUMMARY

1.1 Project Description

Purpose of Project

The purpose of the Water Avenue extension is to improve access to the Southern Triangle area of the Central Eastside Industrial District and to encourage more intensive use of existing large, under-utilized industrial properties. The need for the Water Avenue extension is addressed in several City of Portland plans, studies and land use actions.

The purpose of this study is to clearly explain the design alternatives for the Water Avenue extension, their significance to the surrounding community and the process by which the alternatives have been developed. This report also seeks to effectively assemble all public and private concerns regarding the Water Avenue extension.

Historical Background

In 1991 the Portland Development Commission identified a potential alignment for the future extension of Southeast Water Avenue south from the Oregon Museum of Science and Industry. At that time, no point was identified for the south end of the Water Avenue extension to connect to the existing street system. The Portland Development Commission has authorized this report to study alternative street alignments for this southern connection. This report also discusses the alternatives that were evaluated in 1991.

Policy and Planning Context

The Water Avenue extension is mentioned in several policy and planning documents, including the Portland Comprehensive Plan, the Central City Plan, the Central City Transportation Management Plan and the Central Eastside Transportation Study. In several recent land use actions in the study area, some of the City's Conditions of Approval were related to the Water Avenue extension. Relevant land use actions included the OMSI Conditional Use Permit, the Portland Community College zone change and land partition and the Station L zone change and subdivision.

The Water Avenue extension is significant to several agencies and organizations that have planning, operational or regulatory concerns in the study area, these include the Oregon Department of Transportation (ODOT), the Metropolitan Service District of Oregon (Metro), the Tri-County Metropolitan Transit District (Tri Met) and the Oregon Public Utility Commission (PUC). The concerns of each are discussed in the study. Notable concerns include:

- Metro's two alternative alignments for the South-North Light Rail Transit line pass through the study area. Each of the Water Avenue alignment alternatives accommodates the Light Rail alternative alignments with no difficulty.
- PUC's desire to close the grade-crossing of the Southern Pacific Railroad mainline tracks at the intersection of Division Street and Grand Avenue. PUC has supported this closure for several years and has proposed that it be implemented as soon as the Water Avenue extension is in place. ODOT's position on the closure is ambivalent, while the City of Portland Office of Transportation favors keeping the crossing open.
- Several additional alignments for future transportation or public access facilities have been proposed in the study area.

- The Water Avenue extension is designated in the Portland Comprehensive Plan as a minor transit street, a distinct collector street and a pedestrian and bicycle route
- The Willamette Greenway Trail alignment runs south along the east bank of the Willamette River through the study area to Caruthers Street, east on Caruthers and south on Fourth Avenue. South of the study area it connects to the Springwater Trail
- ODOT has proposed the renovation and widening of the McLoughlin Boulevard / 99E viaduct, the construction of elevated ramp connections from the viaduct to the Interstate 5 Marquam Bridge, and the construction of a southbound access ramp to I-5
- The Southern Pacific mainline has been mentioned as a potential route for a high-speed train from Vancouver, British Columbia, to Eugene, Oregon

Public Involvement

The Study team recorded statements from land owners and tenants and from organizations and agencies with an interest in the study area in order to allow their input into the process of determining the best possible alignment for Water Avenue. The team also studied traffic movements through intersections, access routes for businesses with special needs along the alternative alignments and types of vehicles and operations that must be accommodated.

1.2 Analysis

Alternatives One, Two and Three / Water Avenue North of Caruthers Street

The alignment of the Water Avenue extension from OMSI south to Caruthers Street is common to all three alternatives. Under all three alternatives, Caruthers Street will be improved at least to Local Street standards. Since Caruthers is the designated pedestrian connection from the Willamette Greenway Trail to the Springwater Trail, it will be improved for that purpose under each of the alternatives.

Alternative One

Alternative One runs south, as a collector, from Caruthers to Division Place and east on Division Place to Grand Avenue. Caruthers is improved to Local Street standards.

Advantages

- Most direct alignment
- Fewest circulation obstructions for large trucks and transit vehicles
- Most complete extension of existing street grid into study area
- Fewest conflicts with rail spurs (Alternative Two routes collector-street traffic along Caruthers Street spur and across and along Fourth Avenue spur, Alternative Three also routes collector-street traffic along Caruthers and across Fourth Avenue spur)

Disadvantages

- Requires greatest amount of right-of-way acquisition
- Taking of property from Lone Star site for right-of-way constitutes greatest site disturbance of any of the alternatives
- Requires greatest amount of street construction since both Caruthers and Division Place are improved for the entire distance from Water Avenue to Grand Avenue and Water is improved from Caruthers to Division
- Most costly alternative, due to right-of-way acquisition and extent of construction
- Results in the greatest disturbance to loading operations currently conducted in the right-of-way by routing collector-street traffic along the section of Division Place used by Door Distributors of Oregon

Alternative Two

From Water Avenue, the collector street runs east on Caruthers Street to Fourth Avenue, south on Fourth along the East Portland Traction railroad tracks to Division Place, and east on Division to Grand Avenue. Caruthers from Fourth to Grand is improved to Local Street standards.

A pedestrian link from the Willamette Greenway Trail has been designated on Caruthers Street, from the river east to Fourth Avenue, and south on Fourth to the Springwater Trail, which lies south of the study area. Under Alternative Two, this pedestrian link may be relocated to run south on Grand from Caruthers to Division if the Fourth Avenue right-of-way is found to be too narrow to accommodate the collector street improvement, the railroad tracks and the pedestrian link.

Advantages

- No disturbance of property boundaries or on-site operations
- No expenditure for right-of-way acquisition
- Requires less street construction than Alternative One, however construction is more complex adjacent to rail spurs
- Less disturbance to loading operations in the right-of-way than Alternative One

Disadvantages:

- Most circuitous alignment
- Circulation restrictions for large trucks and transit vehicles due to additional turns at intersections
- Less complete extension of street grid into study area
- Most extensive conflicts with rail spurs, highest potential for delays due to rail operations
- Highest expenditure for rail crossing protection results in this alternative being nearly as expensive as Alternative One while offering fewer operational advantages
- Requires more street construction than Alternative Three

Alternative Three

The collector street runs east on Caruthers Street from Water Avenue to Grand Avenue and south on Grand to Division Place. As with Alternatives One and Two, a pedestrian link runs east on Caruthers and south on Fourth or Grand to Division Place.

Advantages:

- More direct alignment than Alternative Two
- Fewer circulation restrictions than Alternative Two
- No disturbance of property boundaries or on-site operations
- No expenditure for right-of-way acquisition
- Requires less street construction than Alternative One
- Least disturbance to loading operations in the right-of-way
- Lowest construction cost

Disadvantages

- Less direct alignment
- Access obstruction imposed by viaduct column in intersection of Caruthers Street and Grand Avenue, removal of obstruction is costly and requires complex coordination between the City and ODOT
- *Routes collector street traffic along Caruthers Street spur*
- Less complete extension of street grid into study area
- Will be an issue when ODOT reconstructs or replaces the McLoughlin viaduct

Estimated Project Cost per Alignment

Project costs have been estimated for each alternative alignment based on conceptual design information. While every effort has been made to identify total project costs, additional or different cost factors may be identified during final design. For this reason, emphasis has been placed on developing cost estimates for each of the alternative alignments that are as comparable as possible. Estimated costs are summarized below.

- | | |
|---------------------|---------------------------|
| • Alternative One | <i>\$3,496,900</i> |
| • Alternative Two | <i>\$3,167,300</i> |
| • Alternative Three | <i>\$2,929,300</i> |

Significant cost differences between the three alignments include,

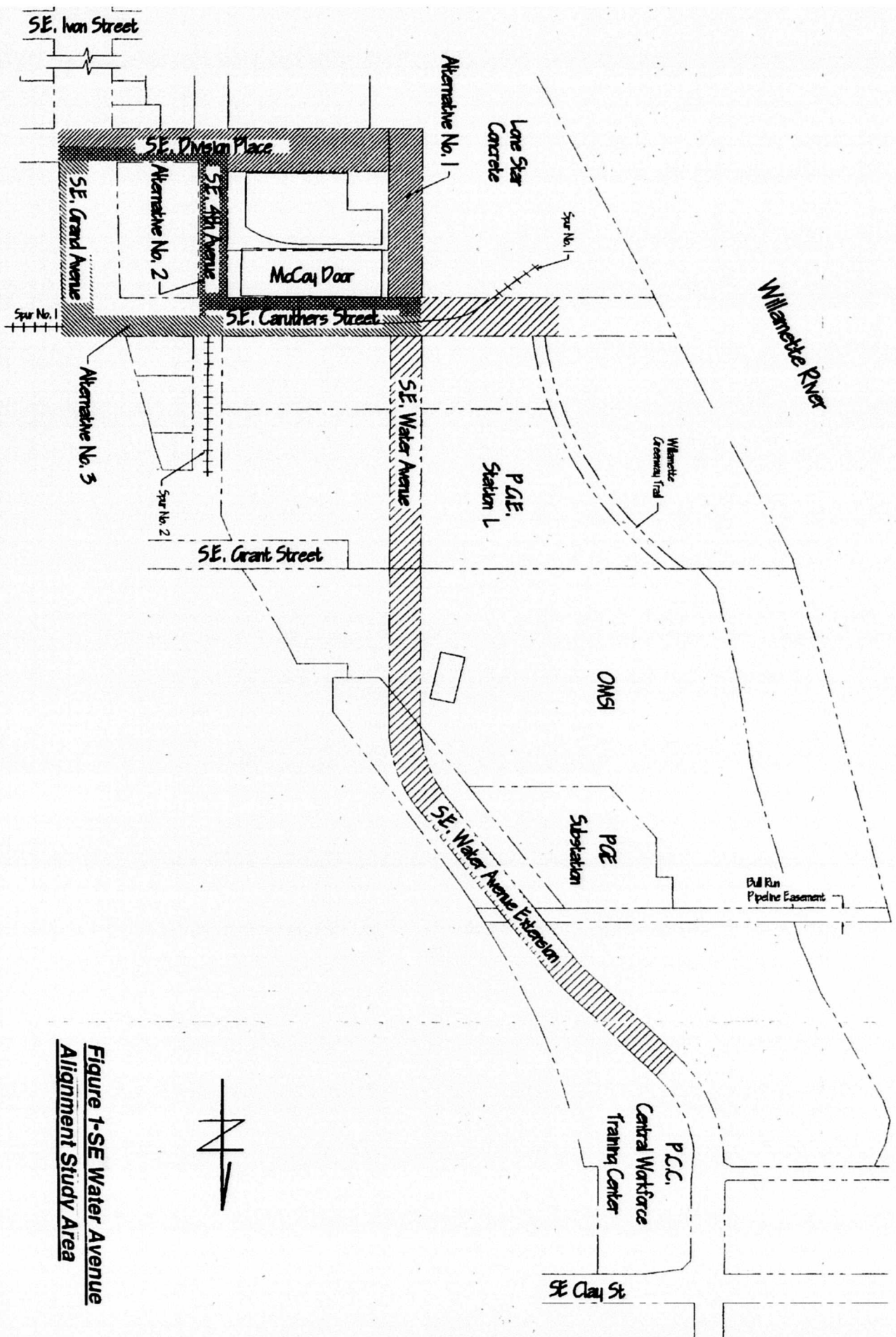
- Alternative One includes \$180,000 additional cost for right-of-way acquisition
- Alternative Two includes \$100,000 for a second rail crossing protection system
- Alternative Three includes \$95,000 for modifications to the McLoughlin Boulevard viaduct

Water Avenue Alignment Study

Table 1 Comparison of Alternative Alignments

COMPARISON CRITERIA	ALT. ONE	ALT. TWO	ALT. THREE
LAND USE AND ALIGNMENT			
Directness of street alignment	1	3	2
Expansion of street grnd	1	2	2
Accommodation of pedestrian and bicycle route	1	2	2
Acquisition of right-of-way	3	1	1
Disruption of property boundanes and on-site operations	3	2	2
TRAFFIC OPERATIONS			
Circulation obstructions	1	3	2
LOADING AND PARKING			
Disturbance of loading operations	3	2	2
RAIL FACILITIES			
Conflicts with rail spurs	1	3	2
PROJECT COST			
Extent of construction	3	2	2
Cost relative to extent and function	1	3	2
TOTAL POINTS	18	23	19

Note Alternatives are on a scale of 1 to 3, with 1 being worst and 3 being best



**Figure 1-SE Water Avenue
Alignment Study Area**

CHAPTER 2 PROJECT DESCRIPTION

2.1 Purpose of Project

The purpose of the Water Avenue extension is to improve access to the Southern Triangle area of the Central Eastside Industrial District and to encourage more intensive use of existing large, under-utilized industrial properties. The need for the Water Avenue extension is addressed in several City of Portland plans, studies and land use actions.

The purpose of this study is to clearly explain the design alternatives for the Water Avenue extension, their significance to the surrounding community and the process by which the alternatives have been developed. This report also seeks to effectively assemble all public and private concerns regarding the Water Avenue extension.

Based on comments from property owners, affected tenants, and planning and engineering considerations, this report will assist the City of Portland in reaching a decision on the alignment of the Water Avenue extension.

2.2 Historical Background

The Southeast Water Avenue alignment study area is located in the Central Eastside Industrial District of the central city. The Central Eastside Industrial District (CEID) is identified in the Comprehensive Plan of the City of Portland and is comprised of five subdistricts: Eastbank, Commercial Corridor, Southern Triangle, Station L and Industrial Heartland. The Water Avenue study area is located in the south end of Station L and the north end of the Southern Triangle.

The Station L subdistrict is named for Portland General Electric's power generation plant that operated on a 30-acre waterfront site until 1975. The northern 18 acres of Station L were subsequently redeveloped for the Oregon Museum of Science and Industry (OMSI), which opened in 1992. At that time, Water Avenue was extended south approximately 600 feet from Clay Street to the OMSI driveway. Options for extending Water Avenue farther south were also studied at that time.

A potential alignment was identified that accommodated existing and proposed facilities in the Station L area but no point was identified where the south end of Water Avenue would connect to the existing street system. At the south end of the study area, dedicated rights-of-way are available for connection at Caruthers Street and at Division Place. However, neither of these east-west rights-of-way has been improved to City standards.

Since 1992, several properties in the Water Avenue Alignment study area have been the subject of land use actions. These land use actions are described under Policy and Planning Context later in this report. Land use actions prior to 1992 are summarized in the following Land Use History taken from the Report and Decision of the Hearing Officer in the Station L Land Use Review.

In 1960, at the time of the adoption of the first modern Zoning Code for Portland (Title 33), the site was zoned M1, General Manufacturing. This zoning allowed the heaviest industrial uses, but also allowed commercial uses. A Greenway Overlay Zone (WSD), or Willamette Scenic Development) was added to the site in 1979, with the adoption of the Greenery regulations. The base zone was later changed to M2, also a General Manufacturing zone. This zone did not allow the range of heavy industrial uses permitted in the M1 zone.

A significant addition to the Comprehensive Plan occurred in 1981. The Industrial Sanctuary Policy reserved industrially zoned parcels for industrial purposes only and no longer permitted retail sales and service and office uses outright. The City in 1985 adopted a new industrial code and the base zone was changed to GI-1, General Industrial, the Comprehensive Plan Designation was GE-2, General Employment. In 1988, the Greenway designation of WSD was changed to "rd," River Development. In 1991, the site was zoned IG-1g, General Industrial with a River General overlay zone (g) and the Comprehensive Plan designation for the site was EG2, General Employment. The northwest corner of the site is within the Scenic Overlay Zone.

2.3 Policy and Planning Context

Central Eastside Transportation Study

The Central Eastside Transportation Study identified the need for the Water Avenue extension to provide access to developments in the Station L area and to improve overall traffic circulation in the Southern Triangle. The study included a map with a schematic alignment of the extension and designated Water Avenue as a Transit Street, Neighborhood Collector Street and a Bicycle Route and Pedestrian Path with Crossings.

The study was based, in part, on input from a citizens' advisory committee that included several members of the Central Eastside Industrial Council, the Hosford Abernethy Neighborhood Development Association (HAND), and several business and property owners from the Water Avenue Alignment Study area. The study was adopted by the City Council in June 1991 and incorporated into the Transportation Element of the Comprehensive Plan.

Among other issues, the Central Eastside Transportation Study addressed Hosford-Abernethy Neighborhood Development Association (HAND) comments and concerns regarding the Water Avenue extension; key points are summarized below.

- HAND supported the Water Avenue extension, especially those elements which would facilitate river access for pedestrians.
- HAND expressed concern about the project's potential to "encourage commuters from the I-5 / Water Avenue ramps, OMSI visitors and industrial traffic from the Southern Triangle to proceed to eastbound destinations via Division east of Twelfth Avenue rather than Powell and other Major City Traffic Streets."
- The Central Eastside Transportation Study recognized HAND's concerns. While stating that the Water Avenue extension would not contribute significantly to increased traffic volumes on Division east of Twelfth, the study noted that, in any case, the extension "represents the only feasible alternative to provide improved access."
- The study recommended several measures to prevent the Water Avenue extension from functioning as a through-route from the freeway to Division:
 - Southbound left turn lane from Eighth Avenue to Powell
 - Eastbound right turn lanes from Division to southbound Eighth and Eleventh
 - Traffic signals at the intersections of Eighth and Woodward and Eighth and Powell
 - Striping plan to reduce weave conflicts on Division between Ninth and Eleventh

Portland Comprehensive Plan

The 1991 update of the Transportation Element of the Comprehensive Plan incorporated the Central Eastside Transportation Study and identified Water Avenue, including the extension, as a minor transit street, a district collector street and a pedestrian and bicycle route.

Central City Plan

The Central City Plan also showed the schematic alignment of the Water Avenue extension and identified access issues in the area of this study. The Central City Plan also addressed the possibility of higher uses for the large, underutilized heavy-industrial sites that are located in the study area between the Southern Pacific Railroad and the Willamette River.

Under the Central City Plan, sites with industrial zoning that had potential for different uses due to their proximity to the river or other factors were given an underlying General Employment designation. This designation allows rezoning of industrial properties if the adequacy of public services to the site can be demonstrated. The key public services in this regard include utilities and street access. Streets must have adequate capacity for anticipated traffic volumes, for transit service and for compliance with the Transportation Planning Rule.

Central City Transportation Management Plan

Central Eastside transportation issues and the Water Avenue extension are also referenced in the Central City Transportation Management Plan (CCTMP) and the draft Central Eastside Transportation Plan, which will be incorporated in the CCTMP.

2.4 Land Use Actions

The following section gives an overview of recent land use actions in the study area. Each action was part of the redevelopment of an existing industrial site, as provided for in the Comprehensive Plan, planning for the Phase One and Phase Two extensions of Water Avenue was an integral part of each action.

Oregon Museum of Science and Industry

In the early 1980's, Portland General Electric initiated a comprehensive study of the Station L site to determine its potential for redevelopment and to identify appropriate new uses. This process eventually culminated with the purchase of the northern portion of the Station L site by OMSI.

The OMSI site is located in an IH zone, with institutional uses permitted conditionally. A specific alignment for the Water Avenue extension, from Clay Street south to Caruthers Street, was identified as part of OMSI's Conditional Use Permit process. *The Conditional Use Permit is subject to ongoing review by the City and is based on an infrastructure agreement between the City and OMSI that contained the following requirements:*

- *OMSI would dedicate right-of-way for the Phase One and Phase Two extensions of Water Avenue*
- *OMSI would share in the cost of the Phase One public works improvements that were needed to provide adequate public services to the site*
- *OMSI would waive the right to remonstrate against the future Phase Two Water Avenue extension, which is the subject of this study*

The Phase One Water Avenue extension included the following elements:

- Water, sanitary sewer, storm drain, electric, telephone and television line extensions
- The extension of Water Avenue from Clay Street 600 feet south to OMSI's driveway
- The widening of Clay Street from Water Avenue east to First Avenue and from Third Avenue east to Martin Luther King, Jr. Boulevard
- Traffic signal construction at the intersections of Clay Street with Water Avenue and MLK
- Relocation of 1,200 lineal feet of Stephen's Storm Drain, extending from the river to OMSI's east property line and serving the future Water Avenue extension,

The transportation-related improvements were financed through loans obtained by the Portland Development Commission from the state Office of Economic Development, the loans were guaranteed with lottery funds.

Portland Community College, Central Work Force Training Center

In 1993, Portland Community College (PCC) selected a site at the corner of Water Avenue and Clay Street, one block north of OMSI, for the location of a new campus, the Central Work Force Training Center. Rather than proposing a conditional use within the existing zone as OMSI, PCC applied for a zone change, from IG1 (General Industrial 1) to EG2 (General Employment 2) because colleges are not permitted in the IG1 zone. The EG2 zone allows for commercial, industrial and industrially-related uses to support employment opportunities without conflicts with interspersed residential uses. The zone change was preceded by a minor land partition in which the PCC parcel was separated from an existing larger parcel owned by Southern Pacific Railroad. The remainder of this parcel is occupied by the Rail Car Restoration Co.

The Phase One and Phase Two extension of Water Avenue constituted a significant element in the City's Conditions of Approval during the zone change and land partition processes. The Water Avenue extension was found to support several transportation-related requirements of the City of Portland.

- *Zoning Code Approval Criteria / Adequate Public Services* Water Avenue and Clay Street, the streets providing direct access to the site, were found to have adequate transportation capabilities, based on the Phase One and Phase Two extensions. The Conditions of Approval required dedication of right-of-way along the future Water Avenue frontage of the PCC site.
- *City Code / Title 34 - Subdivision Approval Criteria* The Water Avenue extension was found to comply with two approval criteria for a Minor Land Division, Section 34.30.030 B3, which requires that "The continuation of existing principal streets in the surrounding areas will not be partially or fully blocked," and Section 34.30.030 B4, which requires that "Access to adjacent property from streets, as required by City Code will not be partially or fully eliminated."
- *Plans and Policies / Transportation Element of the Comprehensive Plan* Goal 6 of the Transportation Element of the Comprehensive Plan was found to be furthered by the Water Avenue extension. Vehicular, pedestrian and transit access were improved by the Phase One extension. Connections to the rest of the Central Eastside will be dramatically improved by the Phase Two extension, transit access especially will be improved from its present marginal condition.

Station L

In 1994, Portland General Electric submitted applications to the City to subdivide and change the zoning of the ten acres remaining from the original Station L parcel south of the Oregon Museum of Science and Industry. The proposal was, through a Zone Map Amendment, to change the zoning from IG1 (General Industrial 1) to EG2 (General Employment 2) and to subdivide Station L into four lots, with two lots fronting on the Willamette River and two lots on the east side of the proposed Water Avenue extension.

In a separate action, following approval of the zone change and subdivision, the City approved the design of the 45,000 square foot KPTV studio building, which will occupy the southern rearfront parcel, and KPTV's parking lot, which will occupy the southeast parcel of the subdivision.

As with the Portland Community College land use actions, the Report and Decision of the Hearings Officer found that the Water Avenue extension was a key element in meeting transportation-related requirements.

- *Zoning Code Approval Criteria/Adequate Public Services* Along with other public infrastructure systems, the transportation system was found to be capable of being upgraded to support the uses allowed by the zoning being sought. This finding was based on the Transportation Impact Study that was part of the development proposal for the Station L site.

Additionally, the existing transportation system was found to be incomplete and inadequate to support any more than the first phase of development of the Station L site, which includes the KPTV building and parking lot. Approval for full development of the Station L site is dependent on "implementation of projects recommended in the Central Eastside Transportation Study."

- Under Conclusions it was noted that "Other property owners object to improvements to SE Division Place and SE Caruthers and have expressed the concern that they were not

involved in the decisions regarding the extension of SE Water Avenue and other planned improvements for streets in the area. *However, those policy decisions were made as part of the Transportation Element of the Comprehensive Plan, and are only being implemented as part of this zone change.*

- The final decision included the requirement that for any development beyond Phase 1, "The following rights-of-way shall have been improved to City Standards
 - "A new public street that runs in a north-south alignment through the site,
 - Caruthers Street, from Grand Avenue to approximately its terminus near the Willamette River,
 - Other street improvements associated with the Water Avenue extension which are considered necessary by the City Engineer to provide a continuous route from the current cul de sac adjacent to the OMSI site to and including segments of Division Place west of Grand Avenue."

2.5 Public Involvement

Public involvement and public information have formed the basis of this study. The City has directed the study team to contact all "stakeholders" with an interest in the extension of Water Avenue, to document and respond to their statements and incorporate them into this report.

A stakeholder is defined as anyone affected by the Water Avenue extension and one who may contribute vital information regarding the best possible decision. Stakeholders include property owners, business owners and tenants in the study area, as well as agencies and organizations with an interest or jurisdictional responsibility in or near the study area.

Communication with stakeholders is important in establishing a basis for sound decisions by the City. Four public meetings were held as part of the public information and public involvement process. An informal meeting was held by City staff in the OMSI Auditorium several months prior to the initiation of this study. The purpose of this meeting was to give stakeholders an overview of the Water Avenue extension and its relation to development plans in the study area.

The next three public meetings were more formal and were integral to the information gathering process. The first formal meeting was introductory and was held on June 20th, 1995, to present basic project information and hear district concerns. After this meeting, eight interviews were conducted with business owners and tenants to identify their access concerns, including truck and rail operations and the time of day they are conducted.

The following persons were interviewed, the names and addresses of their businesses listed, along with the names of the business owners:

Monday, June 26

- Roy Englund, RCR, 1750 SE Water Ave., Owner Ken Keeler
- Larry Corwin, McCoy Group, 342 SE Caruthers St., Owners Larry Corwin, Rick Benjamin
- Tom Frith, Commercial Truck Leasing & Rental, 526 SE Division Pl, Owner Same

Friday, June 30

- Dave Newton, Food Pro, 410 SE Division Pl, Owner Same
- Dick Samuels, East Portland Traction Co., Owner Same
- Gary Madson, Lone Star, 931 N. River St., Owner Lone Star Northwest

Friday, July 7

- Fred Schlotfeldt, Ross Island Sand & Gravel Co., 2611 SE 4th, Owner RB Pamplin Corp

A second formal meeting was held on July 25th to present preliminary findings and respond to concerns identified at the first meeting. Stakeholders were provided with another chance to comment and provide information in addition to the interview process.

The third formal meeting was held on August 29th to formally present the findings and recommendations of the completed study. Stakeholder comments centered on their feeling that their alignment preferences were inseparable from their concerns about potential property assessments, should the Water Avenue extension be funded by a Local Improvement District.

2.6 Alternatives Considered

In response to concerns expressed by stakeholders, the Water Avenue Alignment Study Team determined that, in addition to a No-Build Alternative, three potential alignments are available for the connection of Water Avenue to the intersection of Division Place and Grand Avenue, as summarized below

- *Alternative One* would run straight south from the intersection of Water and Caruthers to Division. The street improvement would also extend along Division Place, from Water Avenue east to Fourth Avenue
- *Alternative Two* is the Fourth Avenue alignment, which would run east on Caruthers from Water to Fourth, south on Fourth to Division and east on Division to Grand
- *Alternative Three* is the Grand Avenue alignment, which would run east on Caruthers from Water to Grand and then south on Grand to Division

For the Water Avenue extension north of Caruthers Street, one alignment is presently under consideration. This is the alignment that was identified in 1991, during the OMSI land use action and was used to determine the exact configuration of public right-of-way dedications that were required of the OMSI, PCC and Station L projects

Most of the Water Avenue extension south of PCC and north of Station L runs through the OMSI property and has not yet been dedicated. However, any significant changes in the alignment in this area would require boundary changes to the PCC parcel, Southern Pacific's Rail Car Restoration parcel and the Station L subdivision parcels

The 1991 alignment of the Water Avenue extension north of Caruthers Street was developed in the Portland Development Commission's Phase One Water Avenue Feasibility Study. This study identified the following considerations and constraints, which are described in north-to-south order

- Avoidance of OMSI's main access road, which was originally designed to function as the Water Avenue extension. Under this alternative, the existing Water Avenue alignment would have been extended straight south through the OMSI site. This alignment was dropped at OMSI's request shortly before the start of construction and a new alignment was identified that angled to the southeast.
- Compliance with curve radius and sight distance requirements for a 35 mile-per-hour design speed
- Minimal disturbance of the Rail Car Restoration Company site, this constraint dictated an alignment east of the RCR site
- Coordination with aerial easements and column locations for the future McLoughlin Boulevard-to-Marquam Bridge ramps
- Avoidance of the OMSI Auction Barn, a prefabricated metal building in OMSI's south parking lot.
- Minimal disturbance to properties located between Caruthers Street and Division Place, in the event that the final Water Avenue extension connected directly with Division Place. To avoid partial demolition of the McCoy Stair and Millwork building, which is quite large, the 1991 alignment runs immediately to the west of the McCoy property, through the east side of the Lone Star property; this alignment requires the demolition of a much smaller and less-intensively used building
- Maximum usability for new land parcels created by the Water Avenue extension. This consideration precluded, for example, an alignment adjacent to the Southern Pacific mainline

CHAPTER 3 ANALYSIS

3.1 Land Use and Alignment Constraints

This section discusses the effects of the three alternative alignments on land uses in the study area, it also discusses constraints on the three alignments. Refer to Figure 2, Alignment Constraints, and Figure 3, Access Routes, on pages 21 and 22.

Existing Conditions in the Study Area

The northern part of the study area is located in the Station L subdistrict of the Central Eastside Industrial District. Until recently, this part of the study area was characterized by large, mostly vacant industrial parcels and a lack of public infrastructure. This land-use pattern has changed with the completion of the Oregon Museum of Science and Industry, the Phase One extension of Water Avenue and the current development of the PCC and KPTV projects.

The southern part of the study area is located in the Southern Triangle subdistrict, which is characterized by well-established, active industrial land uses, including wholesaling, warehousing, distribution and manufacturing. Infrastructure development has taken place in a traditional urban grid pattern but is incomplete. Many public utility systems are in place but streets are privately constructed and substandard.

Access to the southern part of the study area is severely limited on the north and east by the Southern Pacific Railroad mainline and the McLoughlin Boulevard viaduct, which carries State Route 99W. Powell Blvd / US 26, a limited-access facility, lies south of the study area. The study area is bounded on the west by the Willamette River.

Existing Conditions Along the Alignments

Alternatives One, Two and Three

The northern end of the Water Avenue extension is presently configured as a temporary cul de sac. South of the cul de sac the alignment crosses the northeast and east sides of the Railcar Restoration Company parcel. The northeast portion of this parcel was dedicated as public right-of-way for the Water Avenue extension when the PCC parcel was split off. The east portion of the RCR parcel is occupied by a dilapidated wood-frame industrial building and by rail sidings used for storage of railcars.

South of the RCR site the alignment passes through the OMSI parking lot and then through the Station L property in right-of-way that was recently platted as part of the Station L subdivision and is presently unimproved. In the southern end of this right-of-way dedication, temporary access improvements will be constructed to serve the KPTV development until permanent streets are in place.

East of the Water Avenue extension and south of the Station L subdivision, the alignment follows the Caruthers Street right-of-way east to Fourth Avenue and on to Grand Avenue. This section of Caruthers contains private street and storm drain improvements that do not conform to City standards and are not maintained by the City. At Fourth Avenue Caruthers crosses two tracks owned by Portland Traction Company and operated by East Portland Traction Company.

The intersection of Caruthers and Grand Avenue has been improved to City standards and, in addition to surface street improvements, contains columns that support the McLoughlin Boulevard viaduct overhead

Alternative One

South of the Station L subdivision between Caruthers Street and Division Place the Alternative One alignment passes through the east side of the Lone Star, Inc property This side of the property is occupied by an industrial building used for material storage and handling This building is served by a rail spur from Caruthers Street

The Alternative One alignment then extends along Division Place east to Fourth Avenue As with Caruthers Street, this section of Division contains private street and storm drain improvements that do not conform to City standards and are not maintained by the City From Fourth Avenue east to Grand Avenue, Division is improved to City standards

Alternatives Two and Three

Existing conditions along these alignments are described in other sections

Description of the Alternative Alignments

Refer to the Executive Summary, Section 1.1 Analysis, for descriptions of the alignments of Alternatives One, Two and Three

Alternatives Analysis

No Build Alternative

Impacts

- The southern part of the study area will not be served by a neighborhood collector street
- Existing access barriers will not be mitigated. Access to Caruthers Street and Division Place from the north will remain limited to the circuitous approach from Division Street and Grand Avenue
- Access to Caruthers from Grand will remain partly obstructed by viaduct columns
- Development of Station L will be limited to the present phase, which includes only construction of the KPTV building and parking lot
- Transit access to the study area will remain limited
- Pedestrian and bicycle access to the study area will remain limited, neighborhood connections to the Willamette River Greenway via Caruthers Street will not be provided

Mitigations

Some of the impacts listed above can be partially mitigated by constructing access improvements individually or as part of other projects. For example, connections to the Greenway via Caruthers can be constructed separately from the extension of Water Avenue, perhaps as part of a Greenway development project. However, the quality of access improvements constructed separately would not be as high as if constructed as part of the Water Avenue extension project, nor is funding and implementation of individual projects as likely.

Alternatives One, Two and Three / Water Avenue Extension North of Caruthers Street

Impacts

The proposed Water Avenue alignment north of Caruthers Street remains the same under Alternatives One, Two and Three, therefore, impacts north of Caruthers are the same under all three alternatives. The Public Utility Commission proposal to close the Southern Pacific grade crossing at the intersection of Division Street and Grand Avenue applies to Alternatives One, Two and Three.

OMSI Impacts

- The alignment disrupts OMSI's parking lot, eliminating an estimated sixty-five spaces. This is a significant loss since the parking lot presently reaches capacity at peak periods.
- Parking for tour and school buses along OMSI's main access road will be reduced.
- Rail access to OMSI for the "Samtrak" excursion trolley from Oaks Park will be impeded but not enough to warrant mitigation.

Railcar Restoration Company Impacts

- A wood-frame industrial building will be demolished at the Rail Car Restoration site. RCR management has stated that this will be a major negative impact on their operation.
- The car storage capacity of rail sidings at the RCR site will be reduced or eliminated.
- Rail spur access to the RCR site will be impeded by the Water Avenue extension, possibly to an extent that the site is no longer usable by RCR.
- The existing driveway entrance will be relocated.

Mitigations

OMSI

Mitigation of impacts to the OMSI site must be evaluated with the understanding that OMSI entered into an infrastructure agreement with the City in August, 1991, acknowledging the impacts of the Phase Two Water Avenue extension and agreeing to accept them as terms of the agreement

- It may be possible to offset parking losses at OMSI through cooperative agreements with nearby facilities now under construction, since the hours of peak parking use will not coincide at OMSI, Portland Community College and KPTV
- It may be possible to offset the loss of bus parking at OMSI by developing replacement bus parking areas parallel to the Water Avenue extension, east of PGE's Stephen's Substation

Railcar Restoration Company

- It may not be practical to mitigate the effect on the RCR operation of losing the wood building, aside from compensating the building's owner for its value
- There is no place on the RCR site to reconstruct the rail siding used for car storage
- The rail spur used to bring railcars to the site can be realigned to cross the Water Avenue extension at a less oblique angle but probably not close enough to a 90-degree angle to satisfy the requirements of the Public Utility Commission

For these reasons, a plan to relocate the Rail Car Relocation operation to a new site will probably be a part of the right-of-way acquisition process

Alternative One

Impacts

Lone Star, Inc

The proposed alignment requires that the eastern 60-feet of the LoneStar property be acquired as public right-of-way. This will have the following impacts

- Demolition of the industrial building. Lone Star management has stated that this will be a major negative impact
- Loss of the site area surrounding the building, this area is used for access to the building, for access to the rest of the site and for vehicle maneuvering
- Impeded turning radius for cement trucks as they enter the right-of-way

Mitigations

Lone Star, Inc

Site area is not available to reconstruct or relocate the industrial building. The rail spur to the Lone Star site and driveway access can be relocated

Alternative Two

This alternative has negligible effect on land use in the study area and requires no dedication of additional right-of-way. It does require one more 90-degree turn than Alternative One. This alternative results in some conflicts with loading operations conducted in Caruthers by the McCoy Stair and Millwork Company and also results in conflicts with rail operations on Spur No. 1 in Caruthers Street and Spur No. 2 in Fourth Avenue. These impacts and corresponding mitigations are discussed in Section 3.3, Loading and Parking and Section 3.4, Rail Facilities

Alternative Three

As with Alternative Two, this alternative has negligible effect on land use in the study area and requires no additional right-of-way. It also requires one more 90-degree turn than Alternative One. As with Alternative Two, this alternative results in some conflicts with loading operations in Caruthers and also results in conflicts with rail operations on Spur No. 1 and Spur No. 2. Related impacts and mitigations are discussed in Sections 3.3 and 3.4.

Additional Impacts

Operations at the intersection of Caruthers and Grand are constrained by a column that supports the Grand Avenue branch of the McLoughlin Boulevard viaduct. This column is located in the north quadrant of the intersection and limits truck turning movements from southbound Grand Avenue to westbound Caruthers Street.

Southbound-to-westbound trucks are unable to use the westbound lane of Caruthers Street, which is on the north side of the column. Many drivers are confused by this arrangement and mistakenly assume that both the westbound and eastbound lanes of Caruthers are located south of the column.

For these reasons, the column must be relocated if Alternative Three is implemented.

The surface street system under the viaduct is owned and maintained by the City, while the viaduct, which carries State Route 99E, is owned by ODOT. Implementation of Alternative Three will require the agreement and cooperation of ODOT.

ODOT has expressed several concerns about the viaduct, the Alternative Three alignment and the column relocation. These concerns are summarized below and are presented at length in Attachment 1, "Stakeholder Phone Interviews" and Attachment 2, an ODOT interoffice memo dated July 2, 1987, that summarizes their evaluation of the viaduct.

- The viaduct consists of two bridges, the Union-Grand Avenue (Martin Luther King, Jr. Boulevard) Bridge, constructed in 1937, and the bridge in question, the Grand Avenue Bridge, constructed in 1965.
- The Union Bridge has serious structural deficiencies including settlement due to poor soil conditions and should be replaced.
- For this reason, ODOT may be reluctant to permit work on or near the viaduct. They will provide this study team with their geotechnical report.
- Pile driving for new column foundations will probably not be permitted adjacent to existing columns.
- The Grand Bridge has minor structural deficiencies and may be repaired and widened to accommodate the proposed McLoughlin-to-Marquam Bridge ramps.
- The viaduct repair / replacement is scheduled for the year 2000 and is listed in the Regional Transportation Plan Update as a "preferred but financially constrained project."
- ODOT would prefer that the section of Grand Avenue from Division Street south to Division Place not remain in use as a major access route to and from the study area; they would support the closure of the Grand Avenue rail crossing except that it will form an important part of the detour route during the viaduct reconstruction.
- The column relocation would have to be planned so as not to obstruct future detour routes; it would also have to be coordinated with the future widening of the viaduct.

Mitigations

The viaduct column conflict can be mitigated by relocating the column to the east side of Grand Avenue. Construction measures to accomplish this are summarized below.

- Support viaduct with temporary shoring
- Establish temporary traffic control
- Demolish bridge bent, including two concrete columns and concrete beam
- Acquire easement or additional right-of-way for relocated column
- Design and engineer new bridge bent. Possibly comply with current seismic standards, Coordinate with future ODOT plans to renovate or replace viaduct
- Place augured concrete piles and pile caps
- Construct columns and beam

Most of these measures are practical but implementation would be complicated by several factors. In order not to be "thrown away" in a few years, the new bridge bent must be designed and constructed to work as part of the widened or rebuilt viaduct that ODOT envisions. This will be difficult since ODOT has not settled on an approach and must be convinced to allow work on or near the viaduct. The structural engineer on this study team felt that it would be possible but in some cases challenging to construct a new bridge bent that would satisfy several concerns expressed by ODOT.

- The bent could be founded on non-driven piles
- Based on a thorough geotechnical investigation, the piles could be designed for the problematic soil conditions suspected by ODOT. If necessary, the piles could extend clear to the bottom of the 50 foot deep fill that lies under much of the study area. However, this would be expensive and difficult due to limited headroom for handling long auger sections
- Concerns regarding seismic competency could be addressed by simply designing the new bridge bent to exceed the seismic strength of the rest of the structure

3.2 Traffic Operations

This section discusses traffic operations in the study area as they relate to the three alternative alignments

Existing Conditions

Access

Grand Avenue, Division Place, and 8th Avenue serve as the principal routes by which vehicles gain access to the businesses in the Southern Triangle portion of the Central Eastside Industrial District. Traffic from the north uses the Grand Avenue railroad grade crossing just south of Division Street. Eighth Avenue provides a connection to Powell Boulevard to the south. The three block section of Division Place between Grand Avenue and Eighth Avenue serves as the connection between these north-south access points. Besides providing access to the local businesses, this combination route also carries a modest amount of through traffic.

Other access points of lesser importance include the slip ramps to and from Grand Avenue (McLoughlin Boulevard) near Clinton Street, Eighth Avenue from Division Street, Ninth Avenue from Powell Boulevard, and Sixth Avenue from Woodward Street.

Traffic Volumes and Level of Service at Key Intersections

Recent traffic counts from the AM and PM peak hour for key segments and intersections are illustrated in the figure titled Traffic Counts. Intersection turning movement counts are presented for four intersections: 8th Avenue at Powell Boulevard, Division Place at 8th Avenue, Division Place at Grand Avenue, and Caruthers Street at Grand Avenue. Roadway counts are also provided at the following locations: the Grand Avenue slip ramps near Clinton Street, Division Place west of Grand Avenue, Division Place east of Grand Avenue, Caruthers Street west of Grand Avenue, and Grand Avenue south of Division Street (near the railroad grade crossing). At some locations, AM peak, PM peak, and average daily traffic volumes are all provided. At others only the PM peak volumes are shown.

Of the locations shown, only two experience congestion problems as indicated by a poor intersection Level-of-Service (LOS). LOS is measured on a letter scale ranging from "A" to "F" in which "A" represents a free-flow condition with minimum delay while "F" represents severe congestion with lengthy delays. LOS "D" is generally considered the poorest LOS tolerable for an urban intersection.

A previous study had indicated the LOS at the Grand Avenue slip ramp is currently "D" during the PM peak hour and the Eighth Avenue on-ramp to westbound Powell Boulevard is currently LOS "E" during the PM peak hour. Traffic on Grand Avenue and Powell Boulevard at these two locations is not adversely impacted by the poor LOS experienced by the ramp traffic at these locations.

The intersection of Eighth Avenue and Division Place was also examined in detail as part of previous planning for the zone-change request. Conditions at this location were examined but the warrants for installation of a traffic signal were not met for existing or anticipated future traffic volumes. The scenarios analyzed for this intersection included the full development of the Station L site (the PGE property which was subject of the 1994-5 rezoning and subdivision case).

Other Key Intersections

The key intersections potentially impacted by Water Avenue alignment alternatives include:

- Caruthers Street at 4th Avenue,
- Caruthers Street at Grand Avenue,
- Division Place at 4th Avenue, and
- Division Place at Grand Avenue

Caruthers Street at 4th Avenue

The intersection of Caruthers Street and 4th Avenue has very low traffic volumes due to the unimproved nature of 4th Avenue. The predominant traffic movements at the intersection are in the east-west direction, principally to serve the McCoy Stair and Millwork operation on the south side of Caruthers Street west of 4th Avenue. The north leg of the Caruthers Street and 4th Avenue intersection serves as a private driveway. The 4th Avenue alignment also serves as a shared right-of-way within which the East Portland Traction Company operates its rail line. The current traffic control used at the intersection consists of STOP signs on Caruthers Street. The STOP signs also serve as the only rail crossing protection. City of Portland records indicate two property-only traffic accidents at this intersection between January 1, 1990 and March 31, 1994.

Caruthers Street at Grand Avenue

The predominant traffic movements at the intersection of Caruthers Street and Grand Avenue are north-south through movements on Grand Avenue. As shown in the figure titled Traffic Counts, low traffic volumes on Caruthers Street produce low turning movements onto and from Caruthers Street. Both the east leg and west leg of the intersection serve adjacent businesses. The west leg is an improved street, but the east leg is unimproved. A rail spur also shares the Caruthers Street right-of-way. Existing traffic control consists of STOP signs on Caruthers Street. No accidents are listed at this location in City of Portland records. Operations at the intersection are strongly influenced by limited sight distance due to the columns supporting the viaduct. These columns also result in turning movement constraints which prevent multiple unit vehicles from making some turns to the most appropriate lane on Caruthers Street (See also the discussion under Land Use and Alignment Constraints).

Division Place at 4th Avenue

The predominant traffic movements at the intersection of Division Place and 4th Avenue are left turns from westbound Division Place to southbound 4th Avenue and right turns from northbound 4th Avenue to eastbound Division Place. This pair of movements serves trucks going to and coming from the Ross Island Sand & Gravel Company operation located on 4th Avenue south of Division Place. Through movements in the east-west direction on Division Place are of secondary importance and serve Door Distributors of Oregon, which straddles both sides of Division Place west of 4th Avenue, and Lone Star Northwest, at the west end of Division Place. The section of 4th Avenue north of Division Place is unimproved, which accounts for the very low traffic volumes from the north leg of the intersection. The 4th Avenue corridor also serves as the right-of-way for the East Portland Traction Company's rail line. No STOP signs or other traffic control devices are provided at the intersection. No accidents are reported at this location in the City of Portland records for the period from January 1, 1990 to March 31, 1994.

Division Place at Grand Avenue

The intersection of Division Place and Grand Avenue is somewhat more complex than most intersections in the study area. The northbound slip ramp from Grand Avenue to MLK Blvd is aligned on the east side of the viaduct, while the southbound access to MLK Blvd is on the west side of the viaduct. The north leg of Grand Avenue is located on the east side of the viaduct, though the west side of the viaduct serves as an access drive. STOP signs are used on Division Place as the only means of traffic control. Westbound through-traffic on Division Place is required to stop, while right turns onto northbound Grand Avenue are permitted without stopping. Particularly during the AM and PM peak hours, the predominant traffic movements at the intersection are the right turns from westbound Division Place to northbound Grand Avenue and from southbound Grand Avenue to eastbound Division Place. During mid-day periods, through movements on Division Place in both directions are relatively high. City of Portland records indicate no accidents at this location between January 1, 1990 and March 31, 1994. However, business owners in the area report a very high frequency of accidents and near accidents at the intersection. They report the most frequent cause of accidents is a failure by westbound motorists on Division Place to stop at Grand Avenue. Traffic volumes observed during the PM peak hour are illustrated in Figure 5, Traffic Counts.

Vehicle Types

The predominant vehicles in the area are automobiles, vans and pick-up trucks. This is especially noticeable during the PM peak hour. Many single unit trucks of up to 30 feet are regularly used. Trucks with 3 or more axles account for a higher proportion of the total traffic than in most other areas of the City.

Counts conducted during June 1995 indicated the intersection of Division Place and Grand Avenue had the highest percentage of heavy trucks during the PM peak hour. These counts indicated 8 percent trucks during the PM peak hour at the intersection. Counts taken at other times of the day did not differentiate by vehicle type. However, data furnished by businesses about their operations were compared with daily traffic counts from tubes on the street. These data indicate that trucks account for more than half of the vehicles using Division Place during an average day.

Alternative Modes of Travel

At present, the only transit service in the immediate vicinity of Water Avenue alignment alternatives terminates at OMSI on Water Avenue south of Clay Street. Facilities for bicyclists and pedestrians are incomplete or absent in the study area. There are no sidewalks on Division Place west of 4th Avenue, no sidewalks on any section of Caruthers Street, and no sidewalks on Grand Avenue south of Caruthers Street.

Alternatives Analysis

No-Build Alternative

The no-build scenario is assumed to provide for no construction of Water Avenue or nearby streets such as Caruthers Street, 4th Avenue, Division Place or Grand Avenue. The No-Build scenario was analyzed as part of the Traffic Impact Analysis for the Station L Master Plan. In that study, it was concluded that the no-build scenario does not provide an acceptable roadway system for build-out of the Station L site. The Traffic Impact Analysis and supplemental information outlined minor improvements, such as signing and pavement markings, which would allow adequate transportation services for the construction and operation of the KPTV building on a portion of the Station L site.

The decision and conditions of the hearings official for the Station L site rezoning and subdivision require further transportation infrastructure construction before subsequent development can occur on the site.

Alternative One

Access Impacts

The construction of the Water Avenue alignment using Alternative One will alter the access to local businesses. With Alternative One, Water Avenue would extend from its existing terminus north of OMSI to Division Place. This would create new access opportunities since traffic would have a direct route from both Division Place and Caruthers Street to Water Avenue and to points to the north. Some area business owners view this potential connection as a modest advantage, while others see no advantage.

For all of the build alternatives (Alternatives One, Two and Three), there are other potential implications for access depending upon negotiations between the City of Portland and the Public Utility Commission (PUC). The PUC staff has recommended that with the completion of the Water Avenue Extension the at-grade crossing at Grand Avenue immediately south of Division Street should

be closed. The PUC staff's recommendation is based upon accident records and limited sight distances at the existing railroad grade crossing. Should the existing crossing be closed, existing traffic would be diverted to either the new Water Avenue alignment or another existing crossing (8th Avenue, Division Street, 11th Avenue or 12th Avenue). Current traffic volumes using this crossing amount to approximately 2600 vehicles per day with about 240 during the AM peak hour and 220 during the PM peak hour. Most previous analysis, including the Traffic Impact Analysis for the Station L site, assumed that the Grand Avenue grade crossing would be closed.

Whether or not the Grand Avenue grade crossing is closed, it is clear that access patterns will be altered with the construction of Water Avenue on the Alternative One alignment. Water Avenue will provide a new connection to the north, especially for businesses on Division Place and Caruthers Street. Some of the business owners observed that truck traffic will use the Water Avenue Extension, especially if the Grand Avenue grade crossing is closed. The truck traffic will be relatively close to OMSI and the proposed office buildings on the Station L site.

Impacts on Traffic Volume and Level of Service

Previous studies completed for the Station L site included estimates of traffic volumes on Water Avenue. These estimates were based on traffic generated by proposed development of office buildings on the Station L site and on traffic modeling completed by the staff of the City of Portland. The previous planning estimates and modeling were based on the assumption that the Grand Avenue grade crossing immediately south of Division Street would be closed. Two-way PM peak hour traffic volumes on Water Avenue were forecast to be approximately 800 vehicles at the north end of the roadway (near Clay Street) and about 500 vehicles at the south end of the corridor (near Grand Avenue and Division Place).

The selection of the Alternative One alignment for Water Avenue would be expected to cause most of the Water Avenue traffic to use Division Place to connect with the existing street system in the vicinity of Division Place and Grand Avenue. Thus, Alternative One would result in two-way PM peak hour traffic volumes of approximately 500 vehicles on Division Place between 4th Avenue and Water Avenue.

Impacts on Key Intersections

Alternative One would result in substantial changes in traffic flow and volumes at several key intersections in the study area. Traffic volumes at some intersections would increase substantially, while other intersections would experience a decrease.

With Alternative One two new intersections would be created, Water Avenue at Caruthers Street and Water Avenue at Division Place. The six key intersections for Alternative One are:

- Caruthers Street at 4th Avenue,
- Caruthers Street at Grand Avenue,
- Division Place at 4th Avenue,
- Division Place at Grand Avenue,
- Water Avenue at Caruthers Street, and
- Water Avenue at Division Place

Caruthers Street at 4th Avenue

With the Alternative One alignment, the intersection of 4th Avenue and Caruthers Street would be changed little from its present condition. Slight increases in traffic volume might occur along Caruthers Street due to the ability of traffic from businesses to gain access to Water Avenue. No change in traffic control signing would likely be necessary.

Caruthers Street at Grand Avenue

The traffic volumes at the intersection of Caruthers Street and Grand Avenue would likely decrease with construction of the Alternative One alignment, especially if the PUC staff's recommendation to close the Grand Avenue grade crossing south of Division Street is implemented. As indicated in the discussion of existing conditions, the predominant movement at this intersection is for north-south traffic. The closure of the grade crossing would result in nearly total elimination of traffic on the north leg of this intersection.

Division Place at 4th Avenue

With the Alternative One alignment, the intersection of Division Place and 4th Avenue would be substantially impacted. As stated above, significant increases in traffic would be expected on Division Place as the result of the connection with Water Avenue. Two-way peak hour traffic volumes of 500 vehicles on Division Place, combined with high volumes of truck traffic turning to and from the south leg of 4th Avenue, would alter the intersection's operating characteristics. With the forecast traffic increases, it would no longer be appropriate for it to be an uncontrolled intersection (no STOP signs or other traffic control signing is currently provided). East-west traffic would be the predominant movements which suggests STOP signs be installed on 4th Avenue. In addition, STOP signs on Division Place would be the minimum traffic control treatment for the railroad crossing.

Division Place at Grand Avenue

The traffic volume and movements at the intersection of Division Place and Grand Avenue would also be significantly altered by the selection of Alternative One for the Water Avenue alignment. The predominant movement would be in the east-west direction whether or not the Grand Avenue railroad grade crossing south of Division Street were closed. STOP signs would be appropriate for the Grand Avenue approaches. A four-way STOP-controlled intersection would also be an option. It might be recommended if Grand Avenue were to continue to be open to traffic at the railroad crossing or if other factors contributed to traffic volumes on Grand Avenue which approximated those expected on Division Place. Redevelopment of parcels on Grand Avenue or Caruthers Street might be examples of factors which could contribute to higher traffic volumes on Grand Avenue.

Given the projected traffic volumes, STOP control would provide an acceptable level of service at each of the four previously identified key intersections plus the two new intersections (Water Avenue at Caruthers Street and Water Avenue at Division Place). Projected traffic volumes are low enough along the Water Avenue alignment that intersection delays should be tolerable. It is anticipated that these intersections will not meet traffic signal warrants as specified in the Manual on Uniform Traffic Control Devices.

Two-way STOP control is appropriate where approach volumes are unequal. Four-way STOP control is appropriate where approach volumes are comparable. Other considerations, such as sight distance, may lead to a recommendation for installation of STOP signs on all approaches.

STOP signs would be installed on two, three, or four approaches of these intersections. Please refer to the figure titled Schematic Traffic Control Concept. For Alternative One, the recommended STOP sign placement is illustrated for the continuous route utilizing the intersections along Water Avenue and Division Place.

Water Avenue at Caruthers Street

The predominant traffic movement at the Water Avenue and Caruthers Street intersection would be through traffic in a north-south direction. STOP signs would be the appropriate traffic control at the intersection and would be located on Caruthers Street.

Water Avenue at Division Place

The Water Avenue and Division Place intersection would have public streets on only the north and east legs. The south and west approaches would be developed as private driveways. The predominant traffic movement would be on the north and east legs of the intersection (i.e., left turns from southbound Water Avenue to eastbound Division Place and right turns from westbound Division Place to northbound Water Avenue).

Impacts on Vehicle Types

The extension of Water Avenue may alter the vehicle mix within the study area and the routes used by the heavy vehicles. Based upon the previous studies of the area, including the Traffic Impact Analysis for the Station L Site, most new vehicles destined for redeveloped sites would likely be automobiles and small trucks.

Transit buses might be introduced into portions of the study area as a result of the extension of Water Avenue. The completion of the Water Avenue extension would allow transit buses to operate on Water Avenue and the connecting streets. In the case of Alternative One, this would include Division Place. Left turns and right turns at the intersection of Water Avenue and Division Place would be readily made by transit vehicles and would require no special geometric considerations such as wider corner radii. Whatever geometry is developed to accommodate trucks at these intersections would also accommodate transit buses.

New routing options for heavy trucks would probably be one of the more important changes resulting from the selection of Alternative One for the Water Avenue Extension. Alternative One would allow easy access to Water Avenue and other northerly destinations by heavy trucks originating at businesses in the south portion of the study area. Business owners note that their trucks will undoubtedly use Water Avenue. This will put their vehicles in close proximity to OMSI and offices proposed along Water Avenue. Based upon current truck usage in the study area and the projected volumes of traffic on Water Avenue, heavy truck operations are estimated to account for less than 10 percent of peak hour traffic. Recent observations indicate more heavy trucks operate in the study area at off-peak times than during the peak hour. This pattern of truck activity is similar to that in other industrial areas.

With Alternative One, the only intersection on the Water Avenue extension alignment to have a significant number of turning trucks would be the new intersection at Division Place and Water Avenue. To make truck turning movements easier, a larger corner radius could be provided for the northeast corner. A disadvantage of a larger radius is the increased pavement width and longer pedestrian crossing distance. (See also the discussion under Geometric Requirements and Alignment Constraints.)

Alternative Two

Access Impacts

With Alternative Two, Water Avenue will extend from its existing terminus north of OMSI to Caruthers Street. Other street segments to be improved and utilized for connections include:

- Caruthers Street between Water Avenue and 4th Avenue,
- 4th Avenue between Caruthers Street and Division Place, and
- Division Place between 4th Avenue and Grand Avenue

Like Alternative One, Alternative Two would create new access opportunities. Traffic would have a better connection to Water Avenue and to points to the north.

Water Avenue will provide a new connection to the north, especially for businesses on Caruthers Street, and, to a lesser degree, on Division Place. Some of the business owners observed that truck traffic will use the Water Avenue Extension, especially if the Grand Avenue grade crossing is closed. The truck traffic will be relatively close to OMSI and the proposed office buildings on the Station L site.

Impacts on Traffic Volumes and Level of Service

The selection of the Alternative Two alignment for Water Avenue would be expected to cause most of the Water Avenue traffic to use Caruthers Street, 4th Avenue, and Division Place to connect with the existing street system in the vicinity of Division Place and Grand Avenue. Thus, Alternative Two would result in two-way PM peak hour traffic volumes of approximately 500 vehicles on each of these one-block segments.

Impacts on Key Intersections

Alternative Two would result in substantial changes in traffic flow and volumes at several key intersections in the study area. Traffic volumes at some intersections would increase substantially, while other intersections would experience a decrease.

The Alternative Two alignment is designed to use routes which do not include the Caruthers Street and Grand Avenue intersection. The traffic volumes at this intersection would likely decrease with construction of the Alternative Two alignment, especially if the PUC staff's recommendation to close the Grand Avenue grade crossing is implemented. As indicated in the discussion of existing conditions, the predominant movement at this intersection is for north-south traffic. The closure of the grade crossing would result in nearly total elimination of traffic on the north leg of this intersection.

With Alternative Two, one new intersection would be created (Water Avenue at Caruthers Street) and operations at others would be significantly altered. The five key intersections for Alternative Two are:

- Water Avenue at Caruthers Street,
- Caruthers Street at 4th Avenue,
- Caruthers Street at Grand Avenue,
- Division Place at 4th Avenue, and
- Division Place at Grand Avenue

Water Avenue at Caruthers Street

The new Water Avenue at Caruthers Street intersection initially would be expected to be a T-intersection with no south leg. The predominant traffic movement at the Water Avenue and Caruthers Street intersection would be left turns from southbound Water Avenue to eastbound Caruthers Street and right turns from westbound Caruthers Street to northbound Water Avenue. STOP signs would be the appropriate traffic control at the intersection and would be located on Caruthers Street.

Caruthers Street at 4th Avenue

With the Alternative Two alignment, the intersection of 4th Avenue and Caruthers Street would be significantly changed from its present condition. With the connection to Water Avenue, two-way peak hour traffic volumes on Caruthers Street west of 4th Avenue would be expected to increase to approximately 500 vehicles per hour. The predominant movements would be expected to be right turns from eastbound Caruthers Street to southbound 4th Avenue and left turns from northbound 4th Avenue to westbound Caruthers Street. The north leg of the intersection would be expected to be a low volume private driveway. STOP signs would be the appropriate traffic control for the intersection and would be located on the east, west and north approaches to the intersection. A STOP sign represents the minimum crossing protection for the railroad grade crossing. No STOP sign is recommended for the south leg of the intersection because of the higher approach volumes on the south leg and because the absence of a STOP sign will help keep vehicles from stacking on the railroad tracks running along 4th Avenue.

Division Place at 4th Avenue

With the Alternative Two alignment, the intersection of Division Place and 4th Avenue would be substantially impacted. As stated above, significant increases in traffic would be expected on 4th Avenue between Caruthers Street and Division Place and on Division Place east of 4th Avenue. Two-way peak hour traffic volumes of 500 vehicles per hour would be expected on both roads. In addition, relatively high volumes of truck traffic turning to and from the south leg of 4th Avenue would be expected to continue. The predominant movement would be from southbound 4th Avenue to eastbound Division Place and from westbound Division Place to northbound 4th Avenue. With these traffic increases, it would no longer be appropriate for it to be an uncontrolled intersection (no STOP signs or other traffic control devices are currently provided). STOP signs would be appropriate for the east, west and south approaches. STOP signs on Division Place would be the minimum crossing protection for the railroad crossing. No STOP sign is recommended for the north approach because of the higher traffic volumes and to minimize vehicle stacking on the railroad tracks in 4th Avenue. With STOP signs controlling the intersection as described, an acceptable level of service is forecast for the intersection.

Division Place at Grand Avenue

The traffic volumes and movements at this intersection would be as previously discussed for Alternative One.

Given the projected traffic volumes, STOP control would provide an acceptable level of service at each of the five key intersections including the new intersection of Water Avenue at Caruthers Street. Projected traffic volumes are low enough along the Alternative Two alignment that intersection delays should be tolerable. It is anticipated that these intersections will not meet traffic signal warrants as specified in the Manual on Uniform Traffic Control Devices.

Impacts on Vehicle Types

The anticipated change in vehicle mix and operations would be expected to be generally the same as discussed for Alternative One

With Alternative Two, three intersections on the Water Avenue extension alignment would have turns which would have to be negotiated by trucks and other vehicles. These include the intersections of Water Avenue at Caruthers Street, 4th Avenue at Caruthers Street and 4th Avenue at Division Place. To make truck turning movements easier, larger corner radii could be provided at these intersections. A disadvantage of a larger radius is the increased pavement width and longer pedestrian crossing distance.

Alternative Three

Access Impacts

With Alternative Three, Water Avenue will extend from its existing terminus north of OMSI to Caruthers Street. Other street segments to be improved and utilized for connections include

- Caruthers Street between Water Avenue and Grand Avenue, and
- Grand Avenue between Caruthers Street and Division

Like the other build alternatives, Alternative Three would create new access opportunities. Traffic originating in the south portion of the study area would have a better connection to Water Avenue and to points to the north.

Impacts on Traffic Volumes and Level of Service

The selection of the Alternative Three alignment for Water Avenue would be expected to cause most of the Water Avenue traffic to use Caruthers Street and Grand Avenue to connect with the existing street system in the vicinity of Division Place and Grand Avenue. Thus, Alternative Three would result in two-way PM peak hour traffic volumes of approximately 500 vehicles on the southern portion of Water Avenue, Caruthers Street and Grand Avenue.

Impacts on Key Intersections

As with Alternatives One & Two, Alternative Three would result in substantial changes in traffic flow and volumes at several key intersections in the study area. Traffic volumes at some intersections would increase substantially, while other intersections would experience a decrease.

With Alternative Three, one new intersection would be created (Water Avenue at Caruthers Street) and operations at others would be significantly altered. The four key intersection for Alternative Three are

- Water Avenue at Caruthers Street,
- Caruthers Street at 4th Avenue,
- Caruthers Street at Grand Avenue, and
- Division Place at Grand Avenue

Water Avenue at Caruthers Street

The new Water Avenue at Caruthers Street intersection would be the same for Alternative Two and Three. Initially, it would likely be a T-intersection with no south leg. The predominant traffic movement at the Water Avenue and Caruthers Street intersection would be left turns from southbound Water Avenue to eastbound Caruthers Street and right turns from westbound Caruthers Street to northbound Water Avenue. STOP signs would be the appropriate traffic control at the intersection and would be located on Caruthers Street.

Caruthers Street at 4th Avenue

With Alternative Two, the intersection of 4th Avenue and Caruthers Street would be significantly changed from its present condition. Like the existing conditions, the predominant movement with Alternative Three would be through movements in the east-west direction. However, traffic volumes would be significantly higher than current volumes. The north leg of the intersection would be expected to be a low volume private driveway. The south leg would likely continue in its current, unimproved state. STOP signs would be the appropriate traffic control for the intersection and would be located on all four approaches. Although the predominant movement would be east-west, STOP signs would be appropriate as the minimum warning for the railroad grade crossing.

Of the three build alternatives, the Alternative Three causes the greatest impact on the Caruthers Street and Grand Avenue intersection. The traffic volumes at the intersection of Caruthers Street and Grand Avenue would increase with construction of the Alternative Three alignment, regardless of whether or not the PUC staff's recommendation to close the Grand Avenue grade crossing is implemented. As indicated in the discussion of existing conditions, the predominant movement at this intersection is for north-south traffic. The closure of the grade crossing would result in nearly total elimination of traffic on the north leg of this intersection. Even if the Grand Avenue railroad grade crossing were closed, the predominant movements would be from eastbound Caruthers Street to southbound Grand Avenue and from northbound Grand Avenue to westbound Caruthers Street. STOP signs would be the appropriate traffic control for the intersection.

Caruthers Street at Grand Avenue

At the Caruthers Street and Grand Avenue intersection, STOP signs are recommended for the north, east and west approaches, or on all four approaches depending upon conditions. If the Grand Avenue railroad grade crossing were closed (which minimizes the approach volumes from the north), a STOP sign would not be needed on the south approach. If the Grand Avenue railroad crossing remains open, all four approaches should have STOP signs to help reduce confusion and to mitigate the limited sight distance caused by the columns supporting the viaduct above the intersection. (See also the discussion under Land Use and Alignment Constraints.) An adequate level of service is forecast under either condition.

Division Place at 4th Avenue

With the Alternative Three alignment, the intersection of Division Place and 4th Avenue would be substantially unchanged from its current situation. Traffic volumes would be little changed from the existing conditions. The intersection can probably continue in its present uncontrolled state with no STOP signs or other regulatory signing.

Division Place at Grand Avenue

The traffic volume and movements at the intersection of Division Place and Grand Avenue would also be significantly altered by the selection of Alternative Three for the Water Avenue alignment. The predominant traffic movements at this intersection would be similar to those today (i.e. high volumes of traffic turning from westbound Division Place to northbound Grand Avenue and left turns from southbound Grand Avenue to eastbound Division Place). However, the traffic volumes with Alternative Three would be greater than existing volumes. STOP signs would be appropriate for the south, west and east approaches of the intersection.

Reports by local business owners of frequent accidents are not confirmed by City of Portland accident records, but are a cause for concern. Increased traffic volumes could increase the accident potential. A four-way STOP control would also be an option at this intersection to reduce confusion. An acceptable level of service is forecast at the intersection with STOP control.

Given the projected traffic volumes, STOP control would provide an acceptable level of service at each of the four key intersections including the new intersection of Water Avenue at Caruthers Street. Projected traffic volumes are low enough along the Alternative Three alignment that intersection delays should be tolerable. It is anticipated that these intersections will not meet the traffic signal warrants as specified in the Manual on Uniform Traffic Control Devices.

Impacts on Vehicle Types

The anticipated change in vehicle mix and operations would be expected to be generally the same for Alternative Three as for the other build alternatives.

Alternative Three would not provide as much of an access improvement for trucks originating in the vicinity of 4th Avenue and Division Place as would the other build alternatives.

With Alternative Three, three intersections on the Water Avenue extension alignment would have turns which would have to be negotiated by trucks and other vehicles. These include the intersections of Water Avenue at Caruthers Street, Caruthers Street at Grand Avenue, and Grand Avenue at Division Place. To make truck turning movements easier, larger corner radii could be provided at these intersections. A disadvantage of a larger radius is the increased pavement width and longer pedestrian crossing distance. (See also the discussion under Land Use and Alignment Constraints.)

This table summarizes the predominant traffic movements for each of the intersections for the existing conditions and each of the build alternatives

Intersection	Existing Conditions	Alternative One	Alternative Two	Alternative Three
Water Ave at Caruthers St	N/A	NB-SB (t) SB-NB (t)	WB-NB (r) SB-EB (l)	WB-NB (r) SB-EB (l)
Water Ave at Division Place	N/A	WB-NB (r) SB-EB (l)	N/A	N/A
4th Ave at Caruthers St	EB-WB (t) WB-EB (t)	EB-WB (t) WB-EB (t)	NB-WB (l) EB-SB (r)	EB-WB (t) WB-EB (t)
4th Ave at Division Place	EB-WB (t) WB-EB (t)	EB-WB (t) WB-EB (t)	WB-NB (r) SB-EB (l)	EB-WB (t) WB-EB (t)
Grand Ave at Caruthers St	NB-SB (t) SB-NB (t)	NB-WB (l)* EB-SB (r)*	NB-WB (l)* EB-SB (r)*	NB-WB (l) EB-SB (r)
Grand Ave at Division Place	WB-NB (r) SB-EB (l)	EB-WB (t) WB-EB (t)	EB-WB (t) WB-EB (t)	WB-NB (r) SB-EB (l)

Table 2 Summary of Predominant Traffic Movements

N/A indicates this intersection does not exist under this scenario

* Assumes the Grand Avenue railroad grade crossing south of Division Street is closed, if the crossing were to remain open, the NB-SB and SB-NB movements would predominate

NB = northbound SB = Southbound EB = Eastbound WB = Westbound
(r) = right turn (l) = left turn (t) = through movement

3.3 Loading and Parking

This section contains a discussion and analysis of loading and parking in the public rights-of-way in the area of this study

Existing Conditions

Presently, a wide variety of non-standard right-of-way uses occur within the study area and in the Central Eastside Industrial District as a whole. These uses include truck loading operations where trucks are parked at 90-degrees to buildings, partially blocking the right-of-way. The City has recognized the importance of these non-standard uses to the continued viability of the industrial sanctuary. In recent years, dialog between the City and businesses has addressed the potential need for loading policies and permits in the CEID but presently loading operations are regulated through selective enforcement where problems occur.

Traffic conflicts with loading operations are most significant where rights-of-way have been improved to City standards and significant traffic volumes are present. This situation is exemplified on Water Avenue north of Clay Street, just outside the area of this study. Even though this section of Water Avenue carries more traffic than anticipated in the study area, conflicts with 90-degree loading operations are not a problem. This is due partly to loading operations being conducted outside peak traffic periods.

In most of the study area, rights-of-way have not been improved to City standards, traffic is very light and loading conflicts are not a problem. Loading operations occur with a considerable amount of cooperation and communication among businesses and with rail spur users.

North of Caruthers Street, no loading occurs in the right-of-way. Extensive loading operations occur along Division Place, between 4th Avenue and Water Avenue. Loading operations also occur along Caruthers Street and Grand Avenue, with limited operations on 4th Avenue.

Employee and customer parking occurs in rights-of-way throughout the study area. Parking operations are generally informal and unregulated and consist of parallel parking along the edges of the private street improvements as well as head-in parking. In both cases, vehicles are typically parked against the right-of-way line, requiring pedestrians to walk next to traffic lanes.

Alternatives Analysis

No Build

Current operations will continue without major changes from present conditions. Changes that do occur will be related to businesses moving, closing or altering loading bays. No mitigation is required under the No Build Alternative.

A few businesses have indicated that they may alter their parking operations. The Bureau of Traffic Management will review proposed parking and loading plans and likely will recommend more efficient procedures to help reduce conflicts between parking, loading and vehicle circulation.

Alternatives One, Two and Three, Water Avenue North of Caruthers Street

Impacts

No loading operations will occur along this alignment north of Caruthers Street, no mitigation will be required.

Alternative One

Impacts on Loading

The most notable effect on loading operations will occur along Division Place between Water Avenue and 4th Avenue. Door Distributors of Oregon conducts 90-degree truck loading operations on both sides of the street and forklifts cross up to 50 times a day. Directing collector-street traffic through this area will affect the efficiency of the Door Distributors operation as well as the safety and efficiency of passing traffic.

The improvement of Caruthers as a local service street will create similar but much less significant conflicts between passing traffic and 90-degree truck loading conducted by McCoy Stair and Millwork along the south side of the street.

For the loading areas described above, concrete driveway connections will be necessary. Many of these loading areas are wider than the maximum commercial driveway width allowed by the City. Enforcement of this standard would disrupt existing loading operations.

Impacts on Parking

Large truck trailers are occasionally parked along the south curb of Division Place, between 4th Avenue and Grand Ave. Curb side repairs to the parked trailers were observed during a typical business day. These uses may impose a slight restriction on bicycle traffic along the collector street.

Head-in parking areas along McCoy Stair & Millwork and the Door Distributors frontages will be affected by Alternative One. Each of these frontages will probably be improved with commercial driveways. Typically, parking is not permitted in driveways.

Door Distributors of Oregon have indicated that they may expand their facility to include a public showroom, this would increase their parking requirements.

Mitigations

Cooperation between businesses and the Bureau of Traffic Management will be needed to mitigate the impacts of Alternative One on existing loading operations. 90-degree loading may be allowed even where trucks extend out into the street, as long as space is maintained for two lanes of traffic to pass safely. However, it may be necessary to develop alternative loading operations which will have less impact on traffic operations and traffic safety on Division Place. For example, it may be necessary to limit loading operations to one side of the street at a time during peak traffic periods.

The City may need to relax their design and operation requirements for commercial driveways. Extra-wide commercial driveways may be necessary to accommodate existing loading operations and also to function as non-standard parking and pedestrian areas. Some precedents for this approach may be found along NW 13th Avenue in Portland's Pearl District, where recent City street improvements accommodate non-standard loading and parking operations.

Other potential loading mitigations include construction of diagonal loading bays, limiting fork lift crossings to designated locations, and signage to alert drivers to loading operations. However, it should be noted that fork lift crossings of much more heavily-traveled collector streets occur outside the industrial sanctuary without unacceptable conflicts.

Alternative Two

Impacts

The most significant impact on loading operations occurs at the McCoy Stair and Millwork Company and has been described under Alternative One.

Occasional parallel loading and staging operations were observed in 4th Avenue between Caruthers and Division Place. Employee and customer parking also occurs in this section. These uses may be eliminated or severely curtailed by the improvement of 4th Avenue to Collector Street standards and resulting conflicts between loading, vehicular and rail traffic. This situation is discussed in greater detail under "Rail Facilities."

Further east along this alignment, loading occurs predominantly at off-street docks.

Mitigations

Mitigation of impacts along the McCoy frontage of Caruthers Street is discussed under Alternative One. Mitigation of impacts in 4th Avenue is discussed under Rail Facilities.

Alternative Three

Impacts

According to observations throughout a typical business day, 90-degree truck loading operations at Apple Produce Company cause significant obstructions on the west side of Grand Avenue. This is not presently a problem, nor would it become a problem if Alternative Three were implemented, because through-traffic runs along the east side of Grand Avenue, east of the McLoughlin Boulevard viaduct. The loading operations would obstruct pedestrian traffic, which under Alternatives Two and Three, may be routed along the west side of Grand between Caruthers and Division. This obstruction would not be significant enough to warrant mitigation.

90-degree loading occurs less frequently along the Caruthers frontage of Apple Produce and will not pose enough of a conflict to warrant mitigation.

Between 4th Avenue and Grand Avenue, existing head-in parking on the north side of Caruthers and parallel parking on the south side will be disrupted by the improvement of Caruthers to Collector Street standards

Mitigations

It may be possible to mitigate the parking disruptions along Caruthers by using extra-wide commercial driveways as described under Alternative One

3.4 Rail Facilities

Existing Conditions

Two railroad spurs are located in the study area. One spur, designated Spur No. 1 for this study, is a single track in Caruthers Street. This spur originates at a Southern Pacific switch east of Grand Avenue and runs west, terminating at the Lone Star Northwest bulk supply facility. Lone Star leases 1114' of this spur from Southern Pacific R.R. east to their mainline switch near the end of SE Caruthers St.

Since the spur is utilized five times per week, an informal arrangement has been made between Lone Star and other businesses along SE Caruthers Street whereby switching is done at night to reduce conflicts with parked vehicles.

The second spur, designated Spur No. 2 for this study, runs north along 4th Avenue as a double track. The eastern track is not used and ends just north of Caruthers Street. The western track continues north-northwest and is used by the Railcar Restoration Company, Inc. (RCR) and the East Portland Traction Company. North of Caruthers Street, Spur No. 2 runs through the eastern edge of the Station L parcel and through property owned by Southern Pacific to the RCR site. In addition to providing rail access to the RCR site, Spur No. 2 is used by the "Samtrak" excursion trolley which carries passengers from Oaks Park to OMSI. Although the purpose of this trolley is primarily recreational it is used by many OMSI visitors as a parking shuttle since parking is sometimes available at Oaks Park when the OMSI lots are full.

Presently the most significant operational issue related to Spur No. 2 is conflicts with cars and trucks parked on or near the rail line in 4th Avenue.

Alternatives Analysis

No Build

Under the No Build Alternative, the rail system in the study area will continue to function unchanged

Alternatives One, Two and Three

Rail impacts and mitigations associated with the Water avenue extension north of Caruthers Street are discussed in Section 3 1, Land Use and Alignment Constraints

The Metropolitan Service District (METRO) is presently considering two alternative alignments for the South-North Light Rail Transit project that pass through the study area. From downtown Portland, both alignments reach the east bank of the Willamette River at the property line between OMSI and Station L. Both alignments continue east along the property line and across the Water Avenue extension. From that point each alignment follows a different route to the southeast. As presently proposed, the Water Avenue extension will require no adjustments to accommodate the proposed South-North LRT alignments and will provide access to the station that would be located on the east bank of the river.

Under Alternatives One, Two and Three there will be some construction impacts on Spur No. 1 and Spur No. 2 where new utility lines cross under tracks and where street work occurs next to the tracks. Mitigation will consist of detailed scheduling and coordination of all steps of the construction process with rail operations so that rail service interruptions are confined to times and durations that are acceptable to rail owners and users.

During the street design process, the need for concrete surface improvements will probably be identified at several locations where the alignment alternatives cross tracks. The likeliest locations for concrete-surfaced crossings are the intersections of Water and Caruthers, Caruthers and 4th and Division and 4th.

Under each of the alignment alternatives, it will be necessary to determine if sections of rail spurs are deteriorated enough to warrant repair or replacement before street improvements are constructed nearby. This type of work, if necessary, can be ordered by the City and will be the responsibility of the track owner. Even though the City would bear no direct cost responsibility, the issue of track repairs could require significant effort and attention and could thus influence project cost and schedule.

While the City of Portland issues permits for rail spurs to occupy City rights-of-way, the Oregon Public Utility Commission regulates the construction and operation of rail facilities. In area of this study the PUC has expressed concern regarding alternative alignment crossings of rail spurs, this is discussed in the following sections. As noted in 3 2, Traffic Operations, the PUC has also stated their intention to propose the closure of the existing on-grade crossing of the Southern Pacific mainline on Grand Avenue just south of Division Street. A PUC position paper titled Extension of Southeast Water Avenue, Portland, Oregon, addresses this proposal and is attached to this study.

Mitigations

Coordination must occur with the Public Utilities Commission and the Portland Development Commission as well as companies and agencies that manage the rail spurs. It is recommended that these agencies initiate an efficient system of vehicular passage through this neighborhood by providing adequate signage at traffic crossings and assisting with issues related to dislocated businesses.

Alternative One

Impacts

Under this alternative, the Collector Street improvement crosses Spur No. 1 in Caruthers Street where it enters the Lone Star property. The Local Street improvement will parallel Spur No. 1 in Caruthers. This will result in only minor operational conflicts since most rail movements on Spur No. 1 occur outside of peak traffic periods, no mitigation will be required.

The Local Street improvement and the Collector Street improvement will cross Spur No. 2 at 4th Avenue. Only minor operational conflicts are expected.

Mitigations

It is likely that no mitigation will be required for the Local Street crossing at Caruthers and 4th. The Public Utility Commission has indicated that crossing protection equipment consisting of gates, lights and bells will be required for the Collector Street crossing at Division and 4th. The crossing protection will result in slightly longer but still-acceptable delays for automobile traffic than with the existing unprotected crossing.

Alternative Two

Impacts

Impacts on Spur No. 1 will be similar to those described under Alternative One except, as with Alternative Two, the presence of collector traffic adjacent to Spur No. 1 in Caruthers will require reconstruction of the spur.

The spur is owned by Southern Pacific but is located in the right-of-way under a permit from the City. The permit gives the City the ability to require the reconstruction, which would probably be paid for by Lone Star Northwest, the user of the spur.

Conflicts between the Collector Street improvement and Spur No. 2 in 4th Avenue will be significant. The 4th Avenue right-of-way is only 50-feet wide. This width will not allow separation of train and automobile traffic if two tracks remain in place. As noted under "Land Use and Alignment Constraints," this width limitation also precludes the routing of the designated pedestrian connection along 4th Avenue.

Dick Samuels, owner and operator of the East Portland Traction Company (EPTC) and Samtrak, recently informed the study team of plans for potential improvements to the 4th Avenue section of Spur No. 2. The improvements would include construction of open-ballast track and gates at Caruthers and Division. These measures would eliminate automobile traffic on 4th Avenue and would eliminate Alternative Two from consideration.

Mitigations

Since shared train and automobile lanes will probably be undesirable from an operational and safety perspective, the unused eastern track of Spur No 2 must be removed to provide width for separation of train and automobile traffic. With the removal of the eastern track, one traffic lane and one bicycle lane could be located on each side of the western track. The designated pedestrian connection would be routed east on Caruthers and south on Grand to Division.

Since the City must evaluate and approve any plan by EPTC to change or improve Spur No 2 in 4th Avenue and no plan has been submitted, it is not appropriate for this study to speculate on potential mitigations.

The Public Utility Commission has indicated that full crossing protection equipment will be required at 4th and Caruthers and 4th and Division. Although this will provide safety benefits, it will result in delays to automobile traffic that are considerably longer than for the existing unprotected crossings.

Alternative Three

Rail impacts and mitigations associated with this alternative are similar to those described under Alternative One for the Caruthers Street improvement, with the following additions:

- Crossing protection equipment will be required where the Collector Street crosses the tracks in Fourth Avenue.
- As with Alternative Two, the presence of collector traffic adjacent to Spur No 1 in Caruthers will require reconstruction of the spur.

The spur is owned by Southern Pacific but is located in the right-of-way under a permit from the City. The permit gives the City the ability to require the reconstruction, which would probably be paid for by Lone Star Northwest, the user of the spur.

3.5 Estimated Project Cost per Alignment

Estimated project costs for Alternatives One, Two and Three are shown in Tables 3, 4, and 5. These costs are based on conceptual designs for the Water Avenue extension which were developed by KPFF Consulting Engineers, the Bureau of Transportation Engineering and Development, the Bureau of Traffic Management and the Portland Development Commission over a period of several months. Each of these organizations brought to the conceptual design process several years of experience and familiarity with the alignment study area and with stakeholders and issues in the study area.

Many of the conceptual design criteria, such as type of street light, were developed during the design of the Phase One Water Avenue extension prior to the opening of OMSI. Most other design criteria, such as street widths and lane arrangements, were dictated by City standards for Collector and Local streets. Other project components, such as utility systems, were identified through KPFF's earlier work on other projects in the study area.

The cost estimates cover total project costs. Total project costs include direct construction as well as indirect costs such as right-of-way acquisition and engineering and administrative costs to design and supervise the construction of the Water Avenue extension. Although many project elements will not be fully understood until after an alignment has been selected and design is complete, the cost estimates for the alternatives have been formatted to make them as directly comparable as possible. Project elements that are common to each alternative are included in the Base Project cost estimate.

Alternative Analysis

No Build Alternative

Costs associated with the No Build Alternative have not been estimated but may include:

- Loss of efficiency and increased time and vehicle costs for businesses in the study area
- Congestion in the surrounding district as traffic to and from the study area follows circuitous access routes
- Loss of investment in the study area as lack of infrastructure constrains development
- Loss of value as money is expended to maintain existing substandard infrastructure

Alternatives One, Two and Three

The cost to improve Water Avenue from OMSI south to Caruthers Street and to improve Caruthers as a Local Street from the Willamette River east to Grand Avenue is common to the three alternative alignments. These improvements are addressed in Base Project costs. Significant Base Project cost considerations include:

- Variation between estimated and actual right-of-way acquisition costs
- Potential impact mitigation or business relocation costs associated with the OMSI and Rail Car Restoration Company sites
- Potential hazardous material investigation and removal costs

These considerations have been balanced by assuming a slightly higher-than-average right-of-way acquisition cost and by including some track relocation costs

Alternative One

The most significant cost variables for this alternative are similar to those described above, namely costs to acquire right-of-way through the Lone Star site and to mitigate site impacts. As with Alternative One, a slightly higher-than-average acquisition cost was used to cover variables yet maintain a uniform basis of comparison among the alternative alignments.

Alternative Two

Rail work in Fourth Avenue constitutes the most significant cost variable for Alternative Two. Potentially variable items include:

- The extent of special pavement adjacent to rails, which is dependent on decisions that will be made during final design regarding the number of tracks that will remain in place, separation of automobile and train traffic, and transitions from traffic routes parallel to tracks to traffic routes crossing tracks
- The complexity of crossing protection equipment required by PUC

Alternative Three

The relocation of columns under the McLoughlin Boulevard viaduct constitutes the most highly variable element of Alternative Three. The technical feasibility of this work is well understood by the study team but ODOT coordination issues and unsuitable soil conditions cannot be clearly identified within the scope and timeline of this study. These variables were balanced by the following assumptions:

- More-expensive augured piles will be required, rather than driven piles, which are cheaper but more disruptive
- Column and beam removal and replacement will be of slightly higher-than-average complexity
- Potential cost to Lone Star Northwest to reconstruct Spur No. 1 in Caruthers Street

Base Project

Includes Water Ave from OMSI to Caruthers, Caruthers from Water to Grand, as a "local street," including streetscape. These are base costs, common to all three alternative alignments

Item	Quantity	Unit	Unit Price	Total
Mobilization	8%		\$	110,900
Temporary traffic control	1	LS	\$ 25,000	\$ 25,000
Demolish A C pavement	6,650	SY	\$ 8 00	\$ 53,200
Clear and grub	1	LS	\$ 5,000	\$ 5,000
General excavation	9,850	CY	\$ 8 00	\$ 78,800
Fill	2,460	CY	\$ 15 00	\$ 36,900
Geotextile	12,700	SY	\$ 1 10	\$ 14,000
Base rock, 20" depth	7,050	CY	\$ 20 00	\$ 141,000
A C pavement, 4" depth	12,700	SY	\$ 10 50	\$ 133,400
Concrete curb	5,740	LF	\$ 8 00	\$ 45,900
Concrete sidewalks & driveways	34,440	SF	\$ 2 75	\$ 94,700
Landscaping topsoil and trees at 35' spacing	1	LS	\$ 246,600	\$ 246,600
Street lighting, 180' spacing	19	EA	\$ 5,000	\$ 95,000
Permanent traffic control	1	LS	\$ 14,000	\$ 14,000
Storm sewer system mains and manholes	1	LS	\$ 95,800	\$ 95,800
Storm sewer system inlets and leads	1	LS	\$ 20,000	\$ 20,000
Water system (12" main)	1,800	LF	\$ 75 00	\$ 135,000
Retaining wall at Caruthers cul-de-sac, 0-18' height	1,080	SF	\$ 75 00	\$ 81,000
Rip-rap along riverfront	1	LS	\$ 45,800	\$ 45,800
Track realignment	500	LF	\$ 50 00	\$ 25,000
Direct Construction Cost Subtotal			\$	1,497,000
Right-of-way acquisition	50,600	SF	\$ 7 50	\$ 379,500
Engineering and construction admin	15%		\$	224,600
Ads	1	LS	\$ 600	\$ 600
Interest	6 50%		\$	136,600
Supennendence	0 433%		\$	6,500
Misc. Cost Subtotal			\$	747,800
Total Base Project			\$	2,244,800
Estimating Contingency @ 15%			\$	336,700
Grand Total Base Project			\$	2,581,500

Table 3 Base Project

Alternative No. 1

Includes Water Ave south of Caruthers, Division PI from Water to Grand These costs are in addition to the base costs in the table titled "Base Project "

Item	Quantity	Unit	Unit Price	Total
Mobilization	8%		\$	32,800
Temporary traffic control	1	LS	\$ 15,000	\$ 15,000
Demolish A C pavement	6,720	SY	\$ 8	\$ 53,800
General excavation	2,650	CY	\$ 8 00	\$ 21,200
Fill	660	CY	\$ 20 00	\$ 13,200
Geotextile	2,840	SY	\$ 1 10	\$ 3,100
Base rock, 20" depth	1,580	CY	\$ 20 00	\$ 31,600
A C pavement, 4" depth	2,840	SY	\$ 10 50	\$ 29,800
Concrete curb	1,280	LF	\$ 8 00	\$ 10,200
Concrete sidewalks & driveways	7,680	SF	\$ 2 75	\$ 21,100
Landscaping topsoil and trees at 35' spacing	1	LS	\$ 52,000	\$ 52,000
Street lighting, 180' spacing	7	EA	\$ 5,000	\$ 35,000
Permanent traffic control	1	LS	\$ 3,000	\$ 3,000
Storm sewer system mains and manholes	1	LS	\$ 4,000	\$ 4,000
Storm sewer system inlets and leads	1	LS	\$ 7,000	\$ 7,000
Railroad crossing gates and concrete surface	1	EA	\$ 110,000	\$ 110,000
Direct Construction Cost Subtotal			\$	442,800
Right-of-way acquisition	24,000	SF	\$ 7 50	\$ 180,000
Engineering and construction admin	15%		\$	66,400
Interest	6 50%		\$	103,400
Supenntendence	0 433%		\$	3,400
Misc. Cost Subtotal			\$	353,200
Total			\$	796,000
Estimating contingency @ 15%			\$	119,400
Total Additional Cost for Alternative No. 1				\$ 915,400
Base Project Cost				\$ 2,581,500
Grand Total, Alternative No. 1				\$ 3,496,900

Table 4 Alternative 1

Alternative No. 2

*Includes Caruthers St developed to "Collector" standard from Water Ave to 4th Ave
Also includes 4th Ave from Caruthers St to Division Pl, and Division Pl from 4th Ave
to Grand Ave These costs are in addition to the base costs shown in the table titled
"Base Project "*

Item	Quantity	Unit	Unit Price	Total
Mobilization	8%		\$	28,400
Temporary traffic control	1	LS	\$ 15,000	\$ 15,000
Demolish A C pavement	230	SY	\$ 8 00	\$ 1,800
General excavation	1,090	CY	\$ 8 00	\$ 8,700
Fill	270	CY	\$ 20 00	\$ 5,400
Geotextile	2,010	SY	\$ 1 10	\$ 2,200
Base rock, 20" depth	1,120	CY	\$ 20 00	\$ 22,400
A C pavement, 4" depth	2,720	SY	\$ 10 50	\$ 28,600
Concrete curb	960	LF	\$ 8 00	\$ 7,700
Concrete sidewalks & driveways	1,920	SF	\$ 2 75	\$ 5,300
Street trees & grates	6	EA	\$ 1,500	\$ 9,000
Street lighting, 180' spacing	4	EA	\$ 5,000	\$ 20,000
Permanent traffic control	1	LS	\$ 3,000	\$ 3,000
Storm sewer system mains and manholes	1	LS	\$ 2,000	\$ 2,000
Storm sewer system inlets and leads	1	LS	\$ 4,000	\$ 4,000
Railroad crossing gates and concrete surface	2	EA	\$ 110,000	\$ 220,000
Direct Construction Cost Subtotal			\$	383,500
Engineering and construction admin	15%		\$	57,500
Interest	6 50%		\$	66,200
Supenntendence	0 433%		\$	2,200
Misc. Cost Subtotal			\$	125,900
Total			\$	509,400
Estimating contingency @ 15%			\$	76,400
Total Additional Cost for Alternative No. 2				\$ 585,800
Base Project Cost				\$ 2,581,500
Grand Total, Alternative No. 2				\$ 3,167,300

Table 5 Alternative 2

Alternative No. 3

Includes premium for Caruthers St developed to "Collector" standard from Water Ave to Grand Ave These costs are in addition to the base costs shown in the table titled "Base Project " Costs to develop Caruthers St to "Local" street standards are included in the "Base Project "

Item	Quantity	Unit	Unit Price	Total
Mobilization	8%		\$	19,400
Demolish A C pavement	230	SY	\$ 8 00	\$ 1,800
General excavation	520	CY	\$ 8 00	\$ 4,200
Fill	130	CY	\$ 20 00	\$ 2,600
Geotextile	770	SY	\$ 1 10	\$ 800
Base rock, 20" depth	430	CY	\$ 20 00	\$ 8,600
A C pavement, 4" depth	770	SY	\$ 10 50	\$ 8,100
Concrete curb	320	LF	\$ 8 00	\$ 2,600
Concrete sidewalks & driveways	1,920	SF	\$ 2 75	\$ 5,300
Permanent traffic control	1	LS	\$ 3,000	\$ 3,000
Railroad crossing gates and concrete surface	1	EA	\$ 110,000	\$ 110,000
Structural modifications to McLoughlin viaduct	1	LS	\$ 95,000	\$ 95,000
Direct Construction Cost Subtotal			\$	261,400
Right-of-way acquisition	1	LS	\$ 500	\$ 500
Engineering and construction admin	15%		\$	39,200
Interest	6 50%		\$	45,200
Superintendence	0 433%		\$	1,500
Misc. Cost Subtotal			\$	86,400
Total			\$	347,800
Estimating contingency @ 15%			\$	52,200
Total Additional Cost for Alternative No. 3				\$ 347,800
Base Project Cost				\$ 2,581,500
Grand Total, Alternative No. 3				\$ 2,929,300

Table 6 Alternative 3

Summary

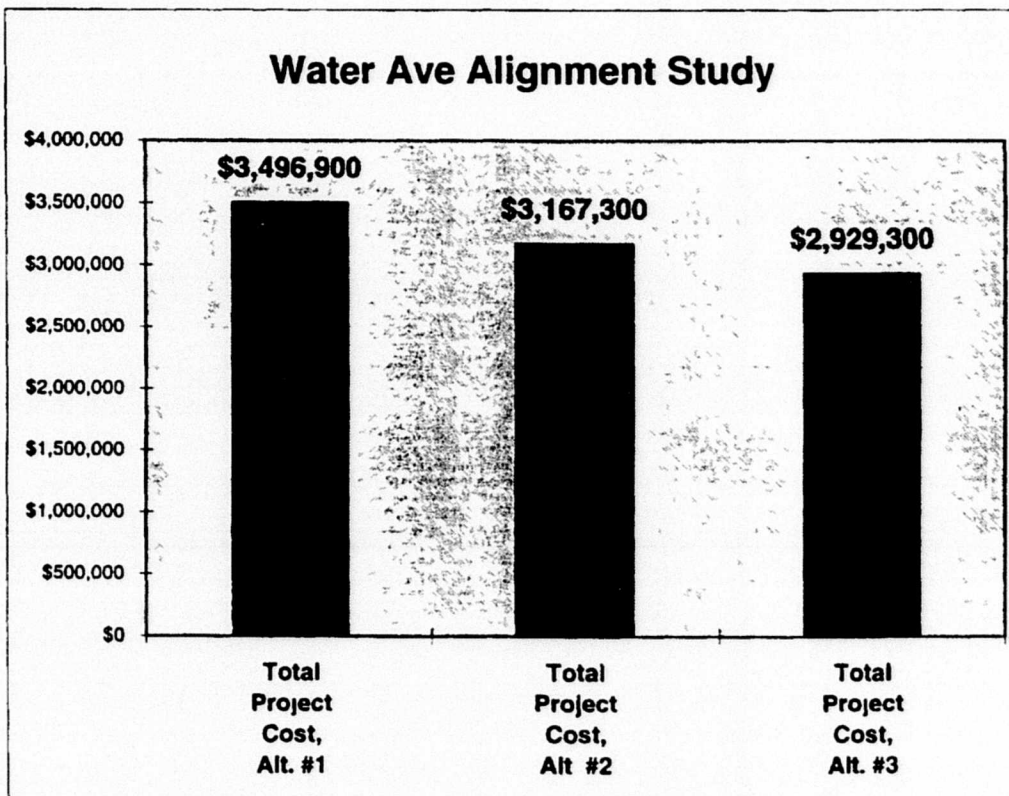


Table 7 Summary of Costs

CHAPTER 4 CONCLUSION: COMPARISON OF ALTERNATIVE ALIGNMENTS

4.1 Alternative Analysis

Alternative One

Advantages

- Most direct alignment
- Southbound traffic on the Collector Street must negotiate only one 90-degree turn to reach Division Place at Grand Avenue, the southern access point of the study area. Alternatives Two and Three require two 90-degree turns
- Safest pedestrian and cycle route
- Most complete extension of the existing street grid into the study area
- This alternative satisfies a major goal of the Comprehensive Plan by continuing and strengthening the street grid, Alternatives Two and Three do not
- Best accommodation of designated pedestrian connection through the study area
- This alternative allows a direct pedestrian connection from the Willamette Greenway Trail to Fourth Avenue and the Springwater Corridor; the other alternatives require a less direct connection via Grand Avenue
- Fewest circulation obstructions for large trucks and transit vehicles, fewest conflicts with rail spurs
- Alternative One crosses Spur No. 1 and Spur No. 2 with minimal conflict
- Alternative Two runs parallel to Spur No. 1 and Spur No. 2 and crosses Spur No. 2 at two locations
- Alternative Three runs parallel to Spur No. 1 and crosses Spur No. 2

Disadvantages

- Requires greatest amount of right-of-way acquisition
- Taking of property from Lone Star site for right-of-way constitutes greatest site disturbance of any of the alternatives
- Requires greatest amount of street construction since both Caruthers and Division Place are improved for the entire distance from Water Avenue to Grand Avenue and Water is improved from Caruthers to Division
- Most costly alternative, due to right-of-way acquisition and extent of construction
- Results in the greatest disturbance to loading operations in the right-of-way by routing collector-street traffic along the section of Division Place used by Door Distributors of Oregon

Alternative Two

Advantages

- No disturbance of property boundaries or on-site operations
- No expenditure for right-of-way acquisition
- Less street construction than Alternative One
- Less disturbance to loading operations in the right-of-way than Alternative One

Disadvantages

- Least direct alignment
- Circulation restrictions for large trucks and transit vehicles due to additional turns at intersections
- Less complete extension of street grid into study area
- Most extensive conflicts with rail spurs, highest potential for delays due to rail operations
- Highest expenditure for rail crossing protection results in this alternative being second highest in cost while offering fewest operational benefits
- More street construction than Alternative Two
- Does not allow pedestrian route to follow the same alignment as the collector street

Alternative Three

Advantages

- More direct alignment than Alternative Two
- Fewer circulation restrictions than Alternative Two
- Fewer conflicts with rail spurs
- No disturbance of property boundaries or on-site operations
- No expenditure for right-of-way acquisition
- Requires less street construction than Alternative One
- Least disturbance to loading operations in the right-of-way
- Lowest construction cost

Disadvantages

- Less direct alignment
- Access obstruction imposed by viaduct column in intersection of Caruthers Street and Grand Avenue
- Routes collector street traffic along Caruthers Street spur
- Does not allow pedestrian route to follow the same alignment as the collector street
- Less complete extension of street grid into study area

4.2 Conclusion

Alternative One is superior with regard to alignment, traffic operations and minimal rail conflicts. However it requires the greatest extent of construction and is the most disruptive to private property and to existing loading operations. It is important to note that the loading operations that will be disrupted are an un-permitted use that dominates a two-block-long section of public right-of-way and has essentially converted it into a private loading area.

Alternative One is the most expensive alignment but arguably offers the best value and the greatest long term benefit to the Central Eastside. It is 10% more expensive than *Alternative Two* and 19% more expensive than *Alternative Three*. Disregarding right-of-way costs, *Alternative One* is only 4% more expensive than *Alternative Two*.

Alternative Two is similar to *Alternative Three* in most respects and is superior only by avoiding the complication posed by the viaduct column. *Alternative Two* is the second most expensive, the most difficult with respect to rail conflicts and offers the least long-term value.

Alternative Three is superior to *Alternative One* in that it requires no right-of-way acquisition and is less disruptive to private property and to loading operations. It is the least expensive alternative. Coordination problems and unknown conditions related to relocation of the viaduct column constitute the most significant disadvantage to *Alternative Three*.

Phased construction may provide additional choices to the City beyond the selection of a single alignment alternative.

CHAPTER 5 REFERENCES

David Evans and Associates, Inc , "Traffic Impact Analysis Station L Development Master Plan " October 1994

ODOT Interoffice Memo, by Jim Bosket, P E , Senior Structural Design Engineer, regarding Union Avenue - Grand Avenue Viaduct, Pacific Highway East, Multnomah County, BRS 2115 and 8905, 6 pages July 2, 1987

Revised Temporary Phase 1 Access Plan (12-14-94), Memo by John Replinger, Traffic Engineer, David Evans & Associates, 11 pages December 14, 1994

Attachment 1 Stakeholder List

Southeast Water Avenue Alignment Study

Public Meeting Notification / Stakeholder List

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Attachment 2 ODOT Interoffice Memo



STATE OF OREGON

INTEROFFICE MEMO

TO Memo To File

FROM *Jim Bosket*
Jim Bosket, P.E.
Senior Structural Design Engineer

SUBJECT Union Avenue-Grand Avenue Viaduct
Pacific Highway East
Multnomah County
BRS 2115 and 8905

DATE July 2, 1987

MAI

2115

8905

A field inspection of the subject bridges was conducted in September 1986 by Otto Staples and Clair Kuiper, Metro Region; Tom Lulay, Maintenance; and Kamal Kamadoli and Jim Bosket, Bridge. The inspection was requested by Walt Hart, Bridge Engineer, to gather information to evaluate the bridges' condition. The following condition report includes 3 alternates with procedures and costs to rehabilitate and/or to replace the bridges.

The bridge conditions were found to be as stated in the State Bridge Inspection Reports dated 2-28-85. The structural deficient areas are identified and included in this report. The major portions of the bridges are structurally sound and require some minor repairs. The deficient areas can be corrected with conventional repair and replacement procedures.

The Union-Grand Avenue Viaduct is comprised of two bridges. The Union Avenue, 1,640-feet long and consisting of a series of continuous reinforced concrete deck girder spans, was constructed in 1937. The bridge has a 48-foot roadway and two 5-foot raised sidewalks. The end approaches are filled concrete retaining walls. The design loading is H 15, and the present sufficiency rating is 48.9.

The Grand Avenue Bridge, 1,090-feet long and consisting of a series of continuous reinforced concrete deck girder and simple steel spans, was constructed in 1965. The minimum roadway width is 30 feet with 2'-6" safety curbs. There is 340 feet of widening at the south end that serves to combine the Union and Grand roadways. A flared roadway section provides for a ramp exit for the future Grand Avenue connection to the East Marquam Interchange. The end approaches are filled concrete retaining walls. The design loading is HS 20, and the present sufficiency rating is 77.0.

The following is a list of structural deficiencies found in the Union Avenue Bridge:

NOTED

Memo To File

July 2, 1987 - BRS 2115 and 8905

Page 2

1. Traffic wear on the concrete deck has caused spalling and heavy rutting, thus exposing aggregate and rebar.
2. Bents 21 through 25 footings, supported on timber piles, have a history of gradual settlement over the years causing some structural damage to the columns and depression of the roadway grade in 6 spans. Four bents settled about 8 inches. Six profiles taken from 1977 to 1986 indicate that the bents have stabilized. Excavation under a footing revealed the timber piling to be sound.

Past corrective work included placing asphalt wearing surface on the deck to correct the roadway grade. This additional dead load may have increased the settlement. In the early 1970s, Maintenance tried to jack up one bent after cutting the columns. The span did not move, so the operation was halted.

3. Deterioration has caused severe cracking and spalling of the spandrel webs in the concrete railing throughout the bridge. The railing does not meet current design standards for a traffic rail.
4. The drainage system is about 50 percent functional. Deteriorated and plugged drain pipes encased in the columns are causing damage to several concrete columns.
5. The deck joints are deteriorated. Concrete at the joint edges is spalling. The broken seals permit water and debris to deteriorate members below the deck.
6. Bearings and rockers, although rusty in appearance, seem to be structurally sound. The damage is caused by exposure to water and debris entering by the deck joints.
7. There are small areas showing leaking, spalling and leaching scattered about the structure, the majority being in the area of the deck overhang.

The structural deficiencies of the Grand Avenue Bridge are minor and include such items as concrete cracks and spalls, paint loss on the steel beams, deck rutting and some deterioration of bearings and joint seals. The railing does not meet current design standards for a traffic rail.

Alternate A - Rehabilitate Union and Grand Avenue Bridges

This alternate rehabilitates the Union Avenue Bridge with repairs and replacements. The Grand Avenue Bridge will be widened and rehabilitated, see attached plan. Both bridges will be modified for connecting ramps to the East Marquam Interchange. The total estimated cost of this alternate is \$6,000,000, including 40 percent

1. A latex modified concrete structural overlay will be applied to the existing Union and Grand Avenue decks. The estimated cost is \$380,000.
2. The depressed roadway on Union Avenue will be raised to the required grade. Columns will be cut, spans jacked to grade and columns replaced as required. Two spans, ends of a continuous series, adjacent to the depressed span series may require removal and replacement to return to grade, since jacking to overcome long-term deflections will be difficult without structural damage. The estimated cost is \$675,000.
3. The existing concrete rail on Union Avenue will be replaced with a pedestrian rail where a sidewalk is provided. A new concrete traffic rail will be placed on each side of both the Union and Grand roadways. The estimated cost is \$450,000, including removal.
4. New deck drains with pipes outside of the columns will be placed on Union Avenue. The estimated cost is \$100,000.
5. Deck expansion joints on Union and Grand will be cleaned and resealed. The estimated cost is \$135,000.
6. An estimated \$250,000 is included to cover miscellaneous repairs such as spalls, cracks and bearing deficiencies.
7. The widening of the east side of Grand Avenue will be of similar structure type as the existing. This widening is for the entire length of the Grand Bridge and will include removal of deck overhang, extending bents and placing new beams, deck and railing. The estimated cost is \$1,900,000.
8. Traffic handling costs are estimated to be \$390,000. A minimum of two traffic lanes can be maintained on each structure.

The above cost breakdowns do not include engineering and contingencies.

The Inventory and Operating Ratings of Union and Grand Avenue Bridges with the rehabilitation will be as follows:

	<u>Inventory</u>	<u>Operating</u>	<u>Member</u>
Union	HS 15 HS 17	HS 23 HS 27	Deck Concrete Deck Girders
Grand	HS 20 HS 21	HS 29 HS 34	Deck Concrete Deck Girders

A 25-year and a 50-year life expectancy is projected for the Union Avenue and Grand Avenue Bridges, respectively, after the

rehabilitation. Union has been in service for 50 years and Grand for 20 years. A life expectancy of 60 years is assumed for a new bridge, after which major rehabilitation or replacement is expected.

The work described above for Union Avenue Bents 21-25 is not the solution to the settlement problem as new pile bents would be. Further settlement can be expected to occur if the dead load of the bridge is increased or if fills or footings are added in the area of the existing bents. An alternate to raising the spans is complete removal and replacement of the spans and pile bents at an estimated cost of \$800,000

Alternate B - Replace Union Avenue and Rehabilitate Grand Avenue

This alternate replaces the Union Avenue Bridge and widens and rehabilitates the Grand Avenue Bridge, see attached plan. Both bridges will be modified for connecting ramps to the East Marquam Interchange. The total estimated cost of this alternate is \$11,500,000, including 40 percent for Engineering and Contingencies. The details and cost breakdowns are as follows:

1. The 1,640-feet of Union Avenue spans built in 1937 including the combined south end of Grand and Union, will be removed. The replacement could be prestressed beams on new bents and longer spans than the existing. The existing filled retaining wall approaches can be incorporated into the new bridge if not removed for widening. The estimated cost for the new bridge is \$6,100,000 with an additional \$910,000 for bridge removal.
2. The remaining north portion of Grand will be widened on the east side using similar structure type. Included are removal of deck overhang, extending bents, placing new beams, deck and railing, and a new retaining wall at the north approach. The estimated cost is \$490,000.
3. A latex modified concrete structural overlay will be applied to the remaining Grand Avenue deck. The estimated cost is \$70,000.
4. A traffic rail will be placed on the west side of the remaining portion of the Grand Avenue Bridge. The estimated cost is \$80,000 including removal cost.
5. Deck expansion joints on Grand Avenue will be cleaned and resealed. The estimated cost is \$20,000.
6. Traffic handling costs are estimated to be \$600,000. A minimum of two lanes should be maintained for both traffic directions. The Grand Avenue Bridge can be used for north and southbound traffic if widened an additional 8 feet to accommodate 4

The above cost breakdowns do not include engineering and contingencies.

The new Union Avenue Bridge will be designed for HS 25 loading. Grand Avenue Inventory and Operating Ratings will be as given under Alternate A.

A 60-year and a 50-year life expectancy is projected for the Union and Grand Avenue Bridges, respectively, with Alternate B.

Alternate C - Replace Union Avenue and Grand Avenue

This alternate replaces the Union Avenue and Grand Avenue Bridges, see attached plan. Both bridges will have connecting ramps to the East Marquam Interchange. The total estimated cost of this alternate is \$13,300,000, including 40 percent for Engineering and Contingencies. The details and cost breakdowns are as follows:

1. The 1,640 feet of Union Avenue spans built in 1937 and 1,090 feet of Grand Avenue spans built in 1965 will be removed. The replacement could be prestressed beams on new bents and longer spans than the existing. The existing filled retaining wall approaches can be incorporated into the new bridge where applicable. The estimated cost for the new bridge is \$7,600,000 with an additional \$1,075,000 for bridge removal and \$125,000 for retaining walls at the approaches.
2. Traffic handling costs are estimated to be \$625,000. A minimum of two lanes should be maintained for both traffic directions.

The above cost breakdowns do not include engineering and contingencies.

The new Union and Grand Avenue Bridges will be designed for HS 25 loading. A 60-year life expectancy is projected for the bridges.

SUMMARY

Alternate A rehabilitates the Union and Grand Avenue Bridges at an estimated cost of \$6,000,000. The life expectancy of Union Avenue will be 25 years and the Inventory Rating is HS 15. The life expectancy of Grand Avenue is 50 years and the Inventory Rating is HS 20. Union Avenue will be in service at near structural capacity which could result in higher than average maintenance costs for its life.

Alternate B replaces the Union Avenue Bridge and rehabilitates the Grand Avenue Bridge at an estimated cost of \$11,500,000. The life expectancy of the Union Avenue Bridge is 60 years, and the Inventory Rating is HS 25. The life expectancy of Grand Avenue is 50 years, and the Inventory Rating is HS 20.

Memo To File

July 2, 1987 - BRS 2115 and 8905

Page 6

Alternate C replaces the Union Avenue and Grand Avenue Bridges at an estimated cost of \$13,300,000. The life expectancy of the bridges is 60 years and the Inventory Rating is HS 25

RECOMMENDATION

Alternates B and C are both good solutions. Both offer low maintenance bridges with structural capacities of HS 20 and higher and at least 50 years of service. Since less than \$2 million separate the two alternates, further study for the optimum choice is recommended at the preliminary design stage.

JGB:jrb

Attachments

cc: Tom Lulay, Maintenance
Rick Kuehn, Metro Region Engineer

Attachment 3 Oregon Public Utility Commission

OREGON PUBLIC UTILITY COMMISSION

STAFF POSITION

EXTENSION OF SOUTHEAST WATER AVENUE PORTLAND, OREGON

PROPOSAL

The City of Portland is proposing to extend Southeast Water Avenue, southerly from its present terminus, to connect with Southeast Division Place

BACKGROUND

Public Utility Commission Order No. 86-503, entered May 22, 1986, authorized extensive alterations to the SE 8th Avenue, SE 9th Avenue, and SE Division Place railroad-highway grade crossings. Federal and state grade crossing safety improvement accounts provided the major portion of funds for the alterations at these crossings. The alterations were performed to improve safety for motorists accessing the area commonly known as the Southern Triangle, bordered by SE Division Street, SE Powell Blvd, and SE 11th Avenue. At this time, the closure of the SE Grand Avenue railroad-highway grade crossing was discussed.

SE Grand Avenue also provides access to the Southern Triangle from the north. A railroad-highway grade crossing is located on SE Grand Avenue, just south of SE Division Street. This crossing has experienced 13 train-vehicle accidents since 1959, the year PUC began recording these accidents. Safety concerns at the crossing were addressed during planning sessions for the alterations to the SE 8th/SE 9th/SE Division Place crossings. It was determined at that time to delay action on the SE Grand Avenue crossing due to the pending extension of SE Water Avenue. The SE Water Avenue extension would provide a north ingress/egress route to the Southern Triangle. This would facilitate the closure of the SE Grand Avenue railroad-highway grade crossing.

The SE Grand Avenue crossing configuration presents many problems that contribute to its past safety record and potential for future train-vehicle accidents, thereby supporting the Public Utility Commission position to close the crossing.

- Motorists' ability to see approaching trains is restricted by columns that support the SE Grand Avenue viaduct. There is no economical solution to this problem.
- The intersection of SE Grand Avenue and SE Division Street does not have vehicle traffic signals. Northbound vehicles on SE Grand Avenue wait on the railroad track for an opportunity to enter SE Division Street. Traffic signals, interconnected with automatic gate and flashing light signals, would eliminate this problem. The cost of the vehicle traffic signals

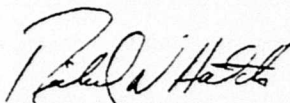
interconnected with new automatic signals at the crossing would be in excess of \$250,000

- The location of the SE Grand Avenue viaduct presents an obstacle to the installation of train activated automatic gate signals. Special gates can be fabricated for this installation. The gates would be costly and their performance reliability is questionable.
- SE Division Street is a two-lane street with two way traffic. Vehicles on SE Division Street, intending to travel south on SE Grand Avenue, wait for trains to clear the crossing and impede the flow of through traffic. SE Division Street would require widening to accommodate left and right turn lanes. Right-of-way acquisition and constraints of existing structures would create a major expense for a widening project.
- Three tracks cross SE Grand Avenue at the crossing. Motorists' view of oncoming trains is restricted by trains on adjacent tracks. On the passage of the first train, a motorist could proceed into the path of another train on the next track. This could be corrected with the installation of automatic gates as described above.
- Public Utility Commission Regulations prescribing vertical alignment of railroad-highway grade crossings cannot be met at this location due to the difference in the elevations of SE Division Street and the railroad tracks. A considerable cost would be incurred to lower SE Division street or to raise the railroad tracks.
- The main line track at this crossing will be used for the High-Speed rail line. Train speeds now are limited at this crossing due to the high potential of train-vehicle accidents.

RECOMMENDATION

Public Utility Commission Staff supports the construction of the SE Water Avenue extension provided the SE Grand Avenue railroad-highway grade crossing is closed as previously discussed.

Dated June 20, 1995



Richard N. Hatch
Railroad Specialist
Crossing Safety Section
(503) 378-5542
FAX (503) 378-8815

RESOLUTION No. 35449

Adopt the SE Water Avenue Extension alignment and direct the Bureau of Transportation Engineering & Development and Transportation Planning to develop land use findings and a finance proposal for the project (Resolution)

WHEREAS, the Water Avenue extension is designated in the Central City Plan, and there was significant public participation from the Central Eastside Industrial District and the Hosford Abernethy Neighborhood Association during plan development, and

WHEREAS, the Water Avenue extension is identified in the Portland comprehensive Plan as a neighborhood collector street, a minor transit street and a pedestrian and bicycle route, and

WHEREAS, the Central Eastside Transportation Study adopted by Council in June 1991 recognized the need for the extension of Water Avenue to provide access to underdeveloped property and to improve overall traffic circulation in the Southern Triangle area of the district, and

WHEREAS, the Willamette Greenway trail alignment is designated along the east bank of the Willamette River through the study area to Caruthers Street east on Caruthers, south on Fourth Avenue to connect with the Spring Water Trail, and

WHEREAS, the City has undertaken several land use actions in the study area related to the extension of Water Avenue to connect the existing street system and provide for a continuous transportation system in the area Land use actions include the OMSI Conditional Use Permit, the Portland Community College zone change and land partition, and Station L zone change and subdivision, and

WHEREAS, on April 13, 1995, the City Council directed staff to conduct an alignment analysis for the extension of Water Avenue, and

WHEREAS, several public meetings and numerous interviews with property owners were conducted and an analysis of impacts on traffic and rail operation, loading and parking conditions and estimated alternative alignment costs were determined

NOW, THEREFORE, BE IT RESOLVED by Council of the City of Portland, a municipal corporation of the State of Oregon, that Council adopts the alignment analysis as shown in Exhibit A attached to the original of this Resolution, and by reference made a part hereof, and

BE IT FURTHER RESOLVED that the City identify Alternative Three as an adequate alignment to provide basic accessibility to properties in the immediate area to satisfy outstanding conditions for previous land use approval between SE Clay Street and SE Caruthers Street, and should be improved to local street standards This alignment requires no right-of-way acquisition and is less disruptive to private property and loading operations Alignment Three is also the least expensive option

BE IT FURTHER RESOLVED, that the City identify Alternative One as the Collector Street serving the Southern Triangle as referenced in the Transportation Element of the Comprehensive Plan, but not be constructed at this time

BE IT FURTHER RESOLVED that the Bureau of Transportation Engineering & Development and Transportation Planning develop findings of fact for the Comprehensive Plan and the Transportation Planning Rule, and,

BE IT FURTHER RESOLVED, that the City staff develop a project finance package to entail a public/private funding partnership with the affected business and property owners to ensure an equitable finance proposal

Adopted by the Council, SEP 20 1995

Commissioner Earl Blumenauer
Jeanne Caswell mcv
September 15, 1995

BARBARA CLARK

AUDITOR OF THE CITY OF PORTLAND

BY

Barbara Olson DEPUTY

1526

Agenda No

TIME CERTAIN

RESOLUTION NO

35449

Title

Adopt the SE Water Avenue Extension Alignment and direct the Bureau of Transportation Engineering & Development and Transportation Planning to develop land use findings and a finance proposal for the project (Resolution)

INTRODUCED BY	Filed SEP 15 1995
Commissioner Earl Blumenauer	Barbara Clark Auditor of the City of Portland
NOTED BY COMMISSIONER	
Affairs	
Finance and Administration	By <u>Cay Kershner</u> Deputy
Safety	For Meeting of _____
Utilities	
Works <u>EB/Han</u>	ACTION TAKEN
BUREAU APPROVAL	
Bureau Transportation Engineering & Development	
Prepared by Date Jeanne Caswell September 15, 1995	
Budget Impact Review <u>MA</u> Completed _____ Not Required	
Bureau Head Victor F Rhodes, P E <u>VR</u>	

AGENDA		FOUR-FIFTHS AGENDA	COMMISSIONERS VOTED AS FOLLOWS		
				YEAS	NAYS
Consent	Regular	Blumenauer	Blumenauer	✓	
NOTED BY		Hales	Hales	✓	
City Attorney		Kafoury	Kafoury	✓	
City Auditor		Lindberg	Lindberg		
City Engineer Victor F Rhodes <u>VR</u>		Katz	Katz	✓	
Approved By					