Council Meeting Date: July 6, 1999 **Agenda Item: 6(a)**

CITY COUNCIL AGENDA ITEM

CITY OF SHORELINE, WASHINGTON

AGENDA TITLE:	Aurora Pre-Design Workshop on Walkability, Traffic Analysis, and Right-of-way Process
DEPARTMENT:	Planning and Development Services
PRESENTED BY:	Tim Stewart, Director Kirk McKinley, Transportation Manager

EXECUTIVE / COUNCIL SUMMARY

This is the second of three workshops staff has scheduled with your Council to discuss key elements of the work being done to design a preferred alternative for Aurora Avenue. The purpose of this staff report, and for the workshop on July 6, is to provide your Council with information on three aspects of the Aurora Pre-Design Study:

- Walkability – includes pedestrian environment, landscaping, lighting, aesthetics and image,
- Traffic Analysis – includes traffic operations, congestion, level of service, and transit operations,
- Right-of-way – includes information on right-of-way acquisition, compensation, and the various steps in the process.

It is the intent of staff to continue briefing your Council on critical aspects of the Aurora Pre-Design Study, so that when we return to your Council asking for action, that you will be sufficiently briefed. The intent of presenting your Council with information on these three topics is that they are essential elements in the design and in the future implementation of the project. Each of the topics is briefly covered in the body of this staff report, and is supported by a map and four attached technical memoranda.

RECOMMENDATION

This presentation is an update on the project. No formal decisions or approvals are requested at this meeting.

Approved By: City Manager LB City Attorney N/A

BACKGROUND / ANALYSIS

At your Council's June 7 workshop, staff presented an update on the Aurora Pre-Design Study process that included a review of the results of the analysis of the three alternatives, an overview of transit issues and needs (by King County/Metro staff), and a presentation by Washington State Department of Transportation (WSDOT) on their issues and needs. At the June 7 workshop, your Council also received a summary of the preliminary recommendation from the Citizens Advisory Task Force (CATF). The results of the analysis of alternatives, input from the May 11 Open House, input from King County/Metro and WSDOT, and from the Interagency Technical Advisory Committee (ITAC), and the preliminary recommendation from the CATF are all leaning toward Alternative 2 as the base design concept. The CATF is continuing its work on refining Alternative 2, the people mover alternative, and will present its final recommendation to your Council on July 19. Our current schedule has your Council taking action on the preferred design concept on August 23.

SUMMARY

Overview

Following are short summaries of the three major topics to be covered on July 6. These include:

- Walkability – This topic includes the pedestrian environment, landscaping, lighting, aesthetics and image. Consultants from Arai Jackson and Hough Beck and Baird, Landscape Architects will be present to assist in answering questions. For more information, refer to Attachments A (Map of Landscape and Urban Design Treatment Areas), B (Landscape Enhancements), and C (Urban Design/Streetscape).
- Traffic Analysis – This topic includes traffic and transit operations, congestion, and level of service. Consultants from Innovative Transportation Concepts will present a traffic simulation model that will allow your Council to observe traffic operations. For more information, refer to Attachment D (Traffic Operation Improvement Measures).
- Right-of-way – This topic includes information on right-of-way acquisition, compensation, and the various steps in the process. Linda Lane of Lane and Associates, a right-of-way acquisition, negotiation and relocation company will be present to assist your Council in understanding the protections and requirements of acquiring and compensating property owners for right-of-way impacts. For more information, refer to Attachment E (Right-of-Way Information).

Landscape & Urban Design Elements

The Design Concept guiding the development of Landscape and Urban Design Elements along the Aurora Avenue North Corridor creates a "Vision" for the streetscape that will unify the entire corridor and create a special character or "identity" to reflect the City of Shoreline community. To accomplish this "Vision", the conceptual design of the corridor has been divided into three main elements:

- *Unify the Entire Corridor,*
- *Create "Signature" Entry Gateways, and*
- *Highlight the 175th to 185th Area & Interurban/Aurora Junction.*

Landscape and Urban Design Elements will be used to create a visually unified, coherent design throughout the length of the *Entire Corridor*. Street trees, lighting and special paving, as well as other elements, will provide a strong visual connection to help unify the corridor design. Public safety elements used throughout the corridor (crosswalks, signalization, signage) will also help enhance pedestrian safety and experience along the corridor. Specific pedestrian areas, such as: bus shelters, intersections, Interurban Trail connections and a pedestrian connection to Echo Lake Park will be highlighted with special interest landscape, public art, signage, etc. within the streetscape design. Landscape and urban design elements also include: landscape planting areas, medians and street trees; site furnishings; lighting; public art; special paving and public safety elements.

"Signature" Entry Gateways will be created at either end of the Aurora Avenue North Corridor to represent the Shoreline community and welcome residents and visitors to the City. Landscape and urban design elements, such as: lighting, special interest landscape, paving and public art will be intensified in these areas to identify the gateways and highlight the unique character and "identity" of Shoreline.

Throughout the *175th to 185th Area* and *Interurban/Aurora Junction*, landscape and urban design elements will be used to create safe, pedestrian oriented streets that reflect the character of each area. A hierarchy of gateways will create "entrances" to the Pedestrian Activity Area to reinforce the character of the neighborhoods. Connections to the Interurban Trail through these areas will also be defined with signage, site furnishings, public art, etc. to recall the Interurban rail line. Public safety enhancements will be used throughout these areas to create safe, public streets for both bicycles and pedestrians.

Attachment A is a map of the corridor identifying the areas for special landscape or urban design treatment. Additional information is contained in two technical memoranda (Attachment B and Attachment C) that provide further detail into landscape and urban design amenities that could be included into the final design for Aurora.

Traffic and Transit Operations Analysis

When considering the redesign of a major arterial street, such as Aurora, it is important to evaluate how traffic and transit will be affected. To compare proposed design alternatives, transportation engineers perform an operations analysis. This analysis is intended to answer questions like: How will traffic operate on the alternative designs? How much time will it take to drive through the corridor?, How much delay will be experienced at intersections?, How much time will it take for buses to drive through the corridor?, How do the alternatives affect reliability of bus schedules?

Typically, when traffic operations are analyzed, a lot of numbers are generated to answer the above questions. We have generated these numbers for each alternative proposed for Aurora Avenue. These numbers, however, are usually not that intuitive to most audiences. Realizing this, we have decided to go one step further. We are using a software program called VISSIM that provides a visual display of cars, buses, and pedestrians and how each alternative impacts their mobility.

Besides displaying traffic operations, VISSIM also produces meaningful output measurements used to compare the alternatives. The following are outputs from VISSIM that are used to answer the questions listed previously:

- Average system delay—how much delay does the average motorist experience at any signalized intersection along Aurora Avenue?
- Average traffic travel times—how long does it take a motorist to travel from 145th to 205th ?
- Average bus travel times – how long does it take a bus to travel from 145th to 205th?
- Bus schedule reliability—does the alternative help buses stay on schedule (the smaller the number, the better a bus can adhere to its schedule)?

VISSIM analysis results are reported in Table 1 below. The best performing alternative for each output category is underlined. Alternative 2 is the best performing alternative in three of the four categories. Alternative 2 adds the most capacity at intersections, therefore yielding the lowest amount of average delay per vehicle at intersections. The transit travel times are best for Alternative 2 because that alternative includes a lane for transit, and buses can load/unload passengers in-lane (while for the other two alternatives, buses experience delays attempting to re-enter traffic lanes from bus turnouts). The transit advantages for Alternative 2 are further demonstrated in the bus schedule reliability measure. The reliability measure indicates that for Alternative 2, 2/3 of bus trips would be within 0.3 minutes of the average bus travel time. Note that for the other alternatives, 2/3 of bus trips would be only within 5 or 6 minutes of the average bus travel time. Alternative 3 performs better in the remaining category since (1) Aurora Avenue through traffic does not have to stop at the signals and (2) the design provides higher speeds on Aurora Avenue.

Table 1. VISSIM Analysis Results for Year 2015 PM Peak Hour Operations

Output Category	No Build	Alternative 1	Alternative 2	Alternative 3
Average System Delay (seconds/vehicle)	88.0	79.9	**65.1**	75.4
Average Traffic Travel Times (minutes)	17.4	17.0	15.1	**5.7**
Average Bus Travel Times (minutes)	24.9	22.8	**12.6**	16.6
Bus Schedule Reliability (minutes)	5.8	4.8	**0.3**	6.7

What this means for the design of Aurora?
The City's Comprehensive Plan sets a standard for traffic operations within the Aurora Avenue "Level of Service" (LOS) zone of E (less than 80 seconds delay per vehicle in the PM Peak Hour). As it is stated in the Comprehensive Plan, LOS is applied not to each individual intersection, but is determined using an average of intersection delay for all intersections within the zone. This zone includes all of the intersections along Aurora as well as some intersections on cross streets immediately adjacent to the Avenue. This provides an opportunity that some intersections along Aurora be allowed to operate worse than LOS E.

Intersection level of service is typically improved by the addition of lane capacity at intersections. In order to provide level of service E operations at each of the intersections along Aurora in 2015, up to 10 lanes (~120' of roadway, sidewalks and landscaping would be additional) will be needed at intersections. For several reasons, intersection approaches of this width are neither practical nor desirable. These reasons include the following:

- Significant right of way and property impacts - Throughout the corridor, intersections are locations where right of way limits are most severe.
- Increased construction costs - Widening at intersections can increase costs associated with resolution of utility conflicts.
- Downstream Congestion - When additional lanes are added only at the intersection, a bottleneck is created where lanes are reduced on the far or downstream side of the intersection.
- Pedestrian crossing distances and counter-productive impact on signal operations - As intersections become wider, the time required for pedestrian to cross also increase, to the point where pedestrian crossing requirements erode the marginal benefit of adding lanes.
- Aesthetic impacts - Overly wide intersections create a void within a community, a large expanse of pavement that consumes valuable land resources.

In this era of limited resources and a clear community desire for improving quality of life, widening intersections to accommodate vehicle movement and restore historical service levels may not serve the greater public good. Intersections cannot be built to unlimited widths and a practical, desired maximum must be reached. Recognizing this, the CATF is recommending a maximum of eight lanes at any leg of an intersection, with seven lanes as a preference. While vehicle capacity is compromised, person-movement capacity is not. With the inclusion of transit amenities to improve transit operations relative to other traffic, personal mobility and mode-choice are enhanced.

Determining the appropriate compromise.
Determining the practical maximum is an exercise in identification of optimal balance point between level of service, right of way needs, and pedestrian crossing distance.

A proposed compromise would seek a point of optimal balance to minimize right of way and pedestrian crossing distance while providing acceptable level of service for vehicles. There is a point of diminishing return encountered when intersection widths begin exceeding the widths that pedestrians can cross in a reasonable amount of time. For the North 175th Street intersection in estimated PM peak conditions for the year

2015, intersection delay benefits tend to level off after the crossing distance reaches 7 lanes. What this means is that as long as you are going to serve pedestrians at grade, the intersection operations will not improve with the addition of lanes beyond a certain point. Operations will be limited by the time needed for crossing pedestrians.

Proposed Compromise

A proposed compromise between right of way and delay would be developed for each intersection based on a value engineering exercise that would balance lanes and delay with pedestrian crossing distance. Intersection approach lanes will be kept to a practical maximum and the result will provide the highest value solution for the project.

Right-of-Way Process and Issues

Right-of-way issues are a major subject of public interest and concern on transportation improvement projects. The Aurora Avenue Multimodal Corridor Project Team has made it a point to respond early and often to the issues and concerns raised by the public. These issues include how right-of-way lines are identified, how much right-of-way will be needed, what is the process through which it is acquired and how are property and business owners compensated.

Staff and the consultant team will be formulating the Policies and Procedures for the acquisition and relocation of parcels along the SR 99 corridor and will return to your Council for a workshop in the fall. Good, basic formats are available to start from but the City can make any policies and procedures it feels necessary to accommodate the needs of the property and business owners. Policies and procedures assist in treating all effected parties in a *fair and consistent* manner.

Right of Way Needs

Right of way needs are not precisely known until well into the preliminary design engineering phase of the project, when alignments and geometrics have been defined to sufficient level of detail and adequate survey information has been collected. This work will be begin in the fall and last approximately one year.

As transportation facilities are expanded to meet growing demand, additional right of way is often needed. This project is not an exception. When urban arterials, such as Aurora Avenue North, are expanded several types of right-of-way are needed. These include general width expansion to accommodate lane widening, intersection widening and sidewalk construction; permanent easements to accommodate utilities, retaining walls, bus zones, signal equipment, etc; and temporary easements to allow construction to take place.

Right-of-Way Steps within Project Phases

This project is currently in the *planning or concept development* phase. The goal of this phase is to identify a preliminary preferred design for the corridor that will be developed further in preliminary design and evaluated in environmental review. At this stage, right-of-way needs are approximated at the "order-of-magnitude" or "comparative" level. They have been quantified based on general, planning-level assumptions without a fine-tuned design or high-accuracy survey information. During this phase, interests affected by right-of-way needs are educated on the process and alerted to future project activities related to right-of-way assessment and acquisition. So far, the staff and consultant team

has meet several times with property and business owners along the corridor including utility interests.

During the *preliminary design and environmental review* phase, beginning in the fall, detailed mapping of the corridor will be conducted and environmentally sensitive properties will be identified. This work will allow a more precise determination of right-of-way needs. Individual meetings with potentially affected property owners will be conducted to discuss interface design and resolve conflicts.

Once the environmental review has been approved and the design adopted, *final design* will be performed. Final design for the first phase of the project will begin in the fall of 2000. During the final design phase, right-of-way acquisitions will occur. In this phase precise maps and descriptions of right-of-way needs by parcel will be developed, right-of-way values will be appraised and agreements for acquisition reached.

Right-of-Way Acquisition Process

Chapter 8.26 RCW and WAC 468-100 define the right-of-way acquisition process. Once right-of-way plans are approved, the City can begin to acquire the necessary right-of-way for the project. This year-long process has several steps. First, two appraisals of the property are performed and provided to the right-of-way negotiator who makes an offer based on fair market value of the property. If relocation is required, a relocation agent will also attend the meeting with the owner, tenant and appraiser. The relocation agent will make the relocation transition as easy as possible for the business owner. This includes providing assistance in locating replacement property, reviewing leasing options, filing claim forms and identifying available benefits. Once the offer has been made to the property owner, it is either accepted or declined. At this point the City either takes possession of the property or pursues other courses of acquisition such as re-negotiation or condemnation.

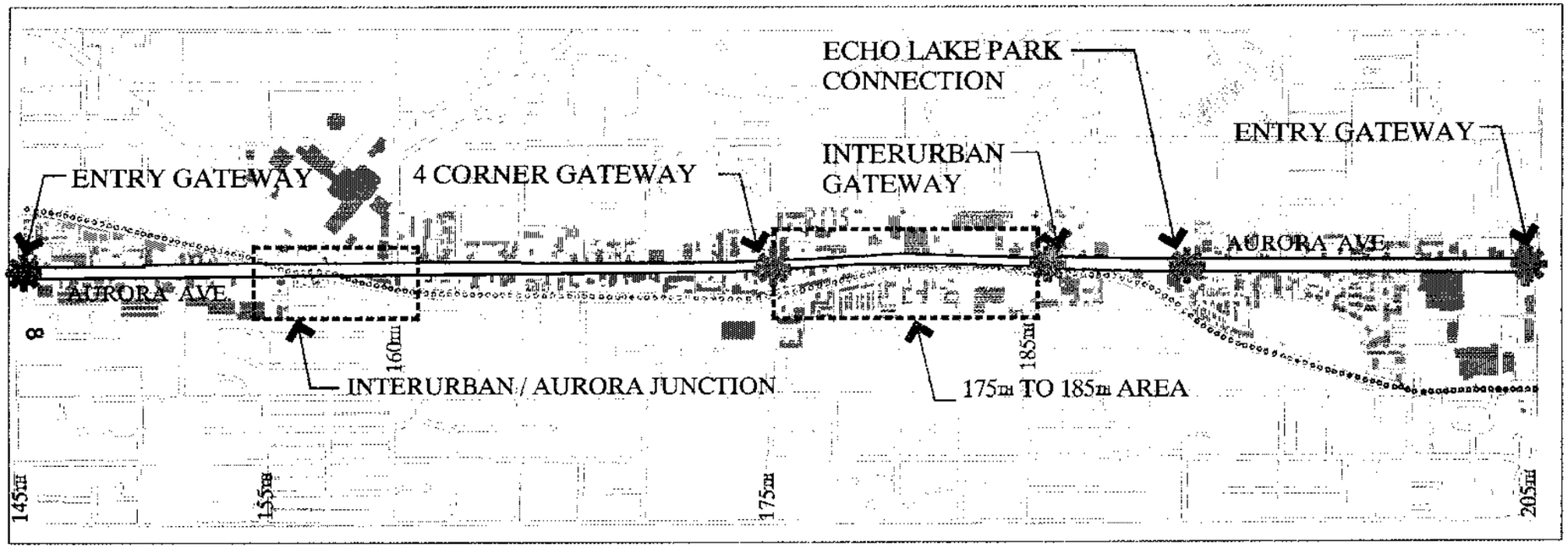
A technical memorandum that discusses this subject in greater detail is provided in Attachment E.

RECOMMENDATION

This presentation is an update on the project. No formal decisions or approvals are requested at this meeting.

ATTACHMENTS

Attachment A – Map Overview of Design Concept
Attachment B -- Landscape Enhancements
Attachment C -- Urban Design/Streetscape
Attachment D -- Traffic Operation Improvement Measures
Attachment E -- Right-of-Way Information



NORTH

CITY OF SHORELINE
AURORA CORRIDOR
URBAN DESIGN CONCEPT PLAN

CH2MHILL / HOUGH BECK & BAIRD INC. / ARAI JACKSON
JUNE 1999

LEGEND

- INTERURBAN TRAIL
- SPECIAL URBAN DESIGN TREATMENT
- SPECIAL INTERSECTION OR GATEWAY

Attachment A

Landscape Enhancements DRAFT

PREPARED FOR: City of Shoreline
Aurora Avenue North Multimodal Corridor Study

PREPARED BY: Jim Howard / Hough Beck & Baird

DATE: February 17, 1999

This technical memorandum explores the different Landscape Enhancement Choices available to compliment and/or enhance the comprehensive design for Aurora Avenue North within the City of Shoreline. The memorandum explores the various ways landscape treatments, street furniture, sidewalk paving and public art can help create a more unified streetscape design throughout the corridor. A unified streetscape will help develop a character or "image" that reflects the surrounding community.

This design exploration responds to concerns raised by the Citizen's Advisory Task Force, City Council, City staff and other governmental agencies concerning the existing lack of trees/plants, variety of plant types, visibility of businesses, traffic/pedestrian safety, litter and maintenance issues. Additional design criteria identified through this process includes: creating a unified design throughout the corridor; enhancing the pedestrian scale of the environment; creating a special character or "identity" for the City of Shoreline; and creating connections to the Interurban Trail.

The following narrative briefly describes the design criteria relative to each option presented and their relationship to other elements of the Aurora Avenue North Multimodal Corridor Study. The attached illustrations and information summarize the advantages and disadvantages of each landscape enhancement choice presented in this memorandum.

Landscape Enhancement Choices

Communities throughout the Pacific Northwest are struggling to control and enhance development in their neighborhoods to create more pedestrian friendly, inviting environments. Cities and communities are gathering together to reclaim the asphalt and concrete 'runways' of commercial strips and transform them into more livable communities.

Landscape enhancements, street furniture and public art can help accomplish these goals by unifying the overall corridor design and creating a special character or "identity" to the community. The history, culture and/or natural environment of the surrounding community, for example, may be used to help reflect this "identity" and create a special interest in the Aurora Avenue North Corridor. Landscape enhancements can vary along the length of the corridor to reflect adjacent land uses.

Landscape Treatments

A number of concerns raised by the Citizen's Advisory Task Force, City Council, City staff and other governmental agencies relate to the lack of trees and anything "green" along the Aurora Avenue North Corridor. Street trees and other landscape plantings can have a significant impact on the character and scale of a street environment. These elements help "soften" the impact of roadways, parking lots and building facades by adding color, texture and diversity to the street corridor. For example, the playful way light filters through a tree canopy on a brisk autumn day creates a rhythm all its own that distracts from the hard, gray surrounding environment.

The following discussion briefly describes the various design options and considerations for landscape planting within the street corridor.

Planting medians with trees, shrubs and/or groundcovers "softens" the impact of the corridor by providing a visual break in the roadway and may increase vehicular safety by separating lanes of traffic in each direction. Clustering different types of trees, such as flowering/accent trees, at major intersections, gateways, etc. in the median may help reinforce pedestrian or special interest areas. Medians may also provide the additional area needed for planting evergreen trees to increase variety, create a more park-like or boulevard effect, and/or provide a dramatic backdrop for other ornamental plant types.

Street trees may be provided along sidewalks, either in tree grates or planting strips, to add interest, provide a pedestrian scale and reduce the overall impact of buildings, parking lots and roadways. Accent plantings may also be provided throughout the streetscape. When located between the sidewalk and roadway, planting strips help protect pedestrians by providing a buffer between sidewalks and vehicles.

Pocket parks and plazas amplify the "softening" effect by providing larger breaks in the streetscape for people to gather and interact. The streetscape planting adjacent to sidewalks and medians may become the corridors or "life thread" between pocket parks and/or plazas connecting and unifying the entire Aurora Avenue North Corridor.

Regardless of whether the landscape is along the street edge or concentrated in pocket parks, it needs to respond to the issues raised by the community, city and other governmental agencies, such as, sight lines to businesses and vehicular/pedestrian safety. The safety and security of pedestrians regarding vegetation heights and densities should also be considered. Tree types selected should reflect impacts from adjacent cars/trucks and overhead utility lines, as well as, other general maintenance considerations.

A variety of plant types used throughout the corridor would provide greater interest and visual diversity in the Aurora Avenue North Corridor. In addition, specific plant types may be grouped together to delineate focal points, major intersections, trail connections and/or gateway locations.

As water becomes scarcer and society's embracement of water conservation practices and goals intensifies, a "water conservation" irrigation system would address both the economical and ecological concerns. Even traditionally "drought-tolerant" and/or native plant types require irrigation in an exposed streetscape environment. In addition, water "auditing" practices and increased viability of plantings reinforces the benefit of using an automatic "water conservation" irrigation system.

Site Furniture/Sidewalk Paving

Street furniture (i.e., benches, tree grates, bicycle racks, raised planters, etc.) and sidewalk paving can help create a more pedestrian friendly environment and provide a unifying element throughout the Aurora Avenue North Corridor. Public amenities, such as benches and drinking fountains, can help create a more inviting atmosphere and attract more people to the area; while materials, color, texture and patterns can help tie these amenities together.

The following section briefly discusses some of the street furniture and paving options available for the Aurora Avenue North Corridor and the potential role of public art in the landscape.

Benches, trash receptacles, drinking fountains, tree grates, bicycle racks, raised planters and bollards may be used to establish a certain character reflected in the style, materials, color, texture, etc. of the different street furniture elements. They may also help connect the corridor design to the surrounding community. Different types of benches (or other elements) may be considered, such as "perching" benches versus a bench with a supporting back element. Each type may portray a different connotation to the user. For example, a regular bench with a back support may suggest a place to sit and relax while a "perching" bench suggests a more transient nature. Different materials can reflect the colors, texture, etc. of a "downtown", industrial, commercial or historic area while patterns within different streetscape elements may reflect a particular architectural feature on an adjacent building or a pattern from the paving surface to help unify the entire corridor design.

Paving materials may be used to help define an "identity"; describe the past history, cultural or environmental aspect of a community; or unify an overall design concept. Special inlays, materials or colors may depict a specific image or create a pattern meandering through the sidewalks and plazas. Special paving may also be extended across roadways at designated crosswalks or major intersections to slow traffic and reinforce the pedestrian as a priority in those areas. They can also help "jump" large intersections to create a more sinuous, coherent movement throughout the entire Aurora Avenue North Corridor.

Public art may be woven into these urban design/streetscape elements to help create a special "identity" to the corridor. Integrating public art into the streetscape design may also help reduce costs. The entire corridor may become an "art walk" highlighting different artist's designs for benches, tree grates and other streetscape elements.

These different streetscape and paving design options may be incorporated throughout the Aurora Avenue North Corridor, or concentrated at intersections, connections to the Interurban Trail, transit stops and/or gateway locations.

Interurban Trail Connection

The Interurban Trail will weave its way through the Aurora Avenue North Corridor and will become a vital connection to adjacent neighborhoods, communities and cities throughout the area. The following section explores ways to create strong, cohesive connections between the Interurban Trail and the Aurora Avenue North Corridor.

Trail connections may be highlighted through the use of special paving, site furniture or other urban design/streetscape elements to help create a general awareness of the trail, while providing a place to stop and rest along the way. It may also be used as a gateway to the Aurora Avenue North Corridor or as a way to reinforce the character or identity of the community.

Connections to the Interurban Trail from businesses, parks/plazas and transit stops may be considered, as well. Although more complicated in creating new partnerships, easements, dedications, etc., multiple connections to the trail from these adjacent uses may create a greater amenity for the entire surrounding community to enjoy.

The following attached illustrations and information describe the various landscape enhancements and provide a brief evaluation based on the advantages and disadvantages of each landscape enhancement option.

LANDSCAPE ENHANCEMENT CHOICES

Landscape Treatments

- Provide landscape median
- Provide street trees between street and sidewalk
- Provide a planting strip with street trees between street and sidewalk
- Provide trees and other landscaping behind the sidewalk
- Develop pocket parks and plazas
- Provide automatic "water conservation" irrigation system to all plant materials

Site Furniture / Sidewalk Paving

- Provide benches, trash receptacles, drinking fountains, tree grates, bicycle racks, bollards
- Provide standard poured-in-place concrete sidewalks
- Provide special sidewalk paving (colored or textured concrete, unit pavers)
- Public art
- Concentrate site furniture and/or special paving at transit stops, gateways, intersections

Interurban Trail Connection

- Integrate trail and trail connections with streetscape
  - special paving
  - site furniture
  - connections to parks, businesses, transit stops

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY
Evaluation of Landscape Treatments

Option/Description	Advantages	Disadvantages
Provide landscape median	– Improves aesthetics of the corridor by separating the paved roadway – May allow planting area for evergreen trees – Reduces paved surface	– Difficult to access for maintenance – May limit sight lines to businesses/signs – Increases cost
Provide street trees between street and sidewalk	– Improves aesthetics of the corridor with street trees lining roadway edges – Creates tree-lined boulevard identity – Provides a visual buffer between sidewalk and the street curb – Trees may be planted inside ornamental tree grates	– Limited planting area restricts healthy tree growth – May limit sight lines to businesses/signs – Trees may require selective pruning (additional maintenance cost)
Provide a planting strip with street trees between street and sidewalk	– Improves aesthetics of corridor with trees, shrubs and groundcovers lining roadway edges – Provides a visual and physical buffer between sidewalk and street curb – Provides better growing environment for trees	– May limit sight lines to businesses/signs – Trees may require selective pruning (additional maintenance cost) – Increases cost – May require wider R.O.W.

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY Evaluation of Landscape Treatments		
Option/Description	**Advantages**	**Disadvantages**
Provide trees and other landscaping behind the sidewalk	– Improves aesthetics of corridor with trees, shrubs and groundcovers at edge of sidewalk – Provides better growing environment for trees and other landscaping – May allow planting area for evergreen trees – Trees require less selective pruning	– Does not allow a buffer for pedestrians between sidewalk and the street curb – May limit sight lines to businesses/signs – Increases cost – May require wider R.O.W.
Develop pocket parks and plazas	– Provides public places along the streetscape – Opportunity exists between streetscape and Interurban Trail connections – May allow planting area for evergreen trees – Improves aesthetics of corridor by providing trees, shrubs and groundcovers and other urban design improvements	– Increases cost – May raise security issues if vegetation and site furniture provides hiding places
Provide automatic "water conservation" irrigation system	– Provides water automatically to plant materials during summer months	– Increases cost

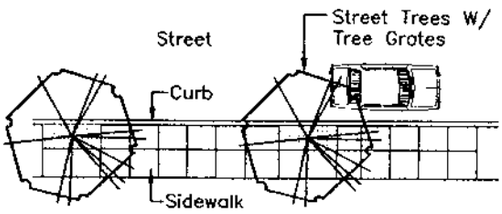
CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY
Evaluation of Site Furniture/Sidewalk Paving Enhancements

Option/Description	Advantages	Disadvantages
Provide benches, trash receptacles, drinking fountains, tree grates, bicycle racks and bollards	– Enhances character or "image" of the corridor – Provides a more pedestrian-oriented scale – Increases pedestrian amenities to attract more users to the area	– Increases cost
Provide standard poured-in-place concrete sidewalks	– Consistent with surrounding uses, materials, character – Easy to make changes or repairs	– Does not enhance character or "image" of the corridor
Use colored or textured concrete sidewalks	– Enhances character and "image" of the corridor	– Increases cost – Difficult to match color or texture if repairs are necessary
Provide unit paver sidewalks	– Enhances character and "image" of corridor – Greater choice of color, pattern, texture – Easy to make changes or repairs	– Increases cost
Incorporate public art into street furniture and/or sidewalk design	– Enhances character and "image" of corridor – Creates a special identity – Provides an opportunity for public involvement and ownership of the project	– Increases cost – Additional coordination may be required during design and construction phases

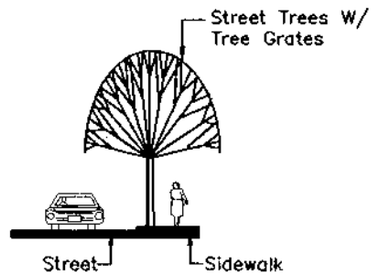
CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY Evaluation of Site Furniture/Sidewalk Paving Enhancements		
Option/Description	**Advantages**	**Disadvantages**
Concentrate site furniture and/or special sidewalk paving (color/textured concrete & unit pavers) at transit stops, gateways, intersections, pocket parks/plazas, trail connections	– Reduces overall cost by not providing elements throughout corridor – Provides an opportunity for partnership with other governmental agencies and/or city departments – Improved transit stops may promote use of transit system – Focuses pedestrian elements around areas of high use	– May emphasize transit stops, intersections, etc. over other project areas – May be added restrictions associated with transit facilities (i.e., increased vandalism, compatibility with existing standards)

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY Evaluation of Interurban Trail Connections		
Option/Description	**Advantages**	**Disadvantages**
Create connections between Interurban Trail throughout corridor from parks, businesses, transit stops, etc.	– Provides an integrated pedestrian environment – Provides greater access to commercial/retail businesses	– May require additional R.O.W., special easements, acquisitions – Increases cost
Use special sidewalk paving (colored/textured concrete, unit pavers) to integrate trail and trail connections with streetscape	– Highlights connections to Interurban Trail – Provides an opportunity to integrate "trailhead" into overall streetscape design	– Increases cost
Use street furniture (benches, tree grates, trash receptacles, etc.) to integrate trail and trail connections with streetscape	– Provides an opportunity for people to interact at "trailhead" – Highlights connection to Interurban Trail – Provides opportunity to integrate "trailhead" into overall streetscape design	– Increases cost

LANDSCAPE TREATMENT OPTIONS

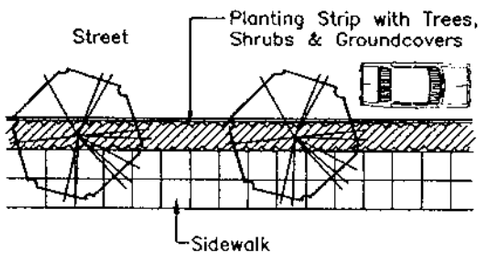


PLAN



SECTION

Street Trees between Street and Sidewalk



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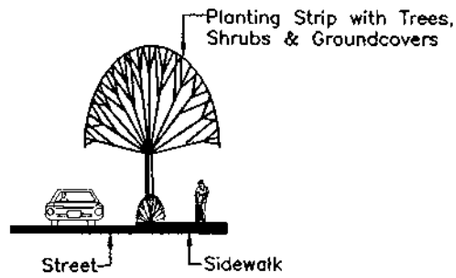
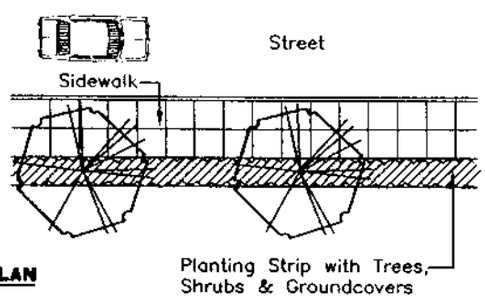


SECTION

Planting Strip with Street Trees Between Street and Sidewalk



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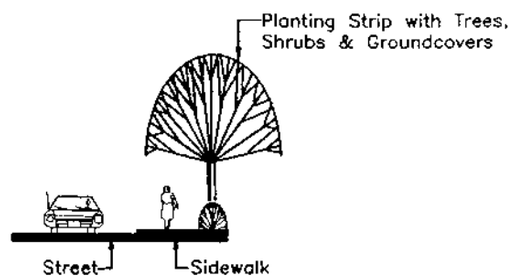
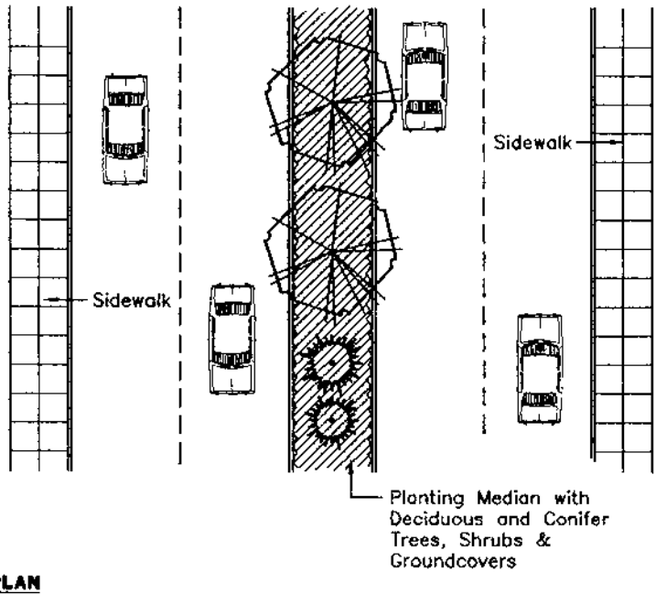


SECTION

Trees and Other Landscaping Behind the Sidewalk



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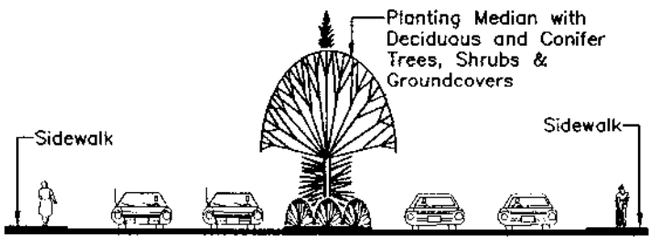


SECTION

Landscape Median in Roadway

TECHNICAL MEMORANDUM

Urban Design/Streetscape - DRAFT

Prepared for: City of Shoreline
Aurora Avenue North Multimodal Corridor Study
Prepared by: Jory Phillips, Arai/Jackson Architects & Planners
Date: February 11, 1999

Introduction

The primary focus of this memorandum is to identify an assortment of potential urban design elements for the public right-of-way. The reconstruction and multi-modal facility improvements to take place on the Aurora Avenue North corridor could be the largest capital investments that Aurora Avenue in Shoreline will experience for quite some time. In conjunction with multi-modal facilities improvements, the proper placement of elements listed in this memo can improve the overall commercial investment climate of the corridor.

Prior to Interstate 5, SR 99 served as the main north-south route from Mexico to Canada. As a result, much of the early development along SR 99 is similar to suburban strip development that grew along state highway routes throughout the country before the construction of interstate highways. The height, scale, character, and placement of buildings along the Aurora corridor is common to most suburban strip development. An over-abundance of signage and utility wires is an additional characteristic of suburban strip development that creates an overall lack of visual quality.

This lack of visual quality is further amplified by a lack of amenities such as sidewalks, and altogether this creates a deficiency in identity and cohesiveness along the Aurora corridor. Also common to many areas of established suburban strip development is a cycle of private disinvestment. Indicators of this cycle include decreasing rent levels, the presence of buildings that are in disrepair, and vacant, blighted, and underutilized properties, all of which are present in the study area.

The Shoreline Comprehensive Plan's vision calls for creating a sense of place for the City and for improving the visual and physical ambience of the corridor. Public investment in the placement of urban design and pedestrian safety improvements can help begin to alleviate some of the problems in the corridor and help to create the sense of place Shoreline is looking for.

This memorandum summarizes such improvements that may be incorporated into the Aurora Avenue North reconstruction program through the City of Shoreline. An overview of urban design is presented, including a description of urban design, its role and importance in improvement projects, and descriptions of general urban design elements. Additionally, this memo briefly discusses the importance of pedestrian safety, an essential component of well-designed urban places. See the Pedestrian and Bicycle Facilities memorandum for more information on urban design techniques that may be used to increase safety for pedestrians, as well as the Landscape Enhancements technical memorandum for further description of design elements such as sidewalk paving, trees and landscaping, and street furniture.

Urban Design Improvements

Urban design can be generally described as the practice of improving the functional and aesthetic characteristics of the built environment. Urban design improvements can be used to transform the Aurora Avenue North corridor from a route primarily exclusive to automobiles into a multi-modal facility. Improvement can be accomplished through the placement and configuration of different elements of urban design, including the roadway, sidewalks, street furniture, lighting, signage, transit stops, vegetation, and buildings.

Care must be taken in the placement and combination of urban design elements. Their placement can not simply be for the purpose of "beautification". Rather, the placement and configuration of urban design elements must be done to provide the correct function and fit in the corridor, in addition to advancing the community's needs and overall objectives.

Urban design contributes to the overall condition, appearance, attractiveness, function, comfort, and commercial marketability of the corridor. Additionally, the accommodation of pedestrian safety and transit facilities is one of the most important aspects of urban design, particularly for Aurora Avenue North. A healthy and convenient mix of transportation modes—automobiles, transit, and pedestrians—is an indicator of a healthy urban environment.

Benefits of Urban Design Improvements

Improving the physical environment of the corridor with urban design can have many positive effects. First, curbs and sidewalks in any configuration will add to the comfort and safety of pedestrians. The addition of street trees, whether on a center-planted median, in a planting strip along the roadway, or between the sidewalk and adjacent properties will improve the appearance and cohesiveness of the corridor. Third, pedestrian-scaled lighting and street furniture help to create a sense of place, further encouraging pedestrian and transit use. All of these elements acting in concert can further define and identify an area, possibly encouraging passing motorists to stop and take advantage of commercial opportunities.

Elements

Lighting

Lighting of the street system, including adjacent sidewalks, walkways, and bike lanes, increases security and pedestrian safety and comfort. Lighting can help to create an overall impression of the corridor by providing identity and cohesiveness.

Overhead "cobra" lighting is the base WSDOT standard for a state highway-classified roadway such as Aurora Avenue North. It may be possible to incorporate light posts and fixtures that are more pedestrian friendly. Such decorative lighting could be lower in height, more pedestrian-scale, less obtrusive, and have softer light sources. It is also possible to combine pedestrian-scale lighting and overhead lighting for the roadway on the same pole.

Several options and combinations of lighting exist for the corridor. First, a uniform lighting standard could provide unity within the corridor. A second option is to use several styles within the same family of lights in separate areas of the corridor, providing unity while helping to create separate, identifiable places.

Public Art

Public Art can be incorporated into a number of other elements of urban design, including sidewalks, grating, bus shelters, lighting, and landscaping. Public Art helps add identity to an area, and can function as another element that advances overall corridor cohesiveness and identity. This could potentially be accomplished through the use of patterns, materials, or images that reflect the history, landmarks, or other meaningful aspects of the community.

Transit Stops (also see Landscape Enhancements tech memo, site furnishing section)

Transit stops are another element of urban design that help to give an area a sense of identity, uniformity, and individuality.

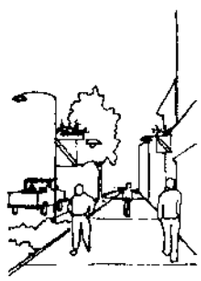
There are a number of options for bus shelters at transit stops: the basic METRO standard, a modified METRO bus shelter, or a completely different bus shelter. The basic METRO bus shelter is a brown box with three walls and a bench and is seen throughout King County. A modified shelter may have public art on the walls of the shelter and a different roof form. Such a shelter can be used to enforce identity for

Shoreline and/or the corridor. A completely different or custom bus shelter could be used within the corridor to greatly enhance the identity and individuality of the area.

Utility Wires

Utility poles and wires along the roadway add visual clutter and obstacles to the environment. While expensive, placing utilities underground improves the aesthetics of the corridor and makes other more pleasing elements more visible. It also reduces the number of obstacles along the roadway. An alternative to placing utilities underground is designing the streetscape such that trees or other elements screen utility wires without conflicting with them

Sidewalks (Discussed in depth in Landscape Enhancements tech memo)



Concrete sidewalks are ordinarily located adjacent to a curb or separated from the curb by a planting strip. Typically, they are five feet wide on residential streets, eight to twelve feet wide or wider on arterial streets or in special districts. The planting strip must usually be at least five feet wide to plant trees. Curbs, drainage and proper location of utilities must already be in place.

Wider sidewalks allow higher volumes of pedestrian traffic and directly affect the comfort level of the pedestrian. Sidewalks should typically be eight to twelve feet wide or greater in areas where there is a high volume of pedestrian activity.

Trees (Discussed in depth in Landscape Enhancements tech memo)

Street Furniture (Discussed in depth in Landscape Enhancements tech memo)

There are several kinds of street furniture that could potentially be used: benches, drinking fountains, kiosks, clocks and others. Street furniture can be clustered in special areas along the corridor to help create identifiable activity nodes or interspersed along the corridor for uniformity.

Pedestrian Safety Improvements (Discussed in detail in Pedestrian and Bicycle Facilities tech memo)

In its current state, Aurora Avenue North functions almost exclusively as a route for automobiles. Pedestrians are forced to use an asphalt shoulder or parking lots as pathways. Given the high speed and volume of traffic on Aurora Avenue, this makes for a very uncomfortable and unsafe journey for those travelling by foot. Fortunately, there are many tools available to facility designers to reduce the risk of pedestrian accidents. Pedestrian Safety Improvements are discussed in detail in the Pedestrian and Bicycle Facilities technical memorandum.

Conclusions and Next Steps

The next step in the process is to develop alternatives. Once this is complete, it will be necessary to determine how the alternatives differ from one another. An approach to this could be to determine potential zones or future special areas within the corridor. Zones could be based on exiting and potential land uses, as well as areas that could serve as gateways or public parks or plazas that might help reinforce the character of the community.

Different combinations and placements of urban design improvements can be used in the corridor to emphasize or reinforce potential areas or zones, along with corridor-wide improvements. Future zones could include gateways, open/public spaces, areas for public art, and linkages to other areas, including the Interurban Trail. An example of this is the use and configuration of special lighting, paving, signage, and landscaping in an area defined as a gateway. These urban design treatments would be configured such that people entering and leaving the study area could easily see that they are doing so.

Urban Design Elements
Lighting *(also see Illumination Improvements tech memo)* • Overhead Cobra • Decorative Lighting • Combinations of Overhead and Decorative
Public Art
Transit Stops • METRO Standard • Modified METRO Standard • Completely Different Shelter
Utility Wires • Above Ground • Underground

Sidewalks *(also see Landscape Enhancements tech memo)*
• Widths
• Location
  • Adjacent to Roadway
  • Not Adjacent to Roadway

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY *Evaluation of Design Options – Urban Design Elements*		
Option/Description	**Advantages**	**Disadvantages**
Lighting		
Standard Overhead (cobra head) Lighting – WSDOT standard	• Provides additional roadway lighting for automobile safety • Cost-effective	• Not pedestrian-scale • May not provide adequate lighting for pedestrians
Decorative Pedestrian-Scale Lighting	• Provides additional lighting for pedestrian safety • A uniform, corridor-wide style would help provide unity and corridor identity	• Creates additional visual clutter on side of roadway • Increased cost
Overhead and Decorative Pedestrian-Scale Lighting Combined on Same Pole	• Reduces visual clutter on side of roadway • Lower cost than providing overhead and ped-scale lighting on separate poles • Helps create identity, character, and cohesiveness	• Individual poles have higher cost than overhead cobra lighting only
Clusters of Overhead and Decorative Pedestrian-Scale Lighting	• Different styles of a particular family of lighting types could be used in separate areas • Help to create identifiable areas within the corridor	• Corridor appearance may not be as cohesive • May not create common identity
Public Art	• Helps create identity, character, and cohesiveness	• Additional cost
Transit Stops		
METRO Standard Transit Stops	• Unified METRO identity	• Cost-effective
Modified METRO Standard Transit Stop	• Can create unified identity for Shoreline, the corridor, or zones/subareas within the corridor • Use of public art on shelter can help create identity, uniformity, and individuality	• Higher cost than METRO standard
Completely Different Transit Stop	• Can create unified identity for Shoreline, the corridor, or zones/subareas within the corridor	• Could have higher cost than METRO standard • More difficult to recognize as a METRO facility

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY *Evaluation of Design Options – Urban Design Elements*		
Option/Description	**Advantages**	**Disadvantages**
Utility Wires		
Above Ground Utility Wires	• Cost-effective • Cost savings can be used to implement elements like street trees that can be used to screen wires	• Retains visual clutter
Underground Utility Wires	• Reduces visual clutter • Consolidates and decreases number of utility poles • Makes other amenities more prominent	• Increased cost
Sidewalks		
Sidewalks Widths	• Wider sidewalk makes a more comfortable pedestrian environment • Larger scale allows for more pedestrian movement and transit areas	• Wider sidewalks incur greater costs—especially if more right-of-way is needed
Sidewalk Adjacent to Roadway	• Requires less right-of-way • Trees and landscaping could be placed away from roadway, keeping • Cost-effective	• Pedestrians feel less comfortable and safe when not separated from roadway
Sidewalk Not Adjacent to Roadway	• A separation between the sidewalk and the roadway gives the pedestrian a greater sense of comfort and safety • Allows for trees and landscaping to separate the roadway from the sidewalk	• Requires wider right-of-way • Increased cost

Traffic Operation Improvement Measures DRAFT

PREPARED FOR: City of Shoreline
Aurora Avenue North Multimodal Corridor Study

PREPARED BY: Todd Slind/SEA

Craig Grandstrom/SEA

DATE: February 5, 1999

Included in this technical memorandum is an investigation of traffic operation improvement measures that should be considered for incorporation into a comprehensive program for the reconstruction of Aurora Avenue North through the City of Shoreline. This technical memorandum provides a description of options for traffic operations improvements, intersection elements and concepts, operation and capacity analysis, qualitative measures that characterize intersection operations, and advanced intersection topics. Methodologies of improving traffic operations are incorporated into each section.

Traffic Operation Improvement Options

Roadway traffic operations break down due to a variety of factors. The most influential of these factors are traffic volume and ineffective traffic control. Improvements to provide additional capacity and maintain service levels are needed as travel demand for roadway facilities exceed capacity and operations break down. Improvements to traffic control and/or intersection geometry, provision of additional lane capacity, and application of demand management strategies are elements that can be used singly or in conjunction.

The public has the choice of if and how it will construct facilities to accommodate future traffic demand or mitigate existing congestion. In the past, the default solution has been to plan and implement capacity improvements to accommodate increasing vehicular volumes. Conventional wisdom warned that without steady increases in capacity to keep up with growth, congestion would grow to a point where traffic impacts and destroyed the community. It now looks like this is not a foregone conclusion. The conventional wisdom that has driven this country to the most roadway miles per capita *and* the most congestion may need to be revisited. There are several examples across the county where capacity has actually been *reduced* without the anticipated congestion impacts to the transportation system.

In San Francisco, the Embarcadero Freeway and portions of the Central Freeway damaged in the 1989 Loma Prieta earthquake have been removed and the traffic that once used these facilities has not re-appeared anywhere else within the system. Communities across the county are engaged in the "pedestrianization" of their arterials. They are adding sidewalks, landscaped medians, reducing lane width and adding intersections in order to create a more amenable pedestrian environment. Critics decried that the resulting congestion would hurt businesses and degrade air quality. These communities are finding that the quality of their public space is greatly improved and that business along these roadways hasn't been better.

In areas where highway construction continues, the "build it and they will come" phenomena is making people reconsider whether we can build ourselves out of congestion. New and expanded facilities, designed to relieve congestion and provide for future needs are becoming congested at an incredibly fast rate. This additional capacity is temporarily allowing people to drive faster, but it is also encouraging people to drive more. Roadway facilities, designed to relieve demand are actually *inducing* it.

These new developments in the business of providing transportation have caused Cities, Counties and Metropolitan Planning Organizations to shift their focus from providing for vehicle capacity to providing for person movement capacity. This entails providing better mobility choices to travelers, choices that don't require a car such as transit, bicycling and walking. They are finding that improving person capacity is much more successful at relieving congestion than attempting to improve vehicle capacity.

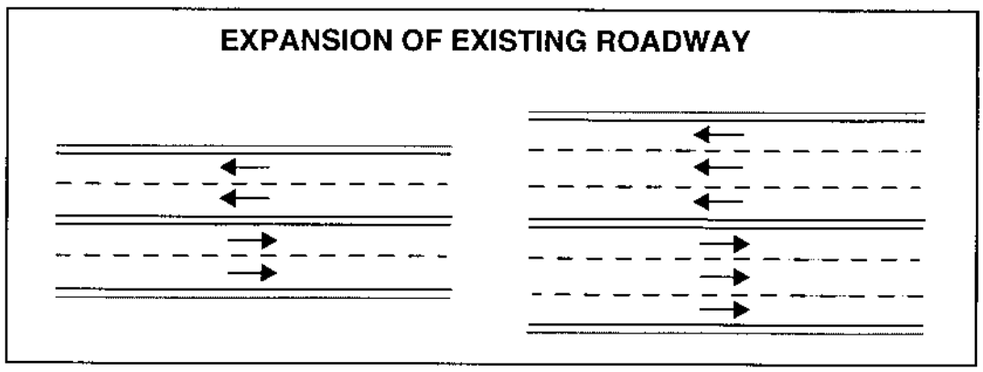
Constructing additional lane capacity can be effective in relieving congestion and improving traffic operations. Additional capacity can also induce additional demand on the roadway, increasing the ultimate traffic volumes perhaps in conflict with community desires. Therefore, careful thought must accompany a decision to add lane capacity. Consideration of improvements to traffic control in the corridor can address community and agency issues and concerns regarding traffic safety, congestion, pedestrian safety, and traffic coordination.

Adding Lane Capacity

Additional lane capacity could be developed several ways. An existing facility may be expanded, a new facility may be constructed, or the roadway system may be reconfigured to redistribute traffic through the system.

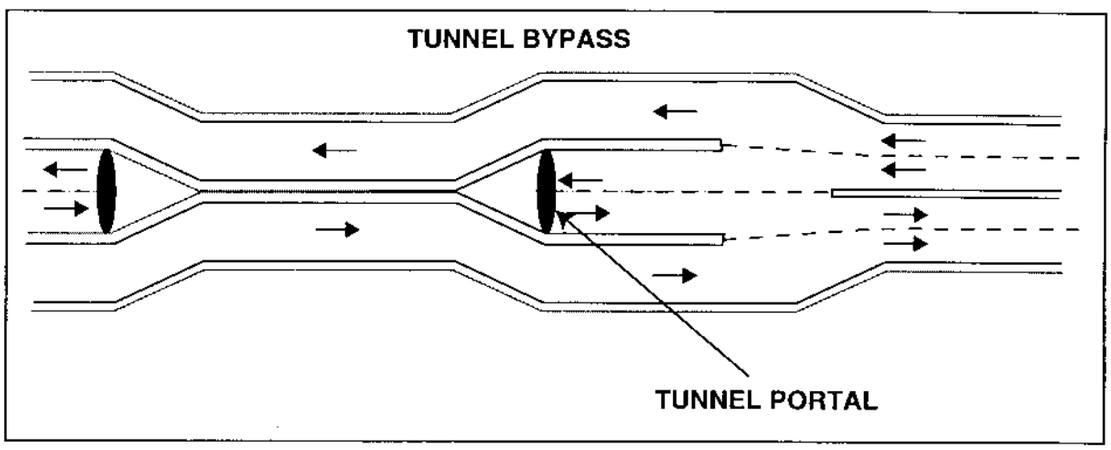
Expansion of the existing roadway.

Aurora Avenue North is currently a five-lane section through the City of Shoreline consisting of two general-purpose lanes in each direction and a two-way left-turn lane. The roadway could be expanded by an additional general-purpose lane to increase the capacity of the roadway, or be expanded by a high-occupancy vehicle (HOV) lane. An HOV lane would increase the vehicle capacity of the roadway, increase the person-capacity of the roadway relative to a general-purpose lane, and provide an incentive for carpools, vanpools, and transit. HOV lane options are discussed in detail in the HOV/Transit Amenities Design Option investigation memorandum.



Development of a traffic bypass route.
Traffic operations can be improved through the reduction of volume on the facility. Traffic not requiring local access could be diverted onto other routes to relieve demand on the roadway or traffic could be split by direction between two separate facilities.

A diversion for regional traffic, not possessing a local destination, could be provided via a limited access route. This route could be a tunnel under the existing roadway, an aerial facility above the existing roadway or along another alignment.



A directional split of traffic by direction would require development of a "couplet" system. One roadway would serve the northbound direction, and the other would serve the southbound direction. The couplet roadways would ideally be within a few blocks apart in order to preserve reasonable access to existing businesses.

Traffic Control Improvements

Roadway traffic control is used to manage operation, improve safety and preserve capacity. Traffic control measures can be deployed at the intersection or along roadway segments between intersections.

Access Management

Traffic conflicts occur when vehicles are entering or exiting the roadway to gain access to or from adjacent properties. Access management is a way to manage where access is allowed in order to reduce conflicts along roadway segments and to locate turning movements at controlled intersections. This concept is discussed in detail in the Access Management Design Option investigation technical memorandum.

Driveways are often modified, consolidated or eliminated as part of an access management design strategy. In fact, driveway access along state highways is now regulated and a limit has been set as to how many driveways any one property may have.

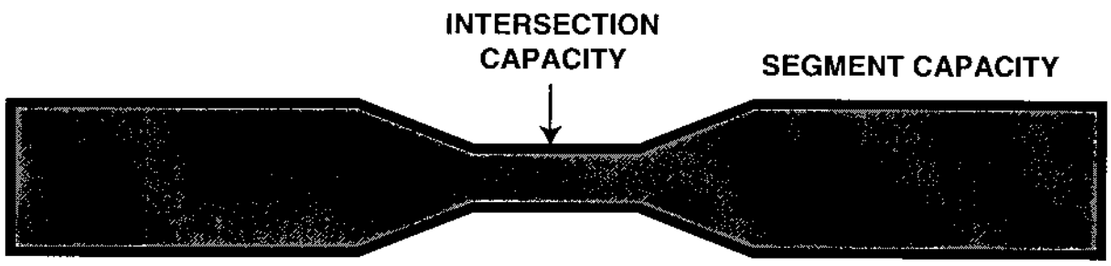
One form of aggressive access management involves the construction of frontage roads parallel to the arterial roadway in order to minimize access points along the arterial. This type of measure has been used extensively in areas such as Los Angeles and Phoenix, where growth in suburban development has outpaced freeway construction and arterials are required to support a large percentage of regional traffic. Frontage roads usually create

higher speeds on the arterial, and can be perceived as a hindrance to local business access. They reduce vehicle/vehicle conflicts, but the higher speeds experienced can increase the severity of accidents and make the arterial extremely inhospitable to other roadway users such as pedestrians and bicycles.

Combining the aggressive forms of access management with the construction of grade-separated intersections would create an 'expressway'

Intersection Improvements

Intersections limit the capacity of a roadway. Due to conflicting movements and shared right-of-way at the intersection, fewer cars can be served at an intersection than along the roadway segment. Intersection capacity is generally 50 percent or more lower than what could be expected along a mid-block segment. This is because access through the intersection must be shared with traffic from the cross street.



Why is intersection capacity important?

The most critical element that affects the capacity and quality of traffic flow of a highway and street network is the at-grade intersection. Intersections are conflict points where vehicles are temporarily interrupted in their path from one point to another. Therefore the overall quality of a roadway is enhanced if traffic is progressed at intersections in an operationally efficient and safe manner with minimal interruption.

Roadway intersections correspond to a key "moving part" in a machine, an element within a working system. With the critical need to rehabilitate existing facilities while minimizing cost, the redesign of intersections must be done with more assurance that they will operate for a long period of time before needing further improvements. This means that when intersections are reconstructed the best possible level-of-service or minimum amount of delay per vehicle should be achieved.

In order to move regional traffic through a corridor most efficiently, intersection operations must be optimized to maintain running speed and throughput. Many of our "regional" arterials carry far fewer regional trips than local trips. This is true not only over the course of a day, but during peak commute periods when people are traveling to and from work. A roadway designed to primarily serve regional trips is generally typified by wider lanes, higher speed limits and a large share of signal time assigned to regional through movements. Across the country, communities are experimenting with converting their regional high-speed arterials to a more locally focused roadway to support emerging community activity centers. These new designs have reduced speed limits, reduced lane widths, and other features that contribute to slower auto traffic such as sidewalks, medians, and landscaping. These types of changes alter the suburban environment that has

historically developed without adequate transportation facilities into a more urban environment that can better support the growing intensity of activity that occurs in emerging urban activity centers.

Elements of the intersection.

An intersection is part of the roadway system where two roads meet or cross. These roads may be of any type from highways to private drives. It is a place where two or more roadways must share the right of way through which vehicles are passed. It is also an opportunity for a vehicle to shift between roadways to travel in other directions on onto higher or lower level facilities in the roadway class hierarchy.

The most common intersection types are the four leg intersection, where two roadways cross; the tee "T" intersection where one roadway meets another at a right angle but does not cross it, and the wye "Y" intersection where one roadway meets another at an angle of less than 60 degrees. The roadways forming the intersections are called the approaches or legs of the intersections. At an intersection, one movement is considered the major movement. Standard intersections should intersect at an angle between 75 degrees and 105 degrees and opposite approaches should not be offset.

Intersection Traffic Control

Intersection designs incorporate a wide variety of influencing elements including the volume and distribution of traffic movements, traffic composition (percentage of cars, trucks and transit), and geometric characteristics (widths and angles within the intersection). Intersections are a complex issue that is broken down into two types of operations; signalized intersections and unsignalized intersections.

Unsignalized Intersections

Unsignalized intersections are either two-way or all-way stop controlled intersections. The main difference between the two types of stop-controlled intersections is the allocation of right of way to conflicting traffic movements.

Two-way stop controlled intersections have stop signs that assign the right of way. The stop-controlled approaches are considered the "minor approach". The approaches at the intersection not controlled by stop signs are considered "major approaches". All stop-controlled "minor" movements will yield the right of way to all "major" movement traffic.

At three-leg intersections either the one or two approaches can be stop controlled and either roadway can be assigned as the major approach.

Along Aurora Avenue North, unsignalized intersections are only appropriate for driveways and low-volume cross-streets.

Signalized Intersections

Signalized intersections include an element of time allocation. A traffic signal allocates time among specific conflicting movement that seek use of the same physical space. The way the time is allocated has a significant impact on the operation and the capacity of the intersection.

Traffic signals can operate in three different ways; pretimed, semiactuated, and actuated operations. In pretimed operations the cycle length, phasing, green times are all preset.

Pretimed signals will rotate through each cycle exactly the same. Pretimed operations have the ability to function on different patterns depending on the time of day. Pretimed operations can operate isolated or within a coordinated system.

Semiactuated operations ensure that the main stream of traffic flow receives a green indication until there has been detection of vehicles on the minor approaches. Then the green time is allocated to the minor phases until all the vehicles are served or until the maximum allocation of green time has been reached. In this type of operations cycle length and allocated green times can vary from cycle to cycle in response to demand specifically on the minor approaches. Coordinated systems severely limit the flexibility of semiactuated operations by the implementation of fixed cycle lengths. The result may benefit the progression of the major approach but none of the movements will be improved unless there are low volumes present.

In fully actuated operations all approaches and movements are controlled by vehicle detection. Minimum and maximum green times are allocated to each phase. This will considerably vary the green time and cycle length based on demand from the system. Although this type of system allows for the greatest flexibility and optimization it is not feasible for coordination.

Signal Coordination

Coordination with a group of successive signals can provide for an increase in capacity for a roadway section. The objective of coordination is having good progression along the major route. With coordinated progression, vehicles along the major approach will receive a green indication as they approach each intersection. If there is good progression along this route then there is a continuous movement of a group of vehicles at a planned speed. If the progression of the traffic is not well coordinated, then most vehicles will arrive at the intersections when their approach has a red indication. Poor progression results in these movements incurring high delays at the intersections.

Signal Operations and Capacity Analysis

Signal operations directly impact capacity. Capacity analysis for intersections is traditionally expressed in the volume to capacity (v/c) ratio. This ratio compares the actual volume for each lane group with the functional capacity for that lane group. Functional capacity is the general capacity of the intersection that has been adjusted to reflect the traffic, roadway and signalization conditions.

Traffic conditions include volumes for each approach, vehicle type (trucks, buses, bicycles, etc.), vehicle distribution for each approach lane, bus stops near the intersection, pedestrian crossings, and adjacent parking. Roadway conditions include the geometrics of the intersection, which includes the number of lanes, lane width, grade, and lane allocation (which movements are allowed in each lane). Signalization conditions include the signal phasing, timing and type of control. The type of progression or connection between signals also affects capacity.

All approaches to the intersection must share the same "cycle." In the cycle, only so much green time is available to each movement. This green time is allocated so that no one movement (or person waiting at the intersection) has to wait too long. For signalized intersections, capacity is influenced by the green time allocated to each movement. The more green time a movement has in relationship to the cycle length (the green time ratio),

the greater number of vehicles those lanes can serve. The manner in which turning movements are accommodated also influence capacity. Signal phasing can provide different levels of protection for turning vehicles. Protected turns, which provide the highest capacity for turning movements, are those without any conflicts. An example is an exclusive left-turn phase where vehicles can turn without any friction since all opposing movements are stopped. Permitted turns are made through either pedestrian or opposing vehicle conflicts. An example of this type of turn is when a left-turn vehicle has to wait for a sufficient gap to occur in opposing through traffic before they can make their turn.

Unopposed turns never experience a conflict with other movements because of the geometrics of the intersection. Unopposed movements can occur on one-way streets, T intersections and at four-leg intersections were the signal phasing provides a complete separation between movements.

Lane Allocation

The allocation of lanes to movements is a major factor in intersection capacity. The issue at hand is whether the lane is exclusively used for a single movement or is shared for several movements. (i.e. a left-turn and through movement can be performed from the same lane). Shared movement lanes generally have a lower capacity than exclusive lane movements. A case in point is when a left-turn and through movement share a lane and the left-turn movement has a permitted phase. This permitted phase only will allow the left-turn vehicle to turn if there is a large enough gap between opposing vehicles. If there is not a large enough gap the left-turning vehicle will stop all vehicles behind it who want to go through the intersection and significantly lower the capacity of that lane.

If there are multiple lanes for a certain movement the distribution of vehicles over the lanes is also considered unequal. Various equations and factors are used to distribute portions of the traffic over those traffic lanes.

Channelization

Intersection channelization involves the use of striping, curbing, traffic control islands or other traffic control devices to guide and control traffic. Channelization can influence the capacity of an intersection. If the lane width is too narrow vehicular speeds will decrease which has a negative impact on the intersection capacity. The channelization of right and left-turn movements can dramatically affect an intersection's capacity. If there is a wide enough corner radii it may be possible to install a triangular island that will allow a free, not opposed, right-turn movement. This type of treatment benefits vehicular traffic, but can cause serious conflicts with pedestrians. To increase the safety for left-turning vehicles a refuge area or pocket between opposing traffic stream can be installed which allows the driver to select a safe gap to turn. The length of the left-turn pocket can also affect the capacity of the roadway. If the length of the pocket is inadequate, stored left-turning vehicles might be stopped in neighboring lanes while waiting for their green indication. This can lower the capacity since other vehicle movements can not get through.

Pedestrian Affects

Vehicles are not the only roadway users requiring passage at intersections. Signalized intersections provide the best opportunity along the roadway for pedestrians to cross in a fully controlled environment. Pedestrian crossing times are set according to the anticipated time it will take for a pedestrian to traverse the intersection. The wider the roadway, the

longer crossing time is required. High pedestrian volumes can reduce the opportunity for right turning vehicles.

Qualitative Analysis of Intersection Operations

The effectiveness of an intersection to serve traffic is measured by a standard called Level of Service (LOS). Level of Service for signalized intersections is expressed in terms of average vehicle delay. Delay is a source of driver discomfort and frustration, fuel consumption, and lost travel time. Technically, level-of-service is the average stopped delay per vehicle for a 15-minute analysis period. Calculating delay is a complex process that is dependent on a number of variables, including the quality of progression, the cycle length, the green time ratio, and the volume-to-capacity (v/c) ratio for the lane group or approach in question. The table below contains a description for each of the level-of-service grades used for describing the quality of operations at signalized intersections.

Intersection Level of Service Definitions

Level of Service	Traffic Flow Characteristics
A	Level of service A describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Level of service B describes operations with delay in the range of 5.1 to 15 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
C	Level of service C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Level of service D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Level of service E describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	Level of service F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, I.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios (those over 1.00) with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: Highway Research Board, *Highway Capacity Manual*, Special Report No. 209, 1994

Level-of-service for unsignalized intersections are defined in terms of total delay. Total delay is the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line. This time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The LOS conditions described in the table above also apply to unsignalized intersections. However the delay ranges for unsignalized intersections differ slightly and are listed in the following table.

LOS delay ranges for unsignalized intersections.

LOS	Unsignalized Intersections (Total delay in seconds)
A	≤ 5
B	> 5 and ≤ 10
C	> 10 and ≤ 20
D	> 20 and ≤ 30
E	> 30 and ≤ 40
F	> 45

Level of Service Standard

Roadway projects are traditionally designed to optimize level of service. Forecast conditions for the design year (usually 15 - 20 years hence) should reflect the "worst case" traffic anticipated. These design year conditions are used to design the roadway in order to achieve the highest LOS possible within project limits or at least the LOS standard set by the jurisdiction.

The City of Shoreline Comprehensive Plan has identified as a policy goal, the maintenance of Aurora Avenue intersection operations at LOS E. Current projects underway on Pacific Highway South (SR-99) are striving to maintain LOS D.

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY Evaluation of Design Options – Lane Capacity Improvements		
Option/Description	**Advantages**	**Disadvantages**
Regional SR-99 traffic diverted onto another route (to be developed)	♦ Allows Aurora Avenue North to be developed as a local "downtown" street	♦ Severe R/W impacts – consumes land ♦ Major environmental impications including air quality, noise, water and displacements ♦ Cost: $100 – $200Million ♦ May induce traffic or attract latent demand ♦ Would serve only 20 – 30 percent of existing Aurora Avenue Trips
Regional SR-99 traffic re-aligned onto limited access facility along Interurban Right-of-way	♦ Could be constructed within existing 100' R/W ♦ Allows Aurora Avenue North to be developed as a local "downtown" street	♦ Requires relocation of high-voltage transmission lines ♦ Major environmental implications including air quality, noise, water and displacements ♦ May induce traffic or attract latent demand ♦ Cost: $50 – $100Million ♦ Conflicts with planned interurban bicycle trail ♦ Creates significant barrier to cross-traffic ♦ Destroys potential of 175th – 185th to serve as a Civic Center ♦ Would serve only 20 – 30 percent of existing Aurora Avenue Trips
Develop three-mile tunnel to serve regional SR-99 traffic	♦ Allows Aurora Avenue North to be developed as a local "downtown" street ♦ Can be constructed within existing right-of-way	♦ Major environmental implications including air and water quality. ♦ Unknown geologic conditions ♦ May induce traffic or attract latent demand ♦ Ventilation system and fire suppression required for all tunnels over 1-mile

		♦ High cost associated with providing access mid-tunnel ♦ Would serve only 20 – 30 percent of existing Aurora Avenue Trips ♦ Cut and cover construction would close Aurora Avenue North to all traffic for at least one year ♦ Cost: $500Million – $1Billion
Develop Aurora Avenue North as an "expressway" with interchanges and grade separated road crossings	♦ Allows increased speed for traffic through Shoreline	♦ Severe R/W impacts – consumes land ♦ Destroys opportunity for pedestrian-friendly "downtown" street setting along Aurora ♦ Would be designed to serve a minority (20 – 30 percent) of existing Aurora Trips at the expense of local access ♦ High cost for access ♦ Air quality impacts ♦ Significantly reduces opportunity for east-west travel across the corridor ♦ Could induce additional traffic volumes ♦ Cost: $100 – $200Million
Develop aerial viaduct to serve regional SR-99 traffic	♦ Allows Aurora Avenue North to be developed as a highly urbanized "downtown" street ♦ Can be constructed within existing right-of-way ♦ Allows increased speed for traffic through Shoreline	♦ Would be designed to serve a minority (20 – 30 percent) of existing Aurora Trips at the expense of local access ♦ High cost for access ♦ Could induce additional traffic volumes ♦ Major construction impacts ♦ Creates "concrete curtain" down Aurora Avenue ♦ Creates shadows and shade ♦ Cost: $200 – $300Million

CITY OF SHORELINE – AURORA AVENUE NORTH MULTIMODAL CORRIDOR STUDY

Evaluation of Design Options – Intersection Capacity Improvements

Option/Description	Advantages	Disadvantages
Add turning lanes at intersections	♦ Increases capacity of the intersection for turning movements ♦ Improves capacity for through movements that share lanes	♦ Extends pedestrian crossing distance ♦ Potential R/W impacts ♦ Increases potential conflicts
Add through lanes at intersections	♦ Increases throughput capacity of intersection ♦ Separates through and turning movements	♦ Extends pedestrian crossing distance ♦ Potential R/W impacts ♦ Increases potential conflicts
Construct grade-separated street crossings	♦ Removes surface intersection ♦ Improves throughput capacity	♦ High cost: $10 – $15Million ♦ Requires roadway to be placed on structure or depressed ♦ Potential R/W impacts ♦ Environmental impacts ♦ Reduces local access
Remove signals and close intersections	♦ Removes surface intersection ♦ Improves throughput capacity	♦ Reduces local access
Add signalized intersections	♦ Improves pedestrian environment ♦ Improves local access ♦ Improves overall safety of the road system ♦ Adds balance to the system to better accommodate all types of trips ♦ Provides opportunities for consolidated access and driveway closures	♦ If not properly implemented, could increase number of stops ♦ Costs associated: $500Thousand – $1.5Million
Restrict unsignalized intersections to right-in/right-out only	♦ Improves safety ♦ Reduces crossing conflicts ♦ Improves throughput capacity	♦ Reduces access
Provide HOV signal priority	♦ Provides incentive for HOV usage ♦ Increases person-capacity of the roadway	♦ If not properly implemented, could increase delay to other vehicles

Right-of-Way Information DRAFT

PREPARED FOR: City of Shoreline
Aurora Avenue North Multimodal Corridor Study

PREPARED BY: Tim Bevan/CH2M HILL
Linda Lane/Lanes & Associates

DATE: February 12, 1999

This technical memorandum provides right-of-way (R/W) information relating to planning, design and construction of transportation improvements in the Aurora Avenue North corridor. Included in this technical memorandum is a discussion on the types of additional right-of-way needed for transportation projects; the phases of right-of-way needs assessment and acquisition; right-of-way map development; and the right-of-way acquisition process. Some survey and right-of-way definitions are attached. Also attached are illustrations that correspond to the discussions and some commonly asked questions and answers about right-of-way acquisition.

The purpose of this information is to respond to issues and concerns raised by the public regarding understanding where existing right-of-way lines are; how much right-of-way will be needed and where; and how and when would right-of-way be acquired.

Right-of-Way Needs for Transportation Projects

Regional and local transportation facilities are developed on publicly owned land or right-of-way (see definitions attached). As transportation facilities are expanded, additional right-of-way may be needed to support the expanded facilities. In the case of Aurora Avenue North, the existing right-of-way in the corridor is generally 100 feet wide in the segments, with some widenings at street intersections. As the City, community, and other agencies plan the future improvements, it may be necessary to obtain additional right-of-way. The extent of the additional right-of-way will depend upon the design that is decided on.

When arterials, such as Aurora Avenue North, are expanded, several types of right-of-way are needed. These types are depicted in an attached figure and include:

- Right-of-way purchases to fit roadway widening and sidewalks
- Permanent easements to fit utilities, retaining walls, bus zones, signal equipment, etc.
- Temporary easements to allow construction of street improvements, regrading and paving of driveways, utilities, installation of landscaping, and restoration of private property.

Phases of Right-of-Way Needs Assessment and Acquisition

The determination of how much and what type of right-of-way is needed and formal acquisition will begin in the corridor planning study, established in greater detail during preliminary design and environmental impact documentation phases, and finalized during

final design. Various aspects of right-of-way needs assessment and acquisition are listed by phase in an attached figure.

This project is currently in the "planning" phase. The city, community, and affected agencies will be identifying and evaluating alternative designs for reconstructing Aurora Avenue North. These alternatives may vary widely with respect to additional right-of-way needs. Therefore, in the planning phase we will try to understand property owner concerns relating to alternatives and evaluate each alternative with regard to right-of-way needs and property impacts. At the end of this phase, currently projected to be July 1999, the city will identify a conceptual design for construction of Aurora Avenue North. That design will be illustrated on an aerial photo map that will depict approximate right-of-way needs.

In the "preliminary design and environmental review" phase, detailed survey and mapping of the corridor will be conducted, meetings with all potentially affected property owners will be held, property interface designs will be resolved and defined, and more precise determinations of right-of-way needs would be established. Depending upon when the city can obtain funding the project, this phase of work would occur in the year 2000 or 2001 for a portion of, or all of the corridor.

Then, during the "final design" phase, formal right-of-way acquisitions would occur (the right-of-way acquisition process is described at the end of this technical memorandum). In that phase of the project, precise maps and descriptions of right-of-way needs by parcel would be developed, right-of-way values would be appraised, and formal offers and agreements for acquisition would occur. Throughout that phase of work, city representatives would hold meetings and have continuous communications with each affected property owner to discuss needs and the acquisition process. Depending upon when the city can obtain funding for the project, the "final design" phase, including formal right-of-way acquisition, would occur in the year 2001 or 2002 for a portion or all of the corridor.

Mapping for Right-of-Way Needs Assessment and Acquisition

As the Aurora Avenue North project progresses from planning to final design, appropriate mapping will be developed to support the engineering and right-of-way acquisition efforts. Ideally, the more mapping information that is available, the easier it is to conduct the work. However, as in the case with Aurora Avenue North within the City of Shoreline, very little mapping has been produced in the past. And any mapping that is available is either incomplete or out-dated. The total costs to develop mapping for planning, engineering, and right-of-way acquisition for this 3-mile project along Aurora Avenue North during course of project development will be substantial, roughly $350-450 thousand. Also, various types of mapping and levels-of-detail are needed as the project is developed. Therefore, the City will need to gradually invest in appropriate mapping as it is needed to support the project. Three types of mapping will be needed to implement improvements in the corridor. These are:

- Planning Study Mapping – approximate mapping at a large scale to support corridor-level decisions.
- Design Mapping – more precise and detailed mapping at a small scale to support design and construction.

- Right-of-Way Mapping – more precise and detailed mapping of the highway right-of-way, and individual right-of-way and easements to be acquired.

Planning Study Mapping. The mapping to be developed for the planning study should support the primary decisions required in this phase of the project. The extent of mapping produced at this time should also be balanced with cost so that only the amount of detail needed at this stage is obtained at a reasonable cost. The primary decisions in this study are to establish the conceptual layout of the roadway and what functional elements or parts will be included in the project. Planning-level mapping is often developed at 1″=50′ or 1″=100′ scale. The criteria for developing the planning study mapping are:

- Understandable by public
- Identifies businesses and streets
- Identifies location of right-of-way and parcel lines
- Illustrates potential design solutions
- Identifies impacts and right-of-way needs
- Manageable scale/size so that 3 miles can be displayed

The items that should be shown on the planning study mapping at this stage of the project are the existing physical features adjacent to the roadway and right-of-way and parcel lines. Important physical features include existing roadway geometrics, the edge of roadway, driveways, property frontages and buildings. Right-of-way and parcel lines need only to be approximate locations at this time. More precise right-of-way mapping should be accomplished at the time of final roadway design. The most important questions to be answered at the planning study phase are how many lanes should the road have, how will the road interface or impact properties, and roughly how much right-of-way would be needed. For the Aurora Avenue North corridor study, an aerial photo-map with approximate right-of-way lines will be used for mapping.

Design Mapping. During the follow-on preliminary and final design phases of the project development, additional mapping is required. This mapping is referred to as topographic mapping. This mapping is developed for use at a scale of 1″=20′ or 1″=50′. It is developed either entirely through field surveys, or with a combination of aerial photogrametric surveys and field surveys. For a 3-mile corridor such as Aurora Avenue North, which has heavy traffic volumes, the design-level mapping will be a major undertaking and will require several months to prepare it. This mapping would be tied into local monuments and property corners along the corner. Design-level mapping will show all surface (e.g., buildings, curbs, sidewalks, driveways, pavement markers) and sub-surface features, (e.g., storm drains, water pipelines) and will incorporate grade or elevation information.

Right-of-Way Mapping. Mapping to support right-of-way needs assessment, and right-of-way acquisitions will also be a major time and cost investment as the project progresses. This mapping will include a survey to establish and confirm the existing Aurora Avenue North right-of-way centerline and right-of-way lines. Also, mapping will be developed for individual right-of-way and easements that are needed for project improvements. This mapping would be developed at 1″=20′ or 1″=50′ scale. Efforts to prepare this type of mapping would include:

- research of records of surveys performed in the project vicinity in the past
- research of assessors maps

- research of WSDOT right-of-way plans
- research of City of Shoreline records of Lot Line adjustments, Binding Site Plans, Subdivisions, Short Plats, Condominium Plats
- field survey of monuments, property corners
- survey tie-in to the Washington State plan coordinate system
- property title searches
- preparation mapping and descriptions of right-of-way and easements to be acquired
- preparation of calculations of areas for right-of-way and easements to be acquired

Right-of-Way Acquisition Process

When and if it is established that right-of-way and/or easements are needed for the project, a formal right-of-way acquisition process will be followed. This process is defined by Chapter 8.26 RCW and WAC 468-100. Application of these procedures to an arterial improvement project is also described in the Washington State Local Agency Guidelines Manual. As pointed out at the beginning of this technical memorandum, planning for right-of-way acquisition and communications with potentially affected property owners and tenants will occur throughout the planning, preliminary design, and final design phase of project development. The formal right-of-way acquisition process would begin during the "final design" phase, and this process is illustrated in an attached figure and described in the paragraphs below. During this process, a City representative will meet with affected property owners to discuss right-of-way and easement needs, along with other issues that may involve the property owner and tenants. Others issues relate to storm drainage and utilities, access, parking, landscaping, grading, signage and lighting. Some of these potential issues are listed on an attached figure.

Once right-of-way plans are approved for right-of-way that is needed for the project, the City can begin to acquire the necessary right-of-way from property owners. The year-long acquisition process includes presentation of an offer to purchase and relocate people or personal property that might be displaced by the project.

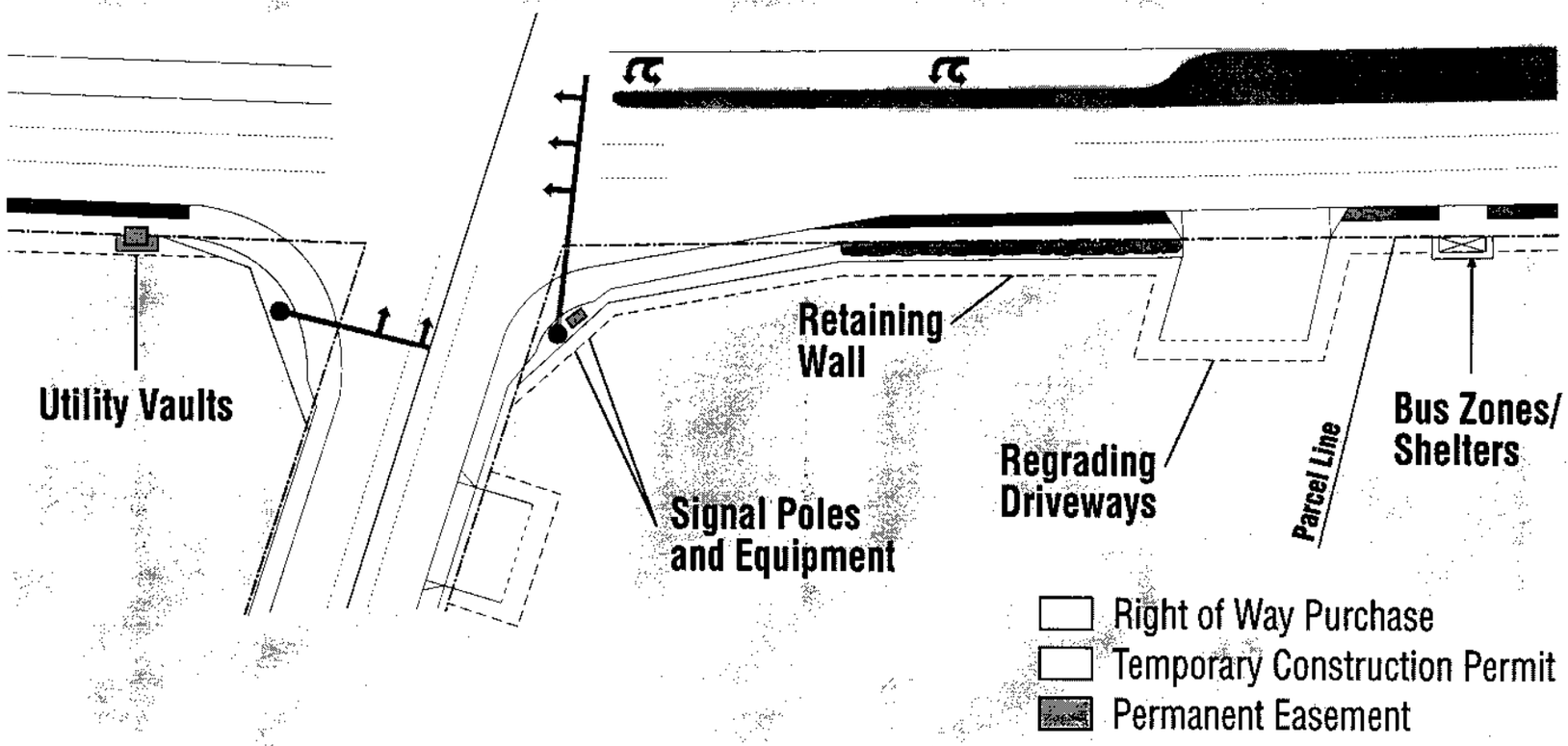
The price offered for property being acquired by the City is established by appraisal. The appraiser's task is to determine "just compensation" for affected properties based on fair market values. When total acquisition is required, the property owner receives the current market value. Compensation for a partial acquisition is the difference between the fair market value of the original property and that of the remainder. Upon completion of the appraisal process a City representative will offer to purchase the property. The representative will answer any questions individuals may have about procedures, rights, and impacts associated with the project. When settlement is reached, the representative will collect the required signatures and complete the necessary paperwork. Only after these details have been completed will payment for the acquisition be processed.

In the event that a structure requires removal, the occupants (tenant or owner) of that structure may be eligible for certain relocation services. Eligibility complies with federal and state regulations (Public Law 91-646, RCW 8.26.010 to 8.26.910). Typically, these benefits may include advisory services, replacement dwelling supplements, and reimbursement for moving expenses incurred as a result of the project.

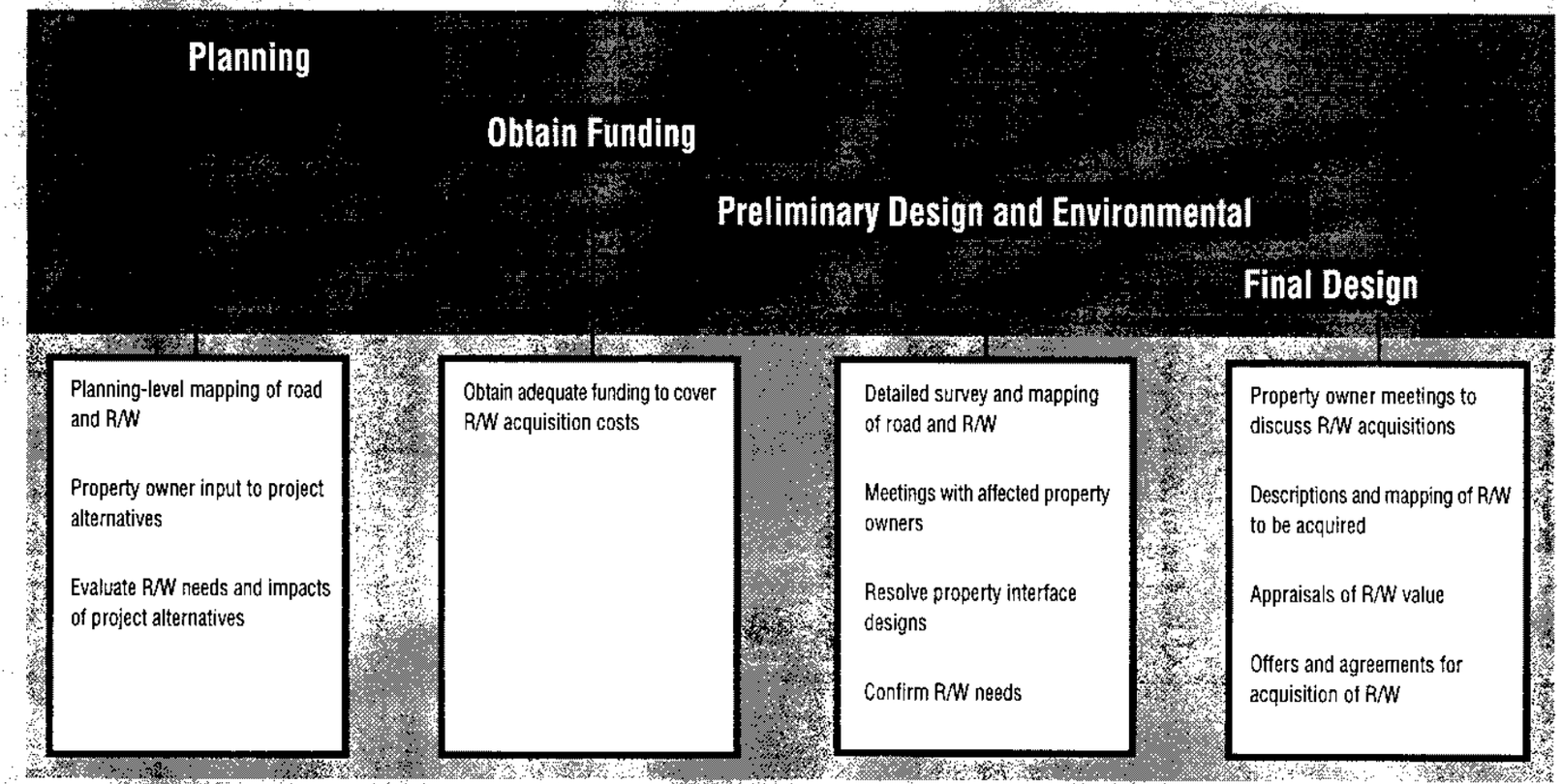
Since each property, ownership, or occupancy is unique, there may be considerable variation in procedures and time requirements. Including the reviews that are necessary

during the process, it will normally take up to 9 months from the appraisal start date to the date when the owner receives payment for the acquisition. Ownerships involving relocation can take about 3 months in addition to the acquisition time frame.

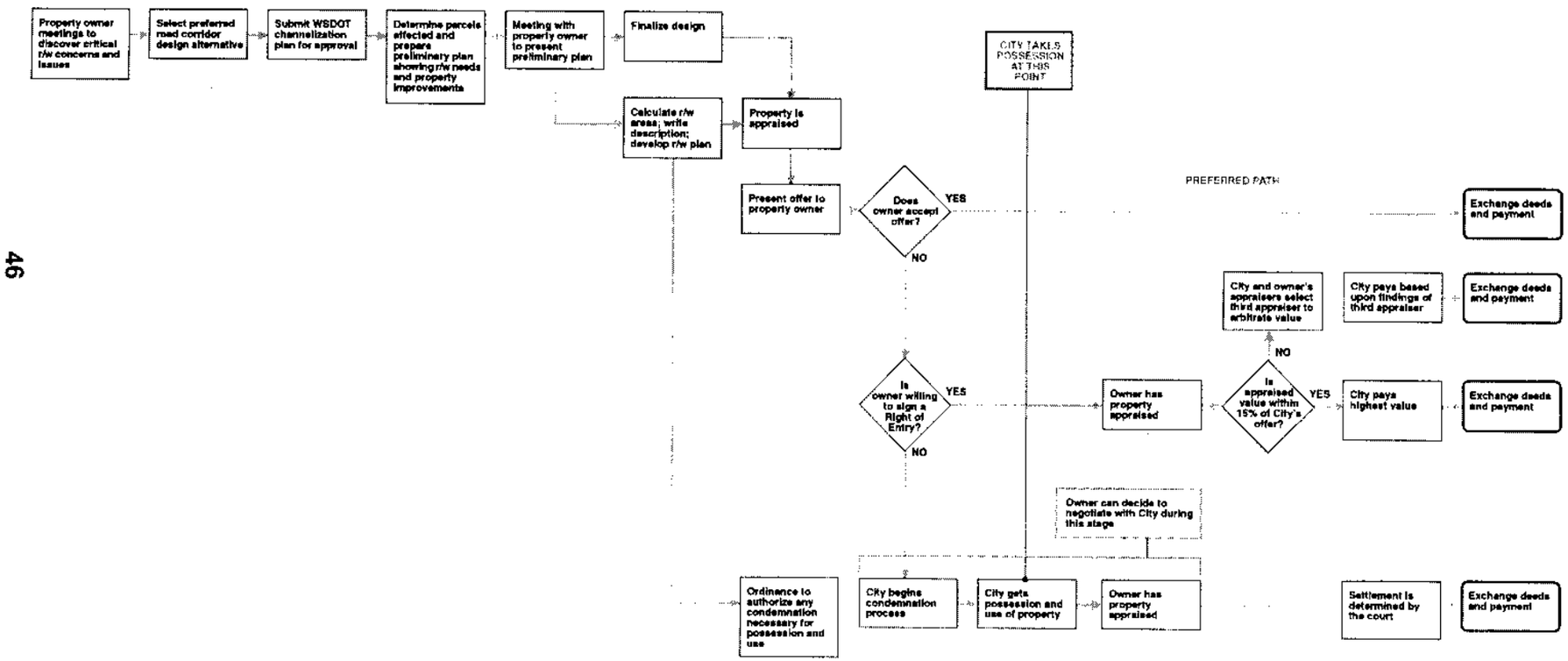
Typical Right-of-Way (R/W) Needs for Road Project



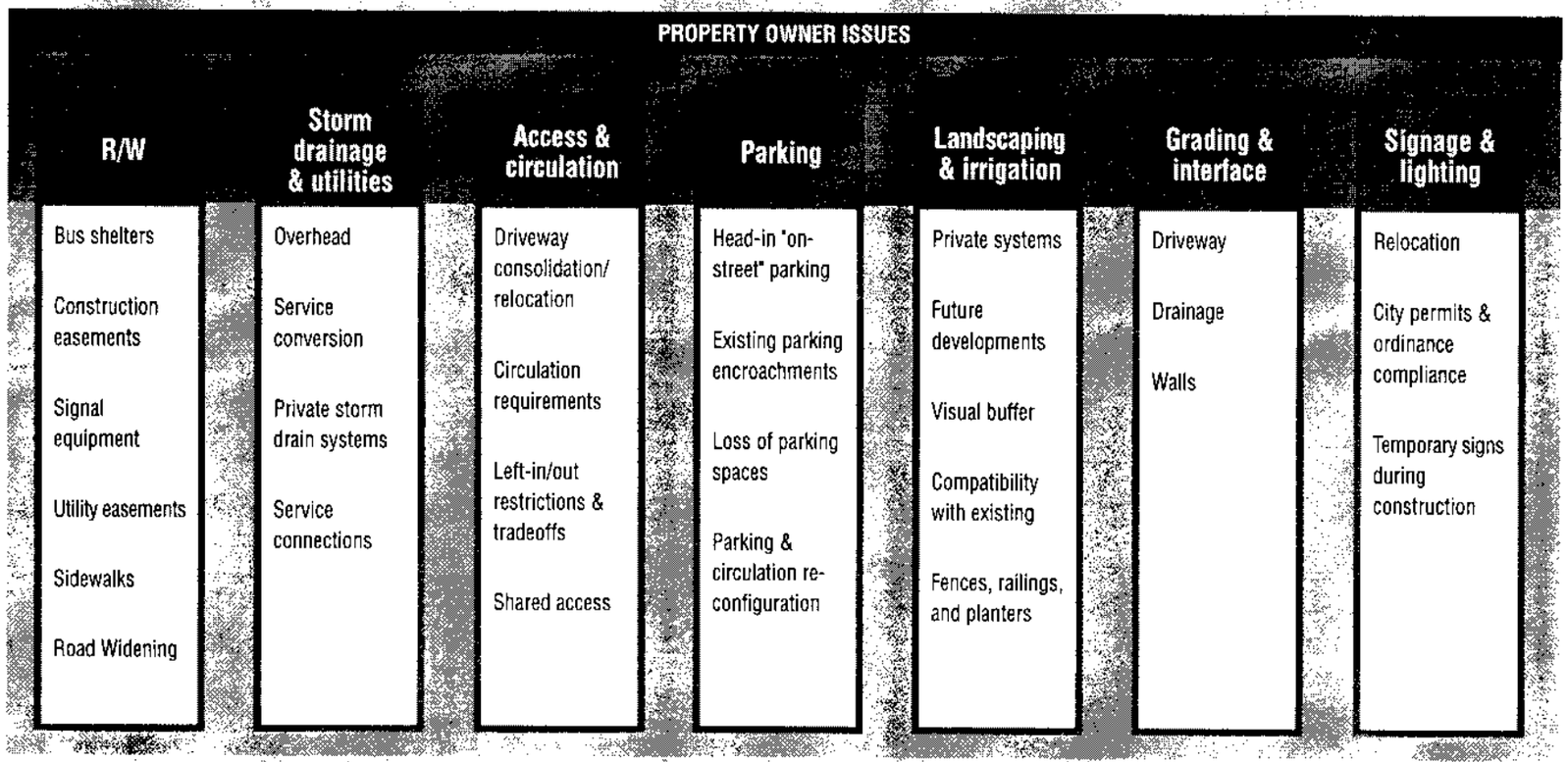
Property Owners Issues To Be Considered during Right-of-Way (R/W) Acquisition Process



Right-of-Way (R/W) Acquisition Process



Property Owners Issues To Be Considered during Right-of-Way (R/W) Acquisition Process



Survey and Right-of-Way Definitions

Appraisal – 1) An estimate and opinion of value. 2) Usually a written statement of the market value, or value as defined by the appraiser, of an adequately described parcel of property as of a specific date. A conclusion that results from an analysis of facts.

Condemnation – 1) The process by which property is acquired for highway purposes through legal proceedings under the power of eminent domain. 2) The act of a federal, state, county, or city government or district or public utility corporation vested with the right of eminent domain to take private property for public use when a public necessity exists. It is the act of a sovereign in substituting itself in the place of the owner and/or the act of taking all or part of the rights of the owner. 3) The term condemnation denotes the acquisition of property by the exercise of the right or power of eminent domain. Pursuant to this right or power, the sovereign, whether it is the federal or state government, or an agency to whom there has been delegated this right or owner, may, upon payment of just compensation, acquire property for the benefit of the public.

Condemnation, inverse – The legal process by which a property owner may claim and receive compensation for the taking of, or payment for damages to, his property as a result of a highway improvement.

Damages – In eminent domain, the loss in value to the remainder in a partial taking of a property. Generally, the difference between the value of the whole property before the taking and the value of the remainder after the taking is the measure of the value of the part taken and the damages to the remainder. There are recognized two types of damages: consequential and severance.

Damages, consequential – A damage to property arising as a consequence of a taking and/or construction on other lands. In many states the owner may be compensated for damage as a consequence of a change in grade of a street which adversely affects ingress to and egress from the affected property. The owner may not be compensated for damage to business, frustration, and loss of good will which result as a consequence of a taking or construction by the government.

Damages, severance – Loss in value of the remainder of a parcel resulting from an acquisition. Sometimes called indirect damages.

Damages to remainder – Loss in value of the remainder of a parcel resulting from acquisition of a part of the property.

Dedication – To dedicate means to appropriate and set apart land from one's private property to some public use. The dedication may be either express or implied. It is express when there is an express manifestation on the part of the owner of his purpose to devote the land to a particular public use, such as the streets in platted subdivisions. It is implied when the owner's acts and conduct manifest an intention to devote the land to the public use. To make the dedication complete, there must not only be an intention on part of the owner to

set apart the land for the use and benefit of the public, but there must be an acceptance by the public.

Deeds – A deed is evidence in writing of an executed and delivered contract, usually for sale of land. As pertaining to land, its purpose is to define location and title to land. Several types exist. (1) Grant Deed. A grant deed conveys the fee title of the land described and owned by the grantee. If at a later date the grantor acquires a letter title to the land conveyed, the grantee immediately acquires the better title without formal documents (after rights). In some states, by law, the grantor warrants the deed against acts of his own volition. (2) Quitclaim Deed. A quitclaim deed passes on to the grantee whatever title the grantor has at the time at which the transaction is consummated. It carries no after rights; i.e. if the grantor acquires a better title at a later date, it is not passed on to the grantee. The deed carries no warranties on the part of the grantor. (3) Agreement Deed. An agreement deed is an agreement between owners to fix a disputed boundary line. (4) Warranty Deed. A warranty deed conveys fee title to the land described to the grantee and in addition guarantees the grantor to make good the title if it is found lacking.

Easement – A nonpossessing interest held by one person in land of another whereby the first person is accorded partial use of such land for a specific purpose. An easement restricts but does not abridge the rights of the fee owner to the use and enjoyment of his land. Easements fall into three broad classifications, which are easement, surface; easement, subsurface; easement, overhead.

Easement, overhead – The right to use the space at a designated distance above the surface of the land; as for power lines, aviation, and air rights.

Easement, subsurface – The right to use the land at a designated distance below the surface of the land; as for pipelines, electric and telephone circuits and cables, storage facilities, etc.

Easement, surface – The right to use only the surface of the land; as for easements of access, flowage, or for rights of way.

Eminent domain – The right by which a sovereign government, or some person acting in its name and under its authority, may acquire private property for public or quasi-public use upon payment of reasonable compensation and without consent of the owner. See also condemnation. The right or power of the government to take private property for public use on making just compensation therefor.

Entry, right of survey – The right to enter property temporarily to make surveys and investigations for proposed improvements.

Monument – A physical structure that marks the location of a corner or other survey point. In public-land surveys, the term "corner" is employed to denote a point determined by the surveying process, whereas the "monument" is the physical structure erected to mark the corner point upon the earth's surface. Monument and corner are not synonymous, though the two terms are often used in the same sense.

Parcel – parcel generally refers to a piece of land that cannot be designated by lot number.

Plat – A diagram drawn to scale showing all essential data pertaining to the boundaries and subdivisions of a tract of land, as determined by survey or protraction.

Property – That which is peculiar or proper to any person; that which belongs exclusively to one; more specifically, ownership; the unrestricted and exclusive right to a thing. The word is also commonly used to denote everything which is the subject of ownership, corporeal or incorporeal, tangible or intangible, everything that has an exchangeable value or which goes to make up wealth or estate.

Right of access – The right of ingress to a highway from abutting land and egress from a highway to abutting land.

Right of entry – The right acquired to enter on private property for a specific reason or purpose.

Right-of-way – Any strip or area of land, including surface, overhead, or underground, granted by deed or easement, for construction and maintenance according to designated use, such as for drainage and irrigation canals and ditches; electric power, telegraph, and telephone lines; gas, oil, water, and other pipe lines; highways, and other roadways, including right of portage; sewers; flowage or impoundment of surface water; and tunnels.

Title search – The checking or reviewing of all documents affecting the ownership of a piece of property.

Questions and Answers About Right-of-Way Acquisition

Acquisition of Right-of-Way

What is right-of-way?

In this usage, "right-of-way" is land owned, dedicated to or purchased by an Agency for Public Works projects that have been developed to serve the needs of the citizens of the City.

A right-of-way must be wide enough to contain the travel lanes, shoulders, drainage facilities and, where provided, sidewalks. At intersections, right-of-way needs may be greater because of turning lanes and safety requirements.

When will I know how much of my property is needed?

The exact alignment of a road and which properties will be affected can only be determined after public meetings are held, and the final design and right-of-way plans are approved. Participation in public meetings will help you to know how the project is developing and some of the possible options. The law requires that the details of right-of-way acquisition be discussed only after the exact amount of right-of-way has been identified and the amount of "just compensation" determined.

After the right-of-way plan is approved by the City Council, it is made available for public review at the City. When the appraisal has been completed and reviewed, a right-of-way agent will contact you and explain in detail the scope of the project, how the project will impact you and the "just compensation" determined for your property. The agent will address any questions and/or concerns you have about the project or compensation.

May I donate the property instead of selling it?

yes, if you decide to give the City the necessary property without compensation, this can easily be arranged. Such transactions may provide you with tax benefits and can save the City the costs of appraisals and acquisitions, as well as property costs. If you are considering donation, please notify the right-of-way agent early in the process.

What is to guarantee that I'm being treated fairly?

All real estate property owners are guaranteed fair market value under the Fifth Amendment of the U.S. Constitution.
Fair market value is determined by a local, independent, qualified real estate appraiser and must be supported by ample market evidence.
Just compensation is the payment of fair market value for real estate and improvements needed for public projects.

How is the amount of just compensation determined?

Your property will be appraised to determine its fair market value. This is defined as the amount of money that would be paid for the property by a willing and informed buyer

(who does not have to buy) to a willing and informed seller (who does not have to sell). Many factors influence fair market value. An appraiser will carefully inspect the home, business or property that will be needed. You will be invited to join the appraiser when he/she visits your property. The appraiser will try to arrange a time that is convenient to both of you. It is to your advantage to point out feature that you feel affect the value of your property.

Who prepares the appraisal?

Appraisals are prepared by an independent appraiser. In all cases, the appraiser will have considerable training and experience. The appraisal report is reviewed by a separate review appraiser. If the appraisal is sound and adequately supported, the review will prepare a Determination of Value (DV), which states the amount of just compensation.

How will I learn how much I am due?

The City right-of-way agent will present an official offer to you and will answer any questions you have concerning the offer. The offer will be for the amount stated as "just compensation" in the Determination of Value.

Who pays the cost of the sale?

The City pays for all costs related to the purchase of the required property.

What if I feel the offer is too low?

Explain to the right-of-way agent why you feel you should receive a higher amount. Point out any items of value you believe were overlooked in the appraisal. The City may reconsider its offer if you show good reason for such a change.

Easements

How is an easement established?

A typical method of establishing an easement is through a deed or by dedication in the form of an easement document. The deed or easement document describes the property to be used for a specific purpose. The easement document is signed by the agreeing property owner; it is then recorded at the County. Once the easement is recorded, it will be noted on the property title report.

How does an easement affect how I use my property?

The property owner still maintains the right to use and enjoyment of the property but such use and enjoyment cannot interfere with the easement rights. Construction of a permanent natures, such as a garage built in the easement that interferes with maintenance and repair of the utility, would be considered as an encroachment, if indeed the structure was built after the easement was obtained.

What is a temporary construction easement?

A temporary construction easement is just that - the temporary use of a property for construction purposes. Such an easement is only applicable for the duration noted in the easement, usually until all construction has been completed. The temporary easement is usually included in the language of the permanent easement document. A temporary

easement is typically larger in size than the permanent easement. The reason for the larger size is to permit construction of the water or sewer line in the easement. Installation normally requires larger equipment than maintenance does.

What happens to the easement when I sell my property?

The recorded easement will be noted on the property title and will remain on the title after you sell. The easement essentially becomes part of the property.