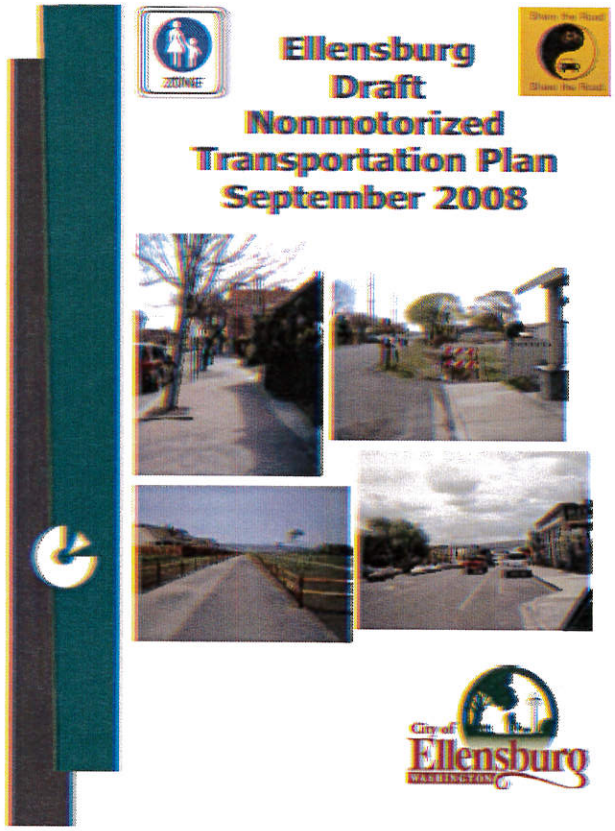
# NMT Code Committee Report




Nancy Lillquist, Committee Chair
Sarah Bedsaul, Committee Member

December 15, 2010

EXHIBIT M32

# Background

- Purpose
  - Implement the 2007 Comprehensive Plan and 2008 Non Motorized Transportation Plan
- Members
- Where are we now?
- Where are we going?

# Environmental Impacts from Transportation

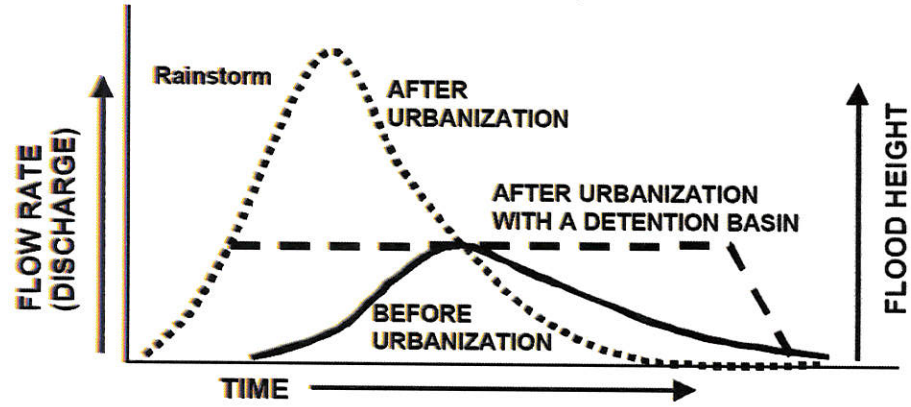
- Hydrologic Modification
- Water Quality
- Air Quality
- Noise
- Habitat Modification

# Hydrology

## Hydrologic Impacts

- Increased impervious surfaces.
- Concentrated runoff, increased flooding.
- Shoreline modifications.
- Loss of wetlands.

**Figure 4-3: Impact of Urbanization and Mitigation on Runoff Rates**




Source: Adapted from Harbor, J. "A Practical Method for Estimating the Impact of Land Use Change on Surface Runoff, Groundwater Recharge and Wetland Hydrology. *Journal of the American Planning Association*. 60: 1, Winter 1994. pp. 95-108.

# Water Quality

## Water Pollution sources:

- Crankcase oil drips and disposal.
- Road de-icing (salt) damage.
- Roadside herbicides.
- Leaking underground storage tanks.
- Air pollution settlement.

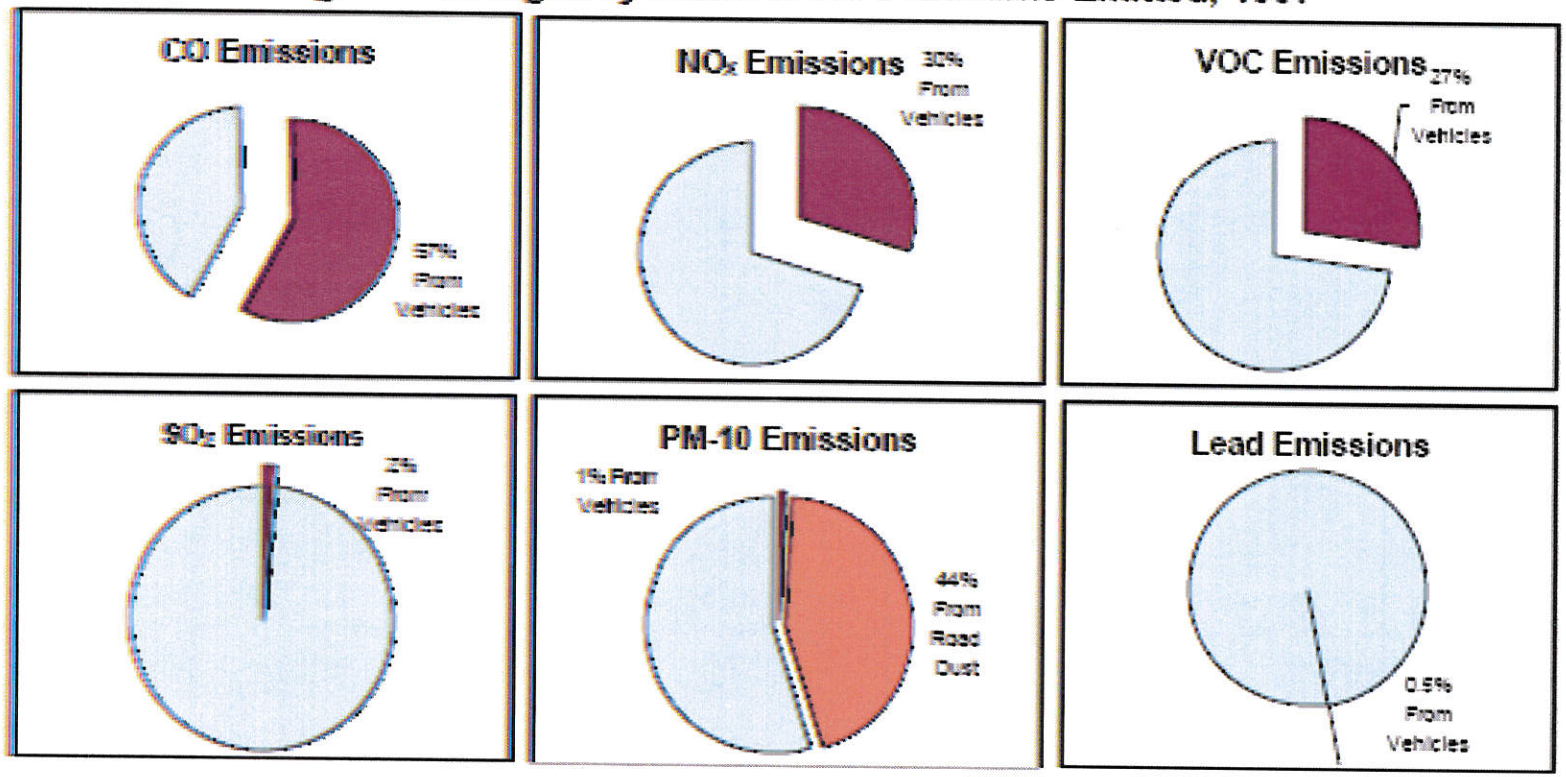
***Table 5.15.3-1*** **Pollution Levels in Road Runoff Waters** (micrograms per litre)[5]

| Pollutant | Urban | Rural | Pollutant | Urban | Rural |
|---|---|---|---|---|---|
| Total suspended solids | 142.0 | 41.0 | Nitrate + Nitrite | 0.76 | 0.46 |
| Volatile suspended solids | 39.0 | 12.0 | Total copper | 0.054 | 0.022 |
| Total organic carbon | 25.0 | 8.0 | Total lead | 0.400 | 0.080 |
| Chemical oxygen demand | 114.0 | 49.0 | Total zinc | 0.329 | 0.080 |

*Transportation Cost and Benefit Analysis II – Water Pollution,* Victoria Transport Policy Institute (www.vtpi.org)

# Air Quality

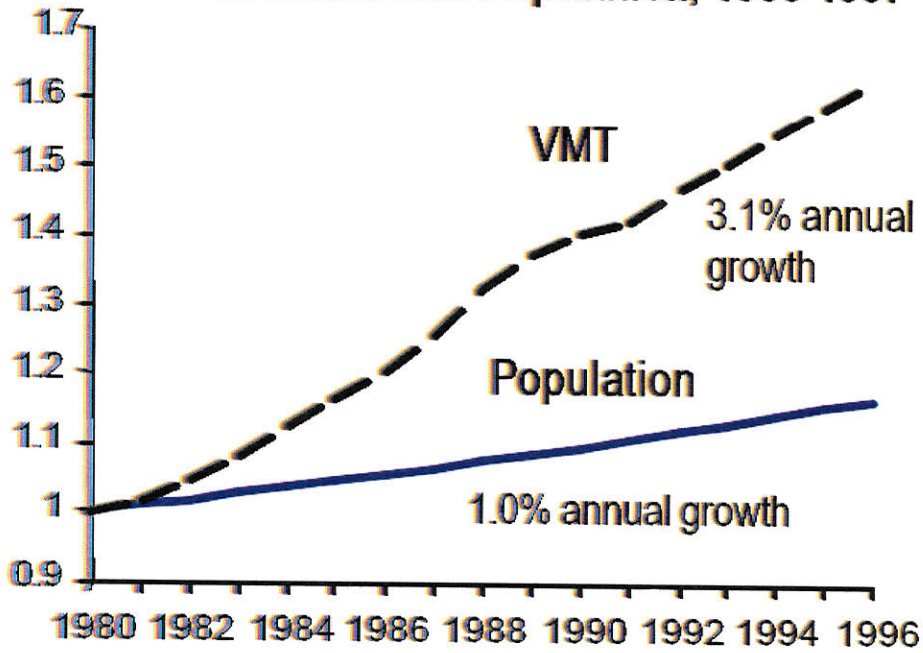
Figure 3-3: Highway Share of Air Pollutants Emitted, 1997




Note: percentages are based on anthropogenic emissions, except for PM-10, which includes natural emissions.
Source: U.S. Environmental Protection Agency. *National Air Pollutant Emissions Trends, 1900-1997*. 1999.

# Vehicle Miles Traveled

**Figure 3-1: Growth in Vehicle Miles of Travel and Population, 1980-1997**




Scale: 1980 value = 1.0

Sources: U.S. Department of Transportation, Federal Highway Administration. *Highway Statistics (Summary to 1995*, and annual editions, *1996* and *1997)*, Washington, DC.

# Building to Reduce Negative Impact

Certain characteristics of the built environment are associated with beneficial environmental results.

1) Compact development (LDCU)
2) Reduced impervious surfaces and improved water detention
3) Safeguarding of environmentally sensitive areas (CAO)
4) Mixed land uses (LDCU)
5) Transit accessibility (LDCU/NMT)
6) Support for pedestrian and bicycle activity and other micro-scale urban design factors

From: "Our Built and Natural Environments," EPA 2001

# Reduce Impervious Surface

Modify street standards and parking requirements (LDCU)

1. Reduce street widths
2. Include vegetated swales

From: "Our Built and Natural Environments," EPA 2001

# Ellensburg Subdivision Example

| | Street Width (ft) | Street System Length (ft) | Impervious Surface (sq ft) |
|---|---|---|---|
| Existing Condition: | 36 | 4,594 | 165,384 |
| What if..."Skinny Streets?" | 28 | 4,594 | 128,632 |
| *Reduced Impervious Surface* | | | *36,752* |
| | | | 22% |
| Added Ped-Bike Connector (pathway) | 12 | 158 | 1,896 |
| Skinny Street + Pathway | | | 130,528 |
| *Reduced Impervious Surface* | | | *34,856* |
| | | | 21% |

Curb/Sidewalk dimensions held constant

Transpo Group

# Support biking and walking

- Street connectivity
- Street design
- Building orientation and design (LDCU)

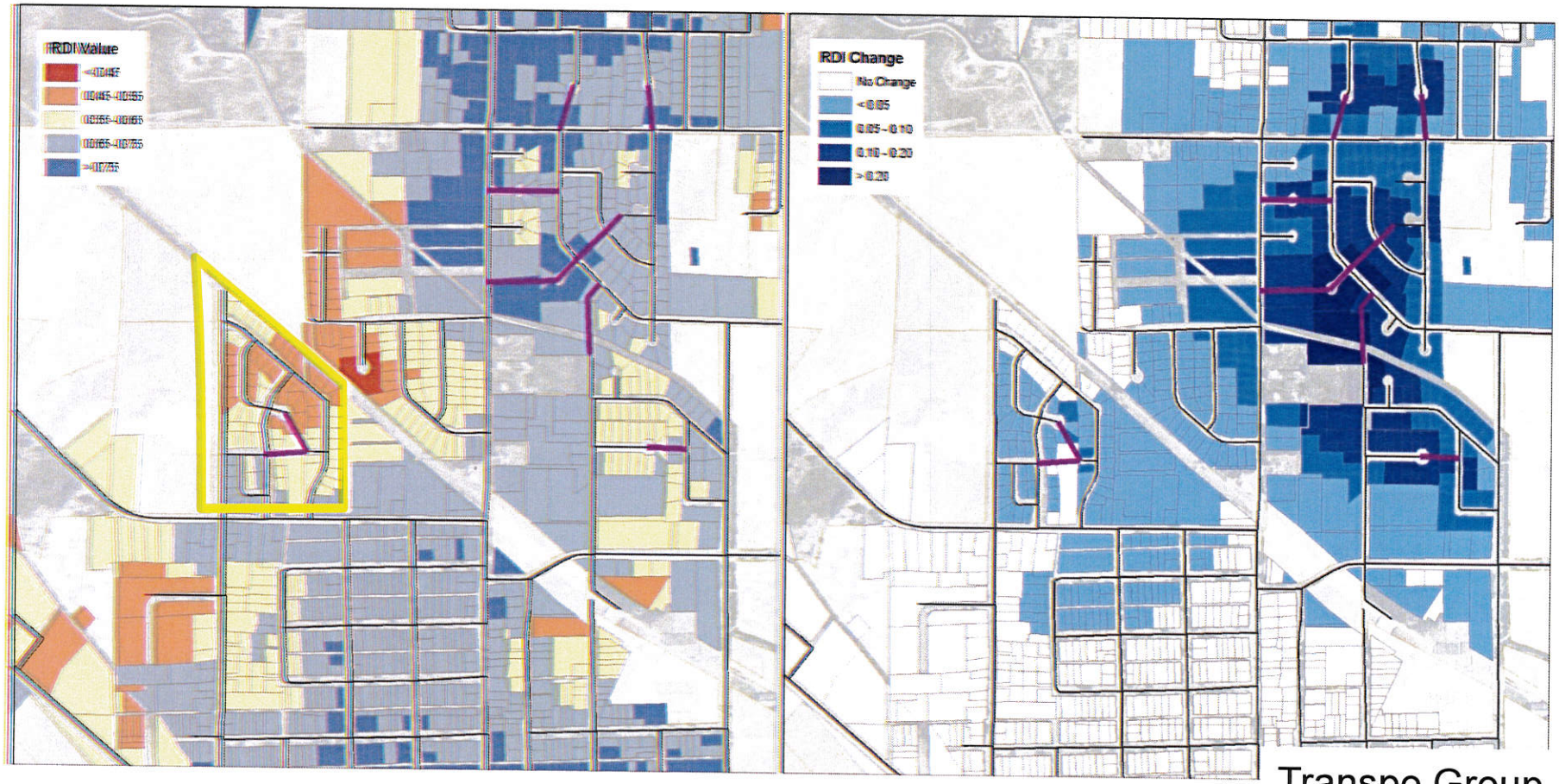
# Some Land Use Impacts on Travel

| Factor | Definition | Travel Impacts |
|---|---|---|
| Connectivity | Degree that walkways and roads are connected and allow direct travel between destinations. | Improved roadway connectivity can reduce vehicle mileage, and improved walkway connectivity tends to increase walking and cycling. |
| Roadway design and management | Scale, design and management of streets. | More multi-modal street design and management increases use of alternative modes. Traffic calming tends to reduce vehicle travel and increase walking and cycling. |
| Walking and Cycling conditions | Quantity and quality of sidewalks, crosswalks, paths and bike lanes, and the level of pedestrian security. | Improved walking and cycling conditions increases nonmotorized travel and can reduce automobile travel, particularly if implemented with land use mix, transit improvements, and incentives to reduce driving. |

From: Litman 2006, as reported in Victoria Transport Policy Institute TDM Encyclopedia

# Connectivity Metric

**What if stronger code used?** **Improvement**




Transpo Group

# Typical Elasticities of Travel With Respect to the Built Environment

| Factor | Description | Trips | VMT |
|---|---|---|---|
| Local Density | Residents and employees divided by land area. | -0.05 | -0.05 |
| Local Diversity (Mix) | Jobs/residential population | -0.03 | -0.05 |
| **Local Design** | **Sidewalk completeness/route directness and street network density.** | **-0.05** | **-0.03** |
| Regional Accessibility | Distance to other activity centers in the region. | -- | -0.20 |

From: Ewing and Cervero 2002, as reported in as reported in Victoria Transport Policy Institute TDM Encyclopedia

# Walkability and Driving

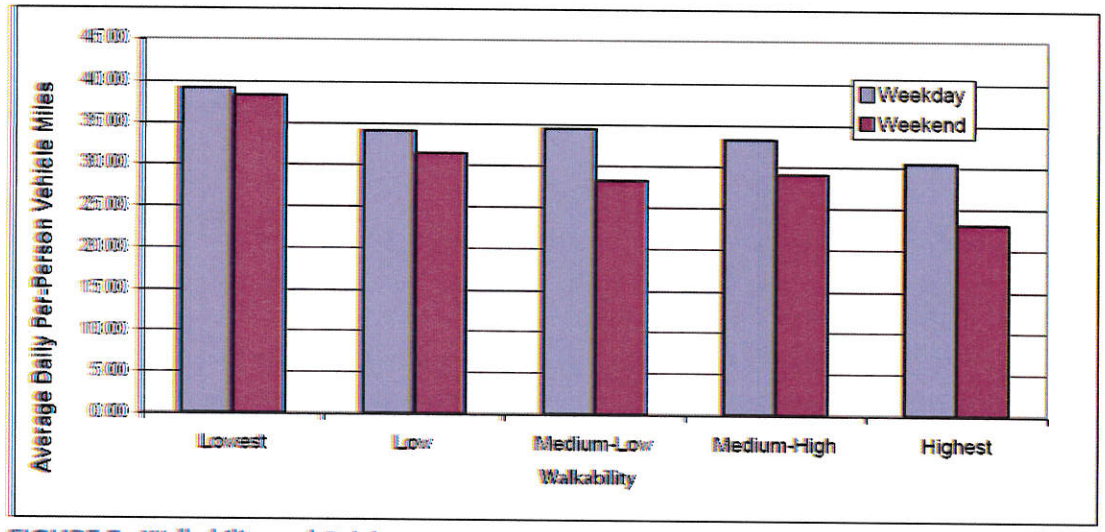



FIGURE 7 - Walkability and Driving

"Residents in the most walkable neighborhoods drive about 30 percent less on weekdays and 40 percent less on the weekend than their counterparts in low-walkability neighborhoods."

NEW DATA FOR A NEW ERA *A Summary of the SMARTRAQ Findings* Linking Land Use, Transportation, Air Quality and Health in the Atlanta Region

# Some other studies…

- Residents in a pedestrian friendly community walked, bicycled, or rode transit for 49% of work trips and 15% of their non-work trips, 18- and 11-percentage points more than residents of a comparable automobile oriented community (Cervero and Radisch, 1995).
- Walking is three times more common in a community with pedestrian friendly streets than in otherwise comparable communities that are less conducive to foot travel (Moudon, *et al*, 1996).

# Walkability and Air Quality

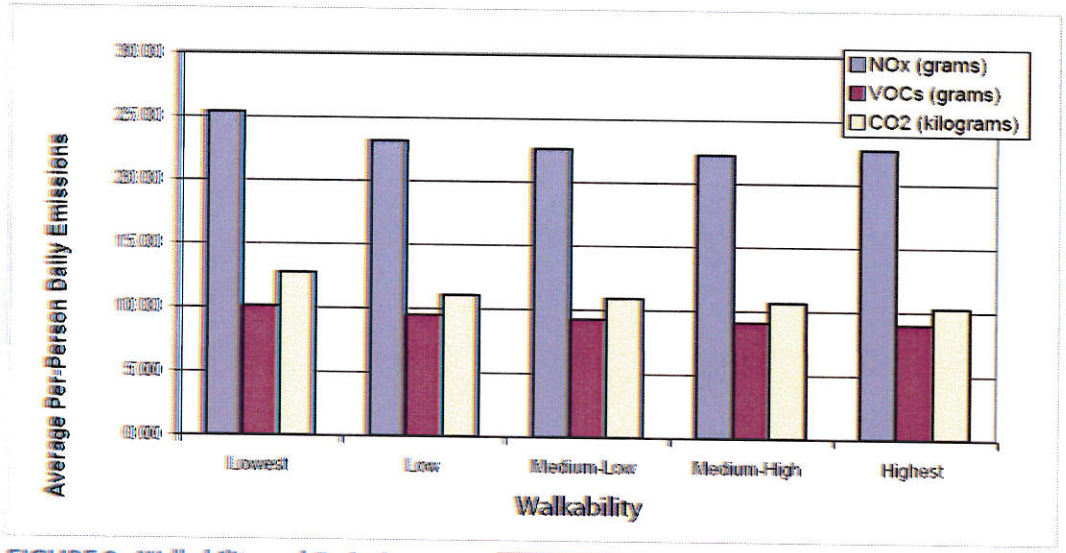



FIGURE 9 - Walkability and Emissions

"Each step up the five-part (quintiled) walkability scale was associated with a 6 percent reduction in NOx and a 3.7 percent reduction in VOC."

"The travel patterns of residents of the least walkable neighborhoods result in about 20 percent higher CO2 emissions than travel by those who live in the most walkable neighborhoods. That comes to about 2,000 more grams of CO2 per person each weekday."

NEW DATA FOR A NEW ERA *A Summary of the SMARTRAQ Findings* Linking Land Use, Transportation, Air Quality and Health in the Atlanta Region

# Overview

- Connectivity
- Street Design
  - Arterial
  - Local
  - Connector
- Other

# Connectivity: Problem

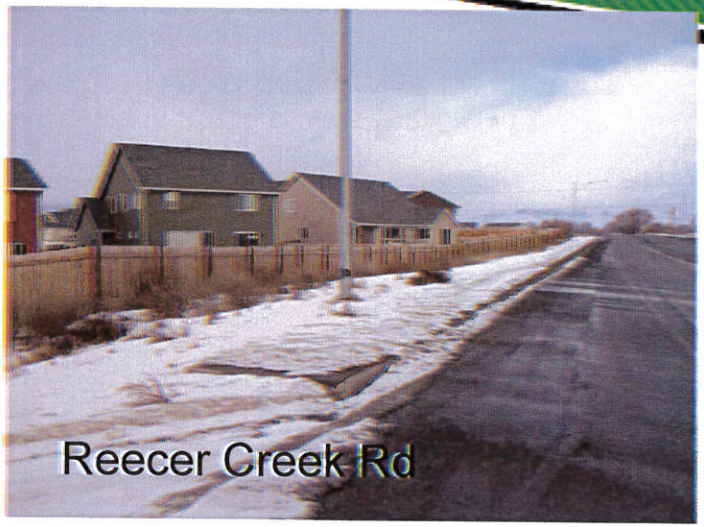
# Connectivity: Recommendations

- Comprehensive plan mapping
- Barriers to grid exist
- Recommended street intervals
- Cul de sacs
- Gated Communities

# Arterial Streets

**Intent:** Provide safe and attractive Arterial Streets to facilitate movement of motorized and non-motorized traffic through the City and to regional and community destinations. As mobility is the primary function of the Arterial Streets, access to property may be limited to accommodate traffic flow.

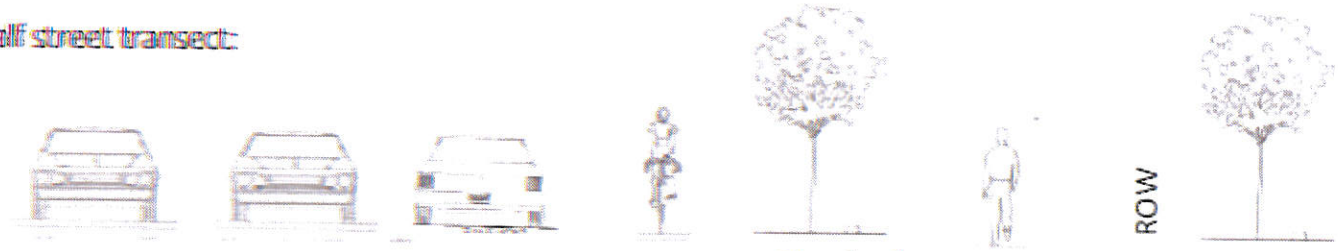
# Arterial Streets: Problem



# Arterial Street Recommendation

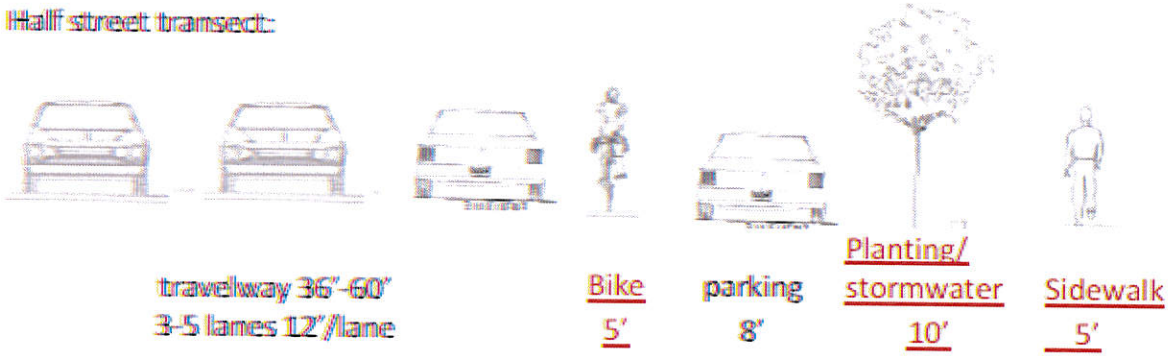
**Recommended Design #1 for Commercial (except CC1), industrial, multi-family residential zones**
80-104 ROW plus 10' landscaping each side;

Half street transect:




**Recommended Design #2 for single-family residential zones**
92-116 ROW

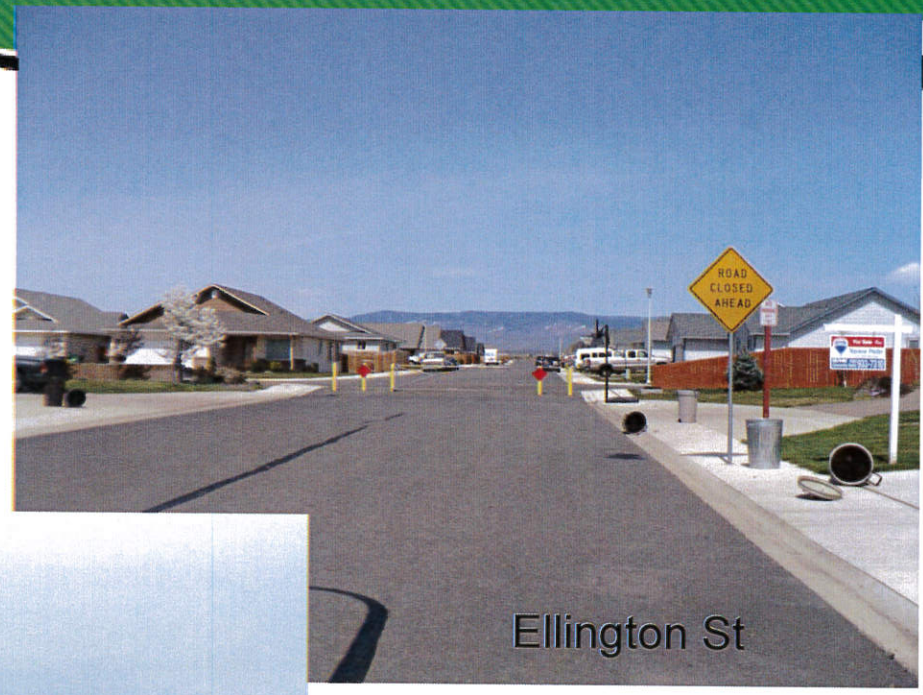
Half street transect:



# Local Streets

**Intent:** Provide safe and attractive local streets to access adjacent property. Discourage through traffic and speed. Convenience to the motorist is secondary to the safety and enjoyment of the residents.

# Local Streets: Problem

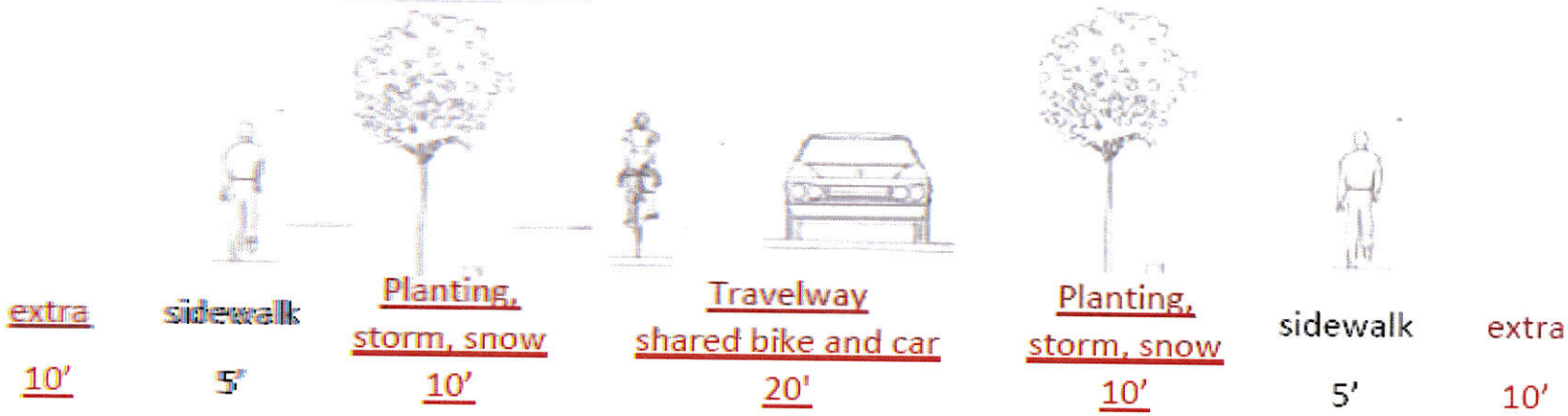



Ellington St

Indiana St

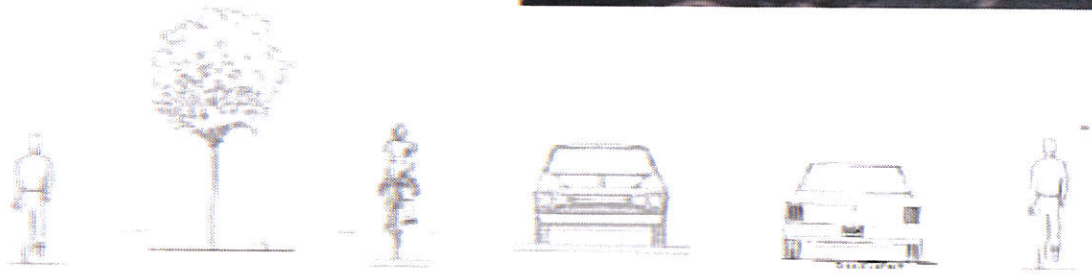
# Local Street: 20 ft

**Option #1 -- 20' pavement no parking**



# Local Street: 24 ft

Option #2 -- 24' pavement parking one side



| extra | sidewalk | Planting, stormwater, snow | Travelway shared bike and car queuing required | parking | sidewalk | extra |
|---|---|---|---|---|---|---|
| 7.5' | 5' | 10' | 17' | 7' | 6' | 7.5' |

# Local Street: 30 ft

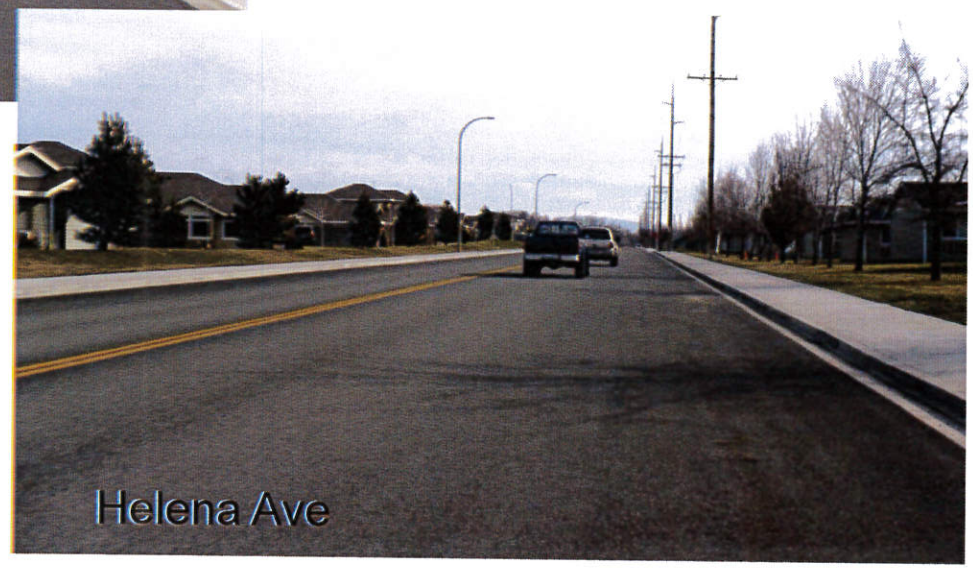
Option #3 -- 30' pavement parking both sides

| extra | side walk | Planting, stormwater, snow | parking | Travelway shared bike and car queuing required | parking | side walk | extra |
|---|---|---|---|---|---|---|---|
| 4.5 | 5' | 10' | 7' | 16' | 7' | 6' | 4.5 |

# Collector Streets

**Intent:** Provide safe and attractive Collector Streets that balance mobility and access to encourage flow of traffic from neighborhoods and provide access to property.

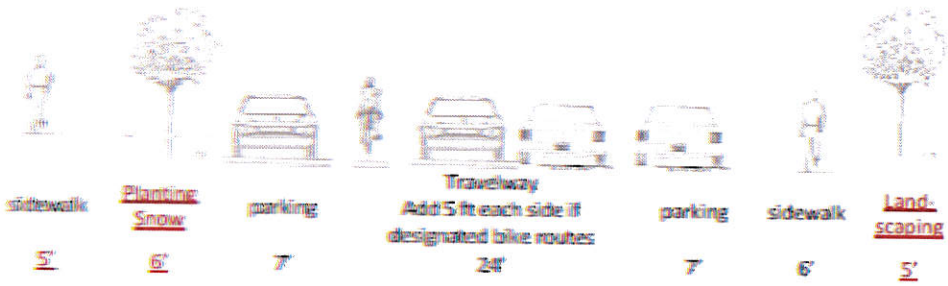
# Collector Streets: Problem



# Collector Streets: Recommendations

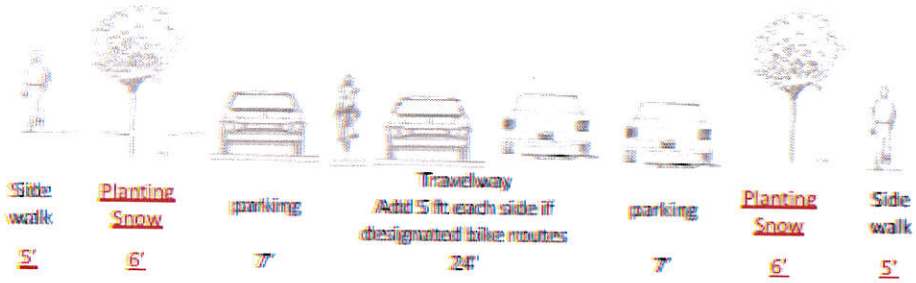
Option 1: Optional landscaping/trees on property-side of sidewalk or street side. *Arguments for: ease of maintenance, buffer from fences.*

**Collector Street Propose Standard, 60 ft ROW, 38 ft pavement**
Add 10 feet ROW and pavement if designated Bike Route



Option 2: Planting strip/trees on street side of sidewalk. *Arguments for: buffer pedestrians from traffic, symmetrical look.*

**Collector Street Propose Standard, 60 ft ROW, 38 ft pavement**
*Add 10 feet ROW and pavement if designated Bike Route*



# Other

- Multi Use Paths
- Bus Shelters
- Bike Facilities

| LOCAL STREET SUMMARY | | | | |
|---|---|---|---|---|
| | Existing Street | 20 ft option | 24 ft option | 30 ft option |
| Function | Access to property Through traffic discouraged | Access to property Through traffic discouraged | Access to property Through traffic discouraged | Access to property Through traffic discouraged |
| ROW | 50 ft | 60 ft | 60 ft | 60 ft |
| Pavement width | 38 ft | 20 ft | 24 ft | 30 ft |
| Spacing | >400 <1300 ft | 1/8 mile (660 ft) except where prevented by natural barriers or existing development | 1/8 mile (660 ft) except where prevented by natural barriers or existing development | 1/8 mile (660 ft) except where prevented by natural barriers or existing development |
| Intersection spacing | >400 <1300 ft | >150 <660 ft | >150 <660 ft | >150 <660 ft |
| PostedSpeed | 25 | 25 | 25 | 25 |
| Design Speed | 30 | 30 | 30 | 30 |
| Street Length | Cul-de-sacs <500 ft and <40 lots | <1/2 mile; Cul-de-sacs prohibited except limited circumstances <500 ft and <40 lots | <1/2 mile; Cul-de-sacs prohibited except limited circumstances <500 ft and <40 lots | <1/2 mile; Cul-de-sacs prohibited except limited circumstances <500 ft and <40 lots |
| Radii | Curb radii 20 ft Centerline 30 mph | Curb radii 20 ft Centerline 30 mph | Curb radii 20 ft Centerline 30 mph | Curb radii 20 ft Centerline 30 mph |
| Curbs | Rolled curb | Full curb and gutter | Full curb and gutter | Full curb and gutter |
| Driveways | See standards for design requirements | See standards for design requirements | See standards for design requirements | See standards for design requirements |
| Bicycles | Shared use | Shared use | Shared use | Shared use |
| Pedestrians | Sidewalk both sides 5 ft | Sidewalk both sides 5 ft | Both sides 5 ft separated 6 ft adjacent | Both sides 5 ft separated 6 ft adjacent |
| Planting strips | Optional 6-10 ft | 10 ft Both sides | 10 ft South and west side | 10 ft South and west side |
| Parking | Both sides | No parking | One side | Both sides |
| Queuing | No | No | Yes | Yes |
| Estimated Cost per lineal foot | $373.41 | $323.52 Plus off-street parking | $336.80 | $361.39 |

| COLLECTOR STREET SUMMARY | | |
|---|---|---|
| | Existing Collector | Proposed Collector |
| Function | NA | Mobility/Access<br>Neighborhood network |
| ROW | 60 ft | 60 ft |
| Pavement width | 44 ft | 38 ft |
| Spacing | NA | ¼ mile except where prevented by natural barriers or existing development |
| Intersection spacing | >400 <1200 ft | >150 <660 ft |
| Street Length | NA | <1 mile |
| Radii | Curb radii 25 ft<br>Centerline 40 mph | Curb radii 25 ft<br>Centerline 40 mph |
| Curbs | Full curb and gutter | Full curb and gutter |
| Driveways | Permitted but backing prohibited, must provide turnaround; see standards for design requirements | Permitted but backing prohibited, must provide turnaround; see standards for design requirements |
| Bicycles | Add 10 ft ROW and pavement on designated routes or optional separated paths; shared use on undesignated streets | Add 10 ft ROW and pavement on designated routes or optional separated paths; shared use on undesignated streets |
| Pedestrians | Sidewalk both sides<br>6 ft | 5 ft separated<br>6 ft adjacent |
| Planting strips | Optional 6-10 ft | Minimum 6 ft south and west sides<br>option for wider sidewalk and trees in grates in commercial/ mixed-use areas |
| Parking | Both Sides | Both Sides |
| Frontage | NA | Front facing encouraged |
| Estimated Cost per lineal foot | $432.41 | $392.28 |

| ARTERIAL STREET SUMMARY | | | |
|---|---|---|---|
| | Existing Arterial | Principal Arterial | Minor Arterial |
| Function | NA | Mobility<br>Regional network | Mobility<br>Community network |
| ROW | 80 ft | 5 lane: 104 feet commercial-industrial-MF Res; 116 feet SF residential | 3 lane: 80 feet commercial-industrial-mf res; 92 feet sf residential |
| Pavement width | 46 ft | 5 lane: 70 ft commercial-industrial-MF Res<br>86 ft SF Residential | 3 lane: 46 ft Com-ind-MF Res<br>62 ft SF Res |
| Spacing | As designated | As designated | As designated |
| Intersection spacing | >400 <1200 ft | >150 <660 ft | >150 <660 ft |
| Street Length | NA | Through city to regional destinations | Through city to local destinations |
| Radii | Curb radii 30 ft<br>Centerline 40 mph | Curb radii 30 ft<br>Centerline 40 mph | Curb radii 30 ft<br>Centerline 40 mph |
| Curbs | Full curb and gutter | Full curb and gutter | Full curb and gutter |
| Driveways | SF zones discouraged | SF zones discouraged<br>Commercial-industrial-MF Res >500 ft | SF zones discouraged<br>Commercial-industrial-MF Res >500 ft |
| Bicycles | Add 10 ft ROW or designated routes or optional separated paths | Add 10 ft ROW and pavement (except Main St) or optional separated paths | Add 10 ft ROW and pavement (except Main St) or optional separated paths |
| Pedestrians | Sidewalk both sides<br>7 ft | Sidewalk both sides<br>7 ft | Sidewalk both sides<br>7 ft |
| Planting strips | Optional 6-10 ft | Both sides 10 ft; option for wider sidewalk and trees in grates in commercial/ mixed-use areas | Both sides 10 ft; option for wider sidewalk and trees in grates in commercial/ mixed-use areas |
| Parking | Both Sides except where prohibited | No Parking Com-Ind-RM Res Zones<br>Both sides SF Res<br>option for on-street parking in neighborhood commercial areas | No Parking Com-Ind-RM Res Zones<br>Both sides SF Res<br>option for on-street parking in neighborhood commercial areas |
| Frontage | Design Standards encourage front facing commercial buildings | <50% frontage fenced | <50% frontage fenced |
| Estimated Cost per lineal foot | $501.39 | | |