# Chapter iii: {Green Streets Prototypes}

The prototype standards establish ideal plans and sections for new streets.

***These prototypes should be followed when:***

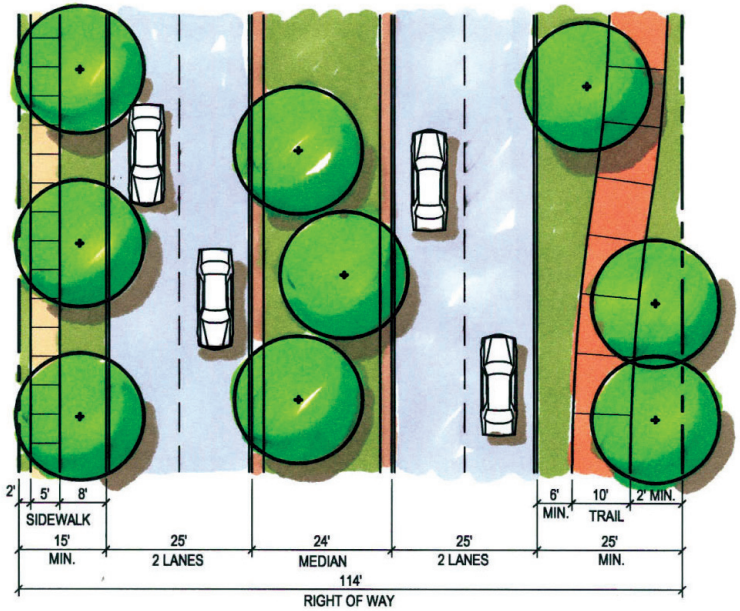
- New streets are built in corridors identified as part of the Green Streets system.
- Existing streets are widened or reconstructed, to the maximum degree permitted by right-of-way width or other corridor limitations.

The Green Streets prototypes also introduce the concept of "*complete streets*" to Omaha. Complete streets are street corridors designed to accommodate all types of transportation, including motor vehicles, bicycles, and pedestrian transportation. Some of the diagrams use sidepaths or parallel multi-use trails within the right-of-way to accommodate non-motorized users. Other concepts include bicycle lanes within the street channel itself, in combination with sidewalks for pedestrians. Various stakeholders have different points of view on which facilities work best for bicyclists, and preferences vary with individual bicyclists' experience level.

Sidepaths or separated pathways in the right-of-way move bicyclists out of the way of motor vehicles. This reduces the stress experienced by cyclists, and is favored by inexperienced riders who are uncomfortable with shared streets. On the other hand, sidepaths can create dangerous conditions at intersections and driveways, where most crashes occur. Many experienced riders and commuters prefer to share street channels, although preferably in facilities that provide enough room for both motorized and non-motorized vehicles. However, these facilities are less comfortable for young riders, families, and inexperienced cyclists. Application of these techniques should follow a subsequent Pedestrian and Bicycle Master Plan. These standards recognize that an ultimate complete street system for Omaha will make use of a number of design solutions, depending on contexts and the nature of users.

***The prototype standards address:***

- Multi-lane divided streets
- Five-lane streets with a continuous center left-turn median.
- Four-lane streets.
- Two and three-lane streets.
- Divided boulevards and parkways.

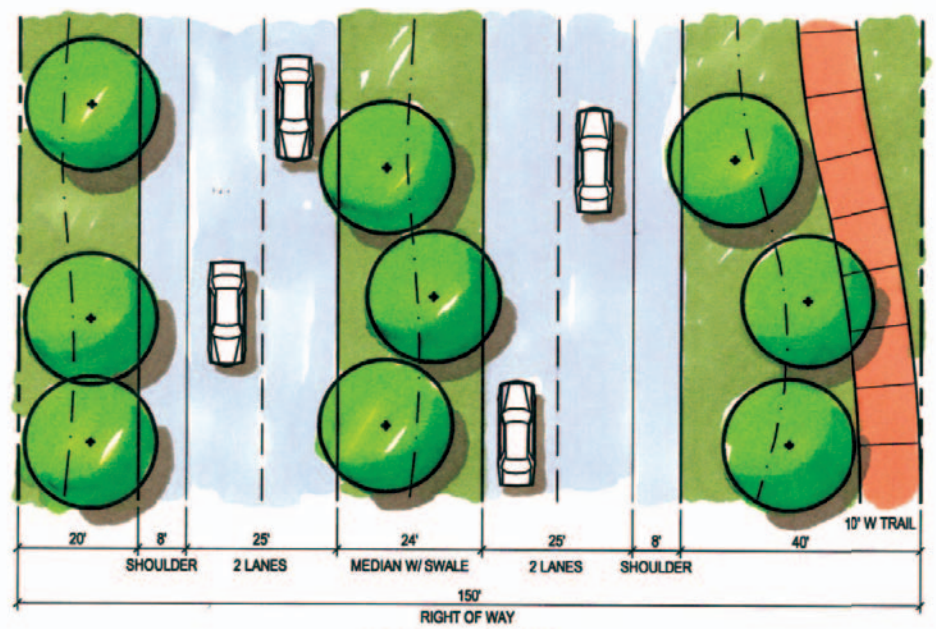



TRAIL ON ONE SIDE
4-LANE DIVIDED WITH 24' MEDIAN

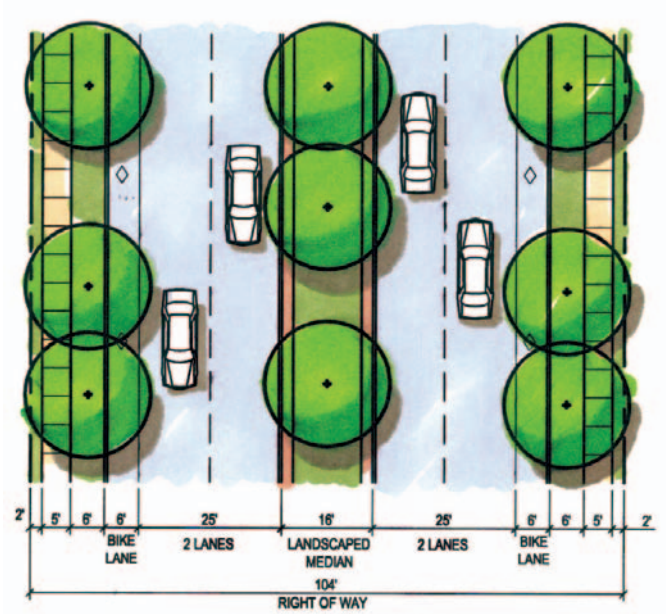
## {Multi-Lane Divided Sections}

***Prototype Characteristics:***

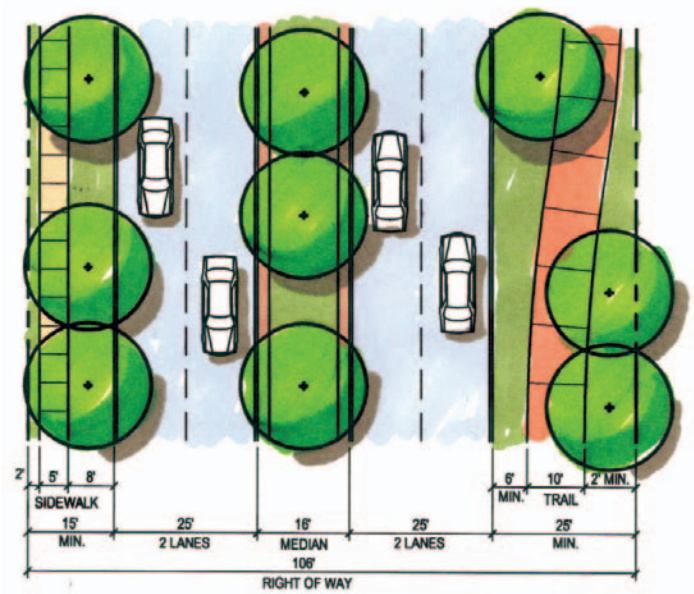
- Divided major arterials, with both urban and rural sections.
- Wide medians reflecting traffic volumes and possibility of double left-turn lanes.
- Minimum 8-foot sidewalk setbacks in urban section with regular street-tree plantings. Average street tree spacing should be no less than 40 feet on center.
- Multi-use trail is detached from paving surface. Trail may undulate within the right-of-way, with a minimum separation of 6 feet from the curb.
- Drainage swales should be incorporated into rural sections. Multi-use trail should be developed on opposite side of swale, adding to separation.




TRAIL ON ONE SIDE
4-LANE DIVIDED WITH RURAL SECTION




DEDICATED BIKE LANES
4-LANE WITH 16' MEDIAN




TRAIL ON ONE SIDE
4-LANE DIVIDED WITH 16' MEDIAN

## {Multi-Lane Divided Sections}

***Prototype Characteristics:***

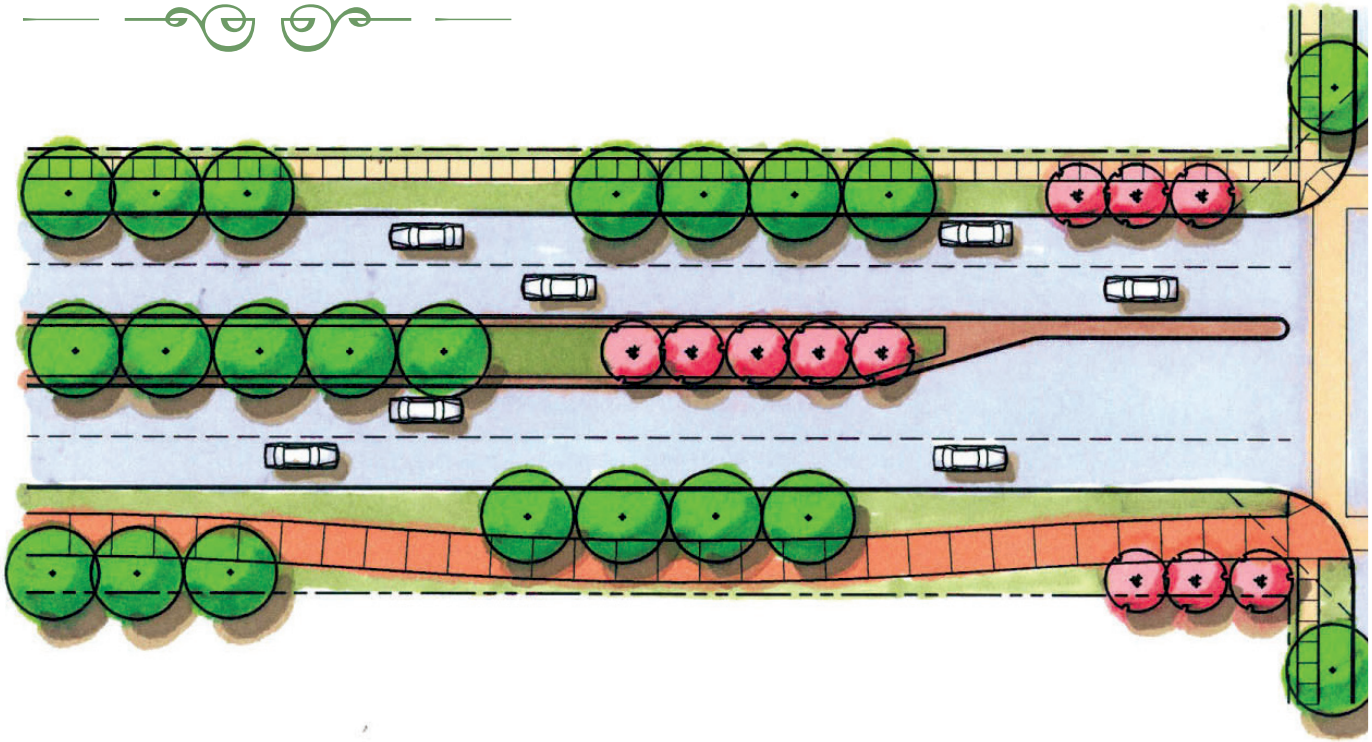
- Divided major and minor arterials with urban section.
- 16-foot median permits single left-turn lane.
- Minimum 8-foot sidewalk setbacks in urban section without bicycle lanes with regular street-tree plantings. Setback may be reduced to 6 feet with bicycle lane, with utilities installed under the lane. Average street tree spacing should be no less than 40 feet on center.
- Multi-use trail is detached from paving surface. Trail may undulate within the right-of-way, with a minimum separation of 6 feet from the curb.

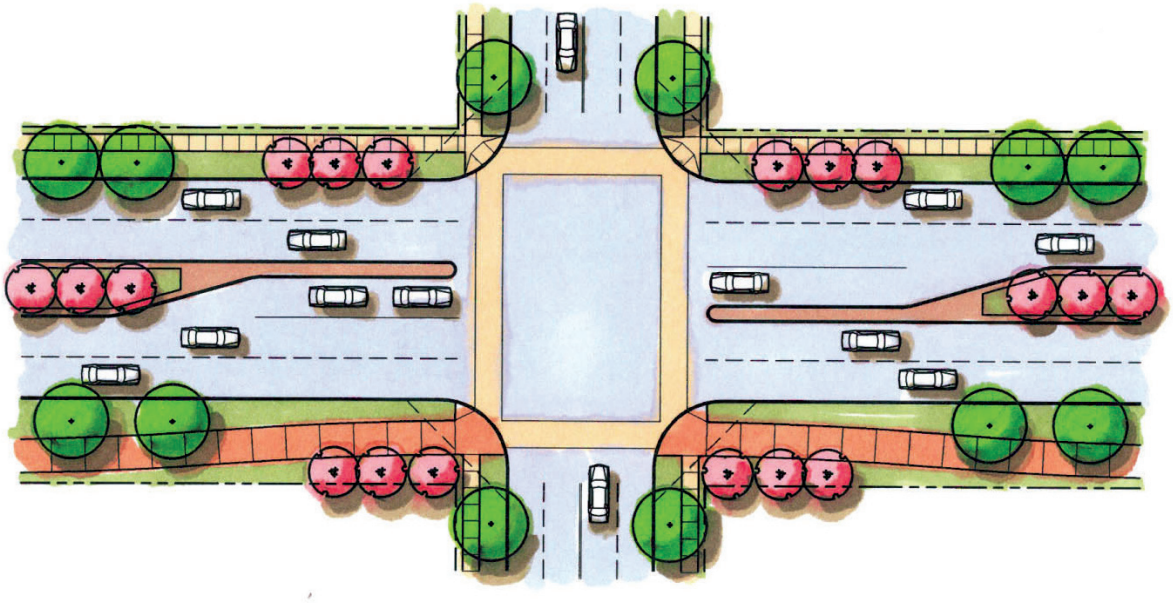
## {Multi-Lane Divided Section}

### Overall Road Segment and Landscaping

***Prototype Characteristics:***

- Ornamental plantings at median nose and near intersections
- Overstory trees away from intersection. Plantings either in groups or irregular spacings.
- Trees may be planted inside and outside of trail if trail undulates.



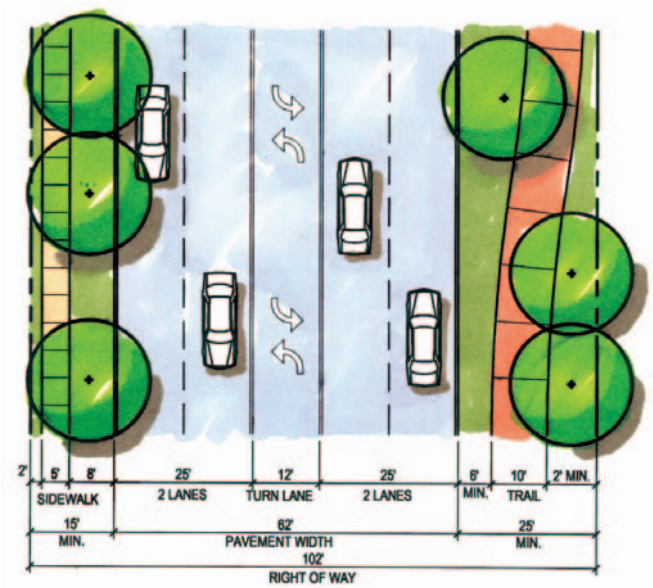


## {Multi-Lane Divided Section}

### Intersection Guideline

***Prototype Characteristics:***

- Multi-use trail crosses street at corner.
- Clear pavement markings or change in paving, color, or texture at major crosswalks.

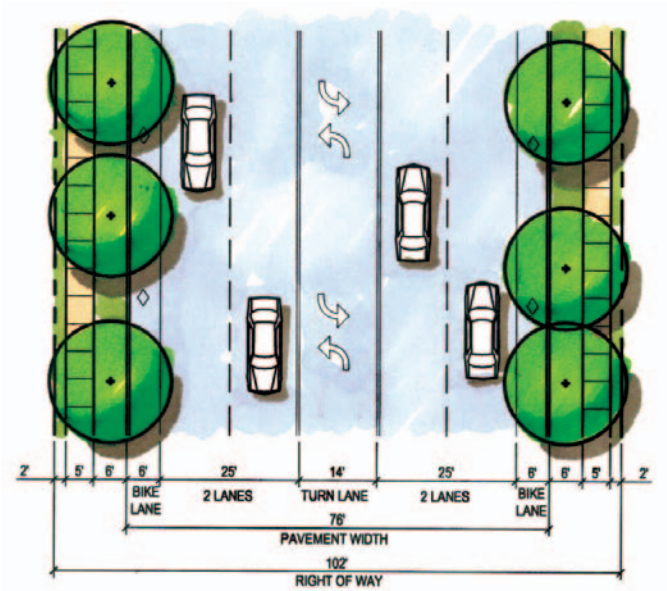



TRAIL ON ONE SIDE
5-LANE UNDIVIDED

## {Five-Lane Undivided Sections}

***Prototype Characteristics:***

- 5-lane major and minor arterials with urban section.
- Minimum 8-foot sidewalk setbacks in urban section without bicycle lanes with regular street-tree plantings. Setback may be reduced to 6 feet with bicycle lane, with utilities installed under the lane. Average street tree spacing should be no less than 40 feet on center.
- Multi-use trail is detached from paving surface. Trail may undulate within the right-of-way, with a minimum separation of 6 feet from the curb.
- Sidewalks may be built adjacent to property line.

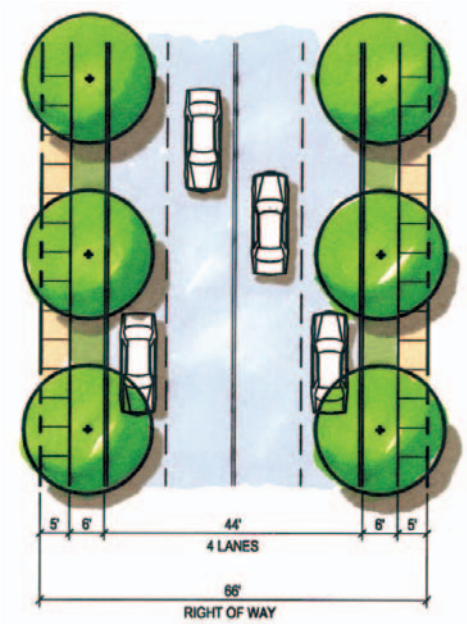



DEDICATED BIKE LANES
5-LANE UNDIVIDED

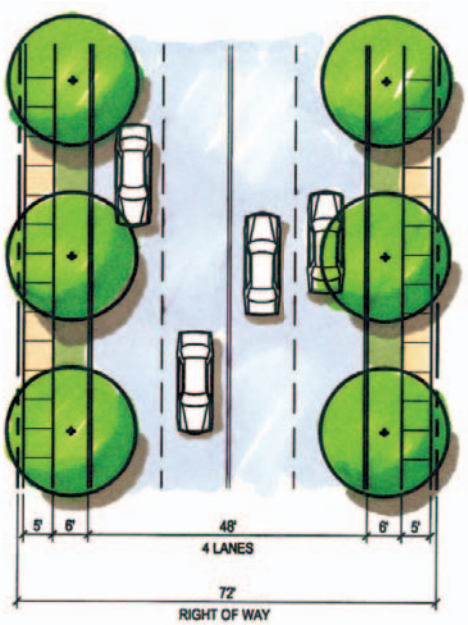
## {Four-Lane Undivided Sections}

***Prototype Characteristics:***

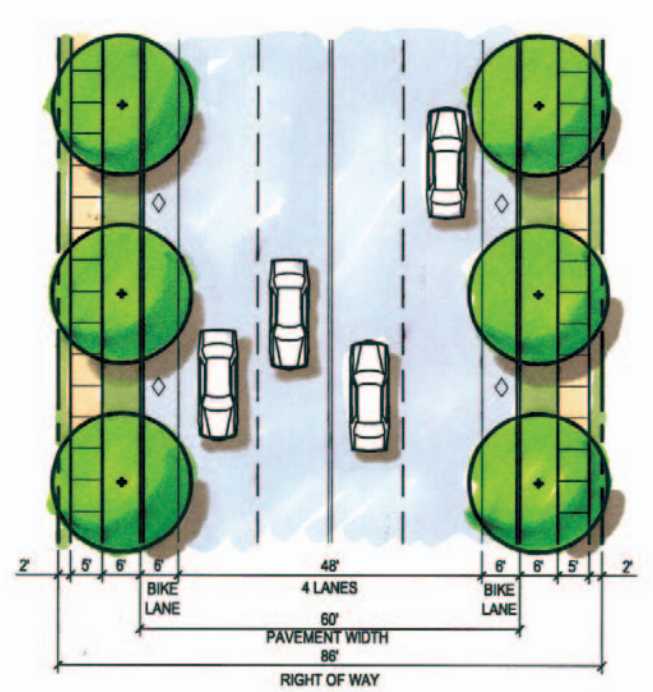
- 4-lane minor arterials with urban section.
- Minimum 6-foot sidewalk setbacks with regular street-tree plantings. Average street tree spacing should be no less than 40 feet on center.
- Complete street treatment in 72-foot ROW provides 11 foot inside lanes and 13 foot outside lanes for shared traffic.
- Sidewalks may be built adjacent to property line.




4-LANE UNDIVIDED
66' RIGHT OF WAY




4-LANE UNDIVIDED INDUSTRIAL
WITH WIDE CURB LANE
72' RIGHT OF WAY



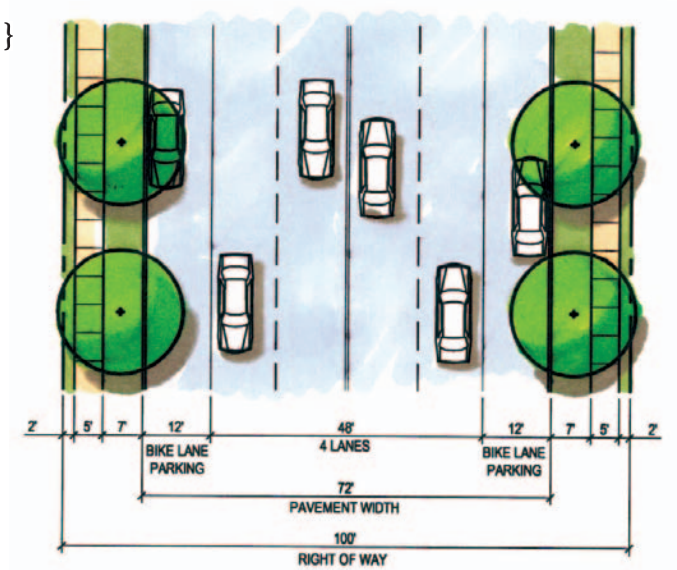

DEDICATED BIKE LANES
4-LANE UNDIVIDED

## {Four-Lane Undivided Sections}

### Complete Street Options

***Prototype Characteristics:***

- 4-lane minor arterials in 86–100 foot ROW.
- Minimum 7-foot sidewalk setbacks with regular street-tree plantings with shared bicycle/parking shoulder. Average street tree spacing should be no less than 40 feet on center.
- Minimum 6-foot sidewalk setbacks with lane in narrower ROW. Average street tree spacing also should be no less than 40 feet on center.
- Prototypes assume 12-foot lanes. Lane width may be reduced to 11 feet to accommodate other dimensions. Sidewalks also may be built adjacent to property line.

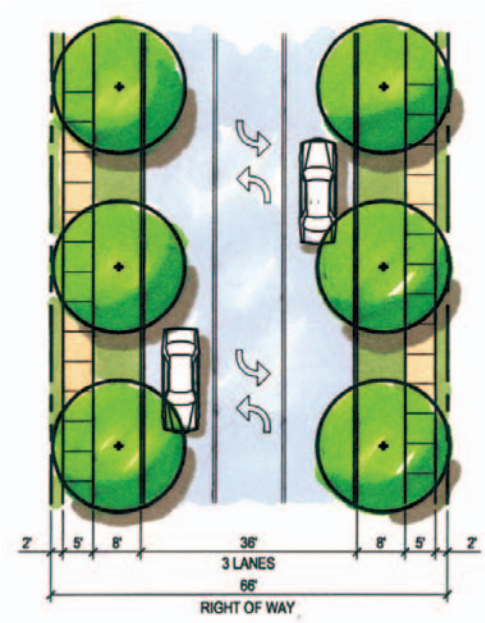



SHARED PARKING/BIKE LANES
4-LANE UNDIVIDED

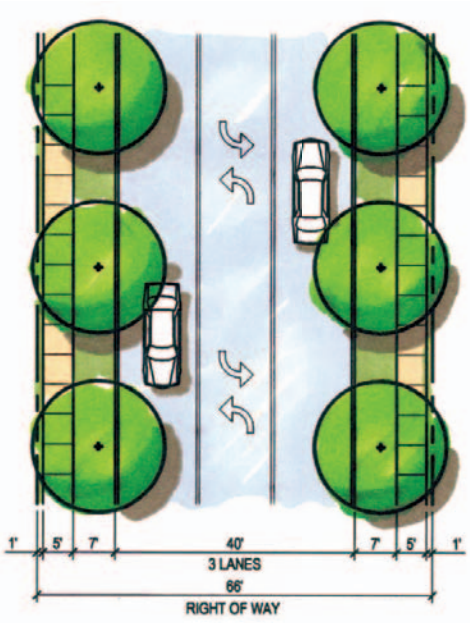
## {Two and Three-Lane Prototypes}

***Prototype Characteristics:***

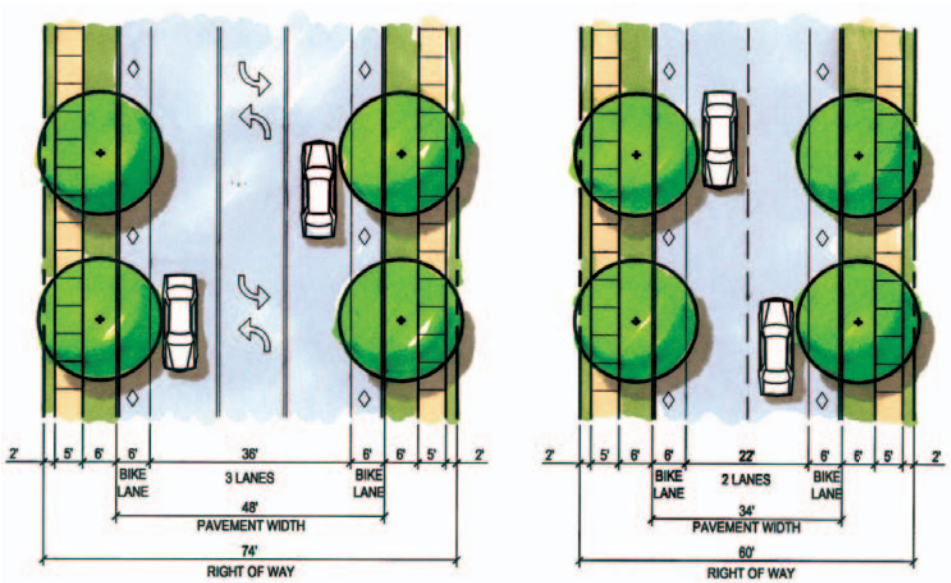
- 3-lane minor arterial or collector in 66-foot ROW.
- Minimum 8-foot sidewalk setbacks with regular street tree plantings with narrower street channel.
- Minimum 7-foot sidewalk setbacks using wide, shared use moving lanes and regular street tree plantings. Concept includes 11-foot center lane, 14-foot moving lanes.
- Average street tree spacing should be no less than 40 feet on center.
- Sidewalks may be built adjacent to property line.




PREFERRED



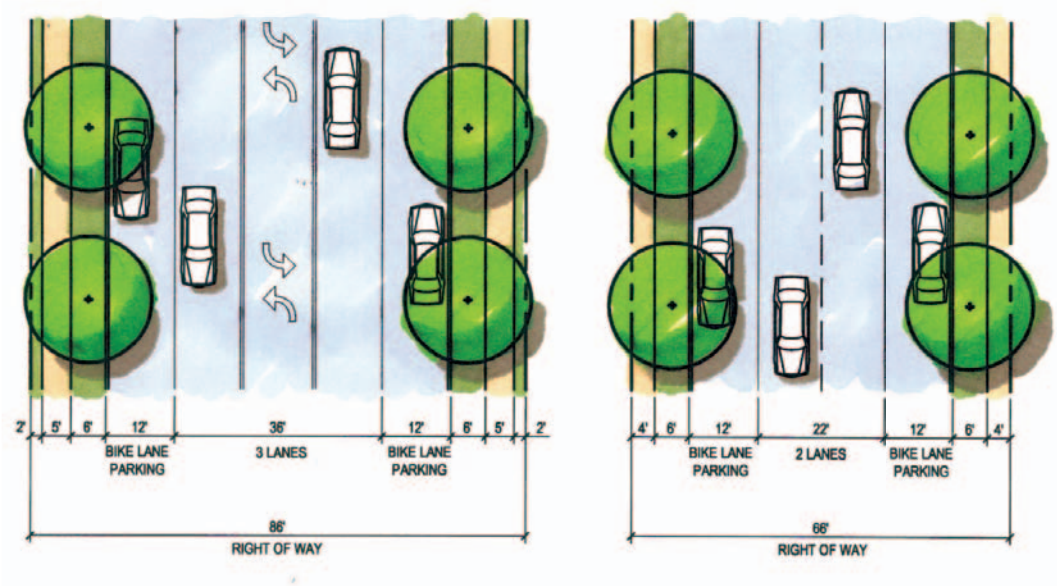

WIDE CURB LANES




DEDICATED BIKE LANES
3-LANE AND 2-LANE UNDIVIDED

***Prototype Characteristics:***

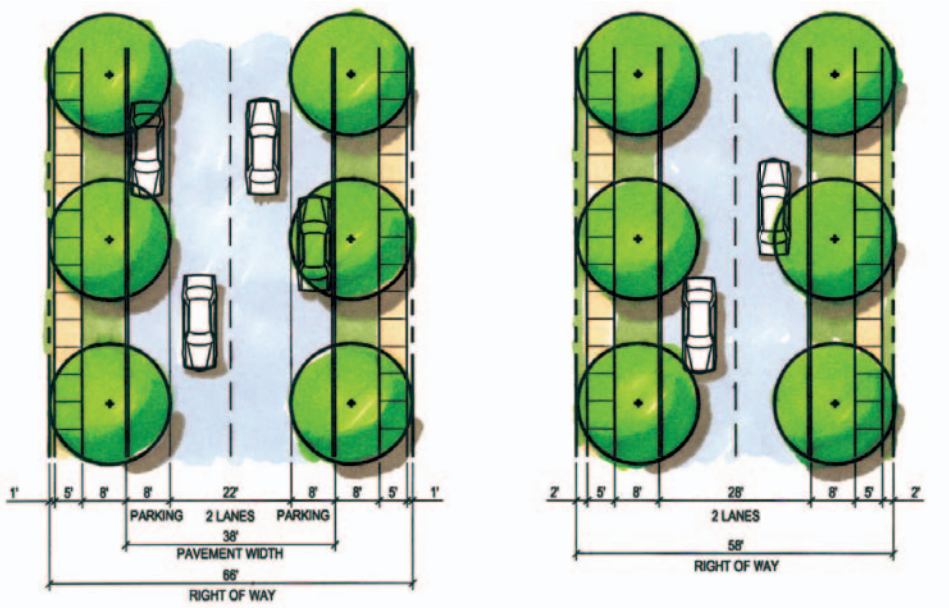
- 2 or 3-lane minor arterial or collector in 60- to 74-foot ROW.
- Minimum 6-foot sidewalk setbacks with regular street-tree plantings with bicycle lanes.
- Average street tree spacing should be no less than 40 feet on center.
- Sidewalks may be built adjacent to property line to increase landscaping or meet other dimensional requirements.
- Lane width may be reduced in 3-lane prototype.




SHARED PARKING/BIKE LANES
3-LANE AND 2-LANE UNDIVIDED

***Prototype Characteristics:***

- 3-lane minor arterial or collector in 66- to 86-foot ROW.
- Minimum 6-foot sidewalk setbacks with regular street-tree plantings with shared parking/bicycle shoulder.
- Average street tree spacing should be no less than 40 feet on center.
- Sidewalks may be built adjacent to property line to increase landscaping or meet other dimensional requirements.

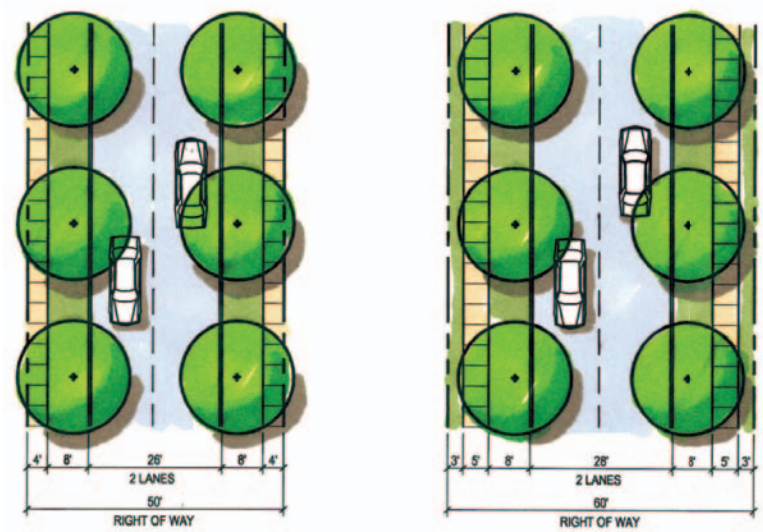



66' RIGHT OF WAY
2-LANE WITH AND WITHOUT PARKING

## {Two-Lane Prototypes}

***Prototype Characteristics***

- 2-lane minor arterial or collector in urban context or collector in 58- to 74-foot ROW.
- Minimum 8-foot sidewalk setbacks with regular street-tree plantings.
- Average street tree spacing should be no less than 40 feet on center.
- Sidewalks may be built adjacent to property line to increase landscaping or meet other dimensional requirements.
- Removing parking lane provides wider moving lanes for shared use.




50' RIGHT OF WAY
2-LANE WITH 4' SIDEWALKS

60' RIGHT OF WAY
2-LANE WITH 5' SIDEWALKS

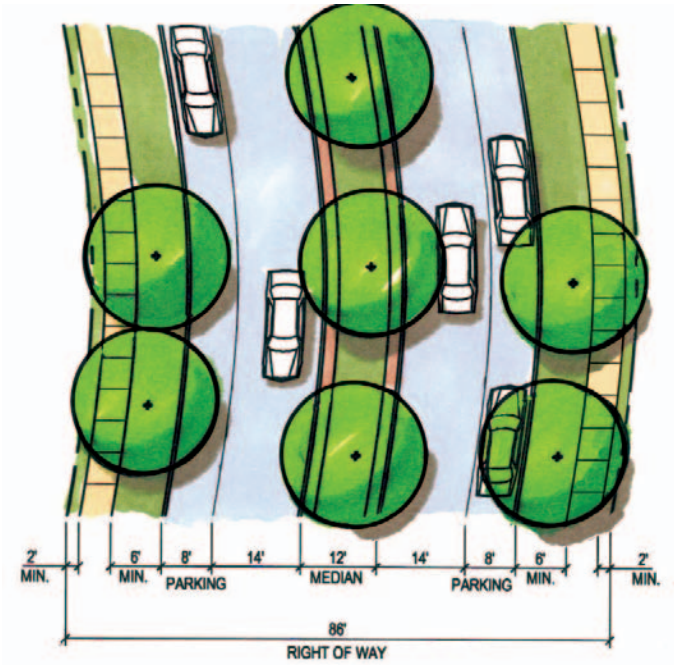
***Prototype Characteristics:***

- 2-lane collector or local street in 50- to 60-foot ROW.
- Minimum 8-foot sidewalk setbacks with regular street-tree plantings.
- Average street tree spacing should be no less than 40 feet on center.
- Sidewalks may be built adjacent to property line to increase landscaping or meet other dimensional requirements.
- Parking unrestricted for local streets in suburban contexts.

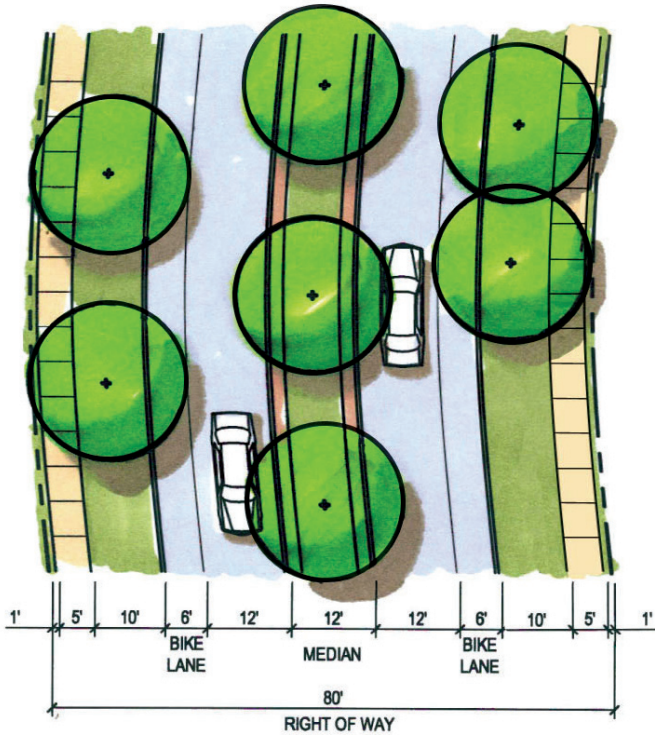
## {Divided Boulevards}

***Prototype Characteristics:***

- Divided 2-lane boulevards in minimum 80- to 86 foot ROW.
- Minimum 6–10-foot sidewalk setbacks with regular street-tree plantings.
- 12 foot median with regular street-tree plantings.
- Average street tree spacing should be no less than 40 feet on center.
- Sidewalks may be built adjacent to property line to increase landscaping or meet other dimensional requirements. Sidewalks may undulate for greater interest.




DIVIDED BOULEVARD
2-LANE WITH PARKING



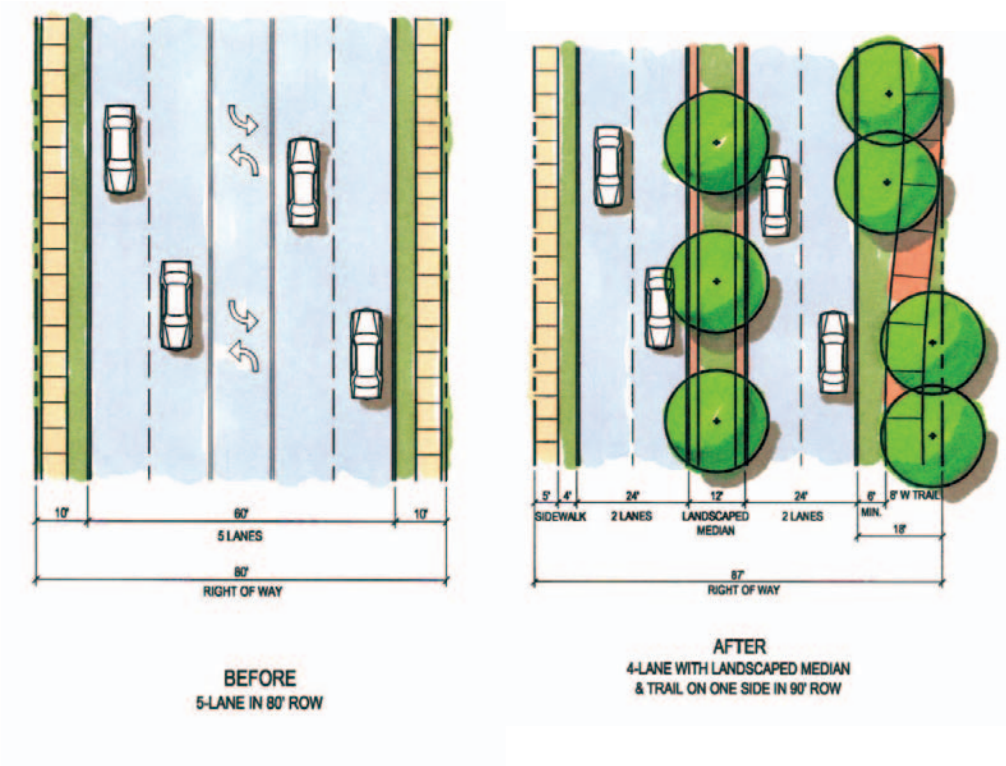

DIVIDED BOULEVARD
2-LANE WITH BIKE LANES

# Chapter iv: {Green Street Retrofit Concept}

*The previous chapter addresses prototype streets, and the City and other agencies should apply its recommendations when building new streets. However, most of Omaha's street network is already in place, and will never fully comply with these prototypes. This chapter presents a variety of approaches for retrofitting existing streets to become "greener." It also applies these concepts to specific situations, showing how, over time, Omaha's existing street network can also become Green Streets.*

*Retrofit recommendations are specific to different contexts. The re-design process for a specific corridor must completely analyze the context and function of the street, and tailor solutions appropriate to the specific case. In common with the prototype sections, retrofit concepts also consider accommodating non-motorized transportation as part of the concept of a "green street." Therefore, many of the recommendations include modifying existing rights-of-way and street channels to provide better movement of pedestrians and bicyclists.*

*Existing*



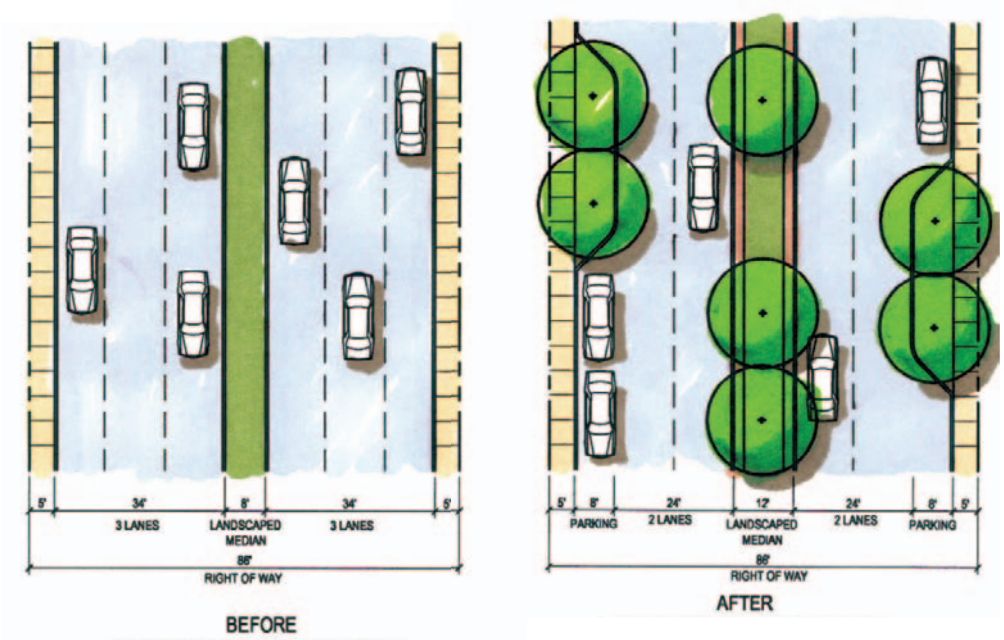

## {Five-Lane Conversion}

This recommendation applies to major street corridors with five-lane facilities. In urban contexts, some of Omaha's wide streets, sometimes the route of regional highways, have been converted to five-lane facilities. The five-lane street channel without a raised median has also grown in popularity in transitional and suburban contexts. However, the five-lane width, typically 55 to 60 feet, dominates the field of vision of most road users. In addition, many of these streets provide uncomfortable pedestrian domains and do not accommodate bicyclists.

***Retrofit Features:***

- Raised median with regular tree-planting to replace center left-turn lane. Ideal minimum width is 12 feet to accommodate left turns.
- Sidepath/widened sidewalk on one side of the street. Path can undulate within a 15–18-foot space, with a minimum setback of 6 feet.
- Street tree plantings on the sidepath side of the corridor.
- Medians may be intermittent and need not be continuous for long distances. The 5-lane section may be used along parts of the street where left-turns for business access are critical.

*Existing*



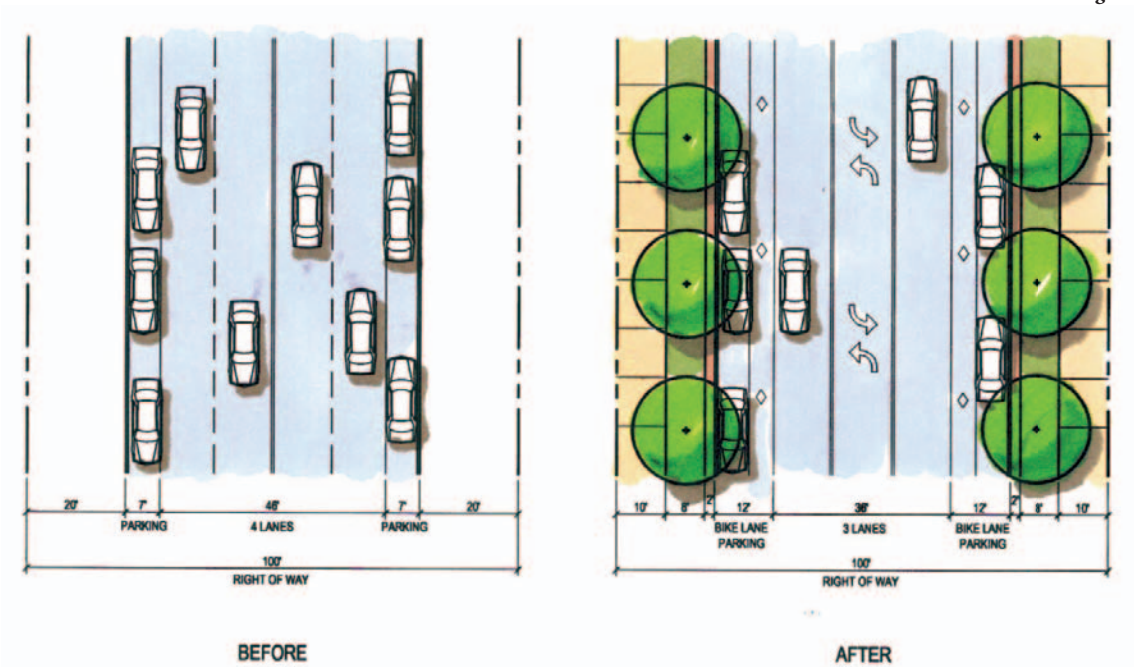

## {Divided Arterial Conversions}

This concept applies to arterials where narrow concrete medians divide opposing traffic flows on major arterials. In some places, parking is prohibited along the curb lane in rush hours, providing a third moving lane. Traffic behavior and changes in road use sometimes make use of this narrower third lane unnecessary or even hazardous by encouraging faster traffic or passing on the right.

***Retrofit Features:***

- Narrow concrete median replaced by wider, green median with adequate space to accommodate left turns as required.
- Street channel redesigned to provide 2 standard moving lanes.
- Landscaped nodes extend into the existing parking lane at regular intervals, providing a place for street trees. Extension of node is 6–7 feet from the existing curb face.
- Current curb line and sidewalk remain at existing locations.

*Existing*



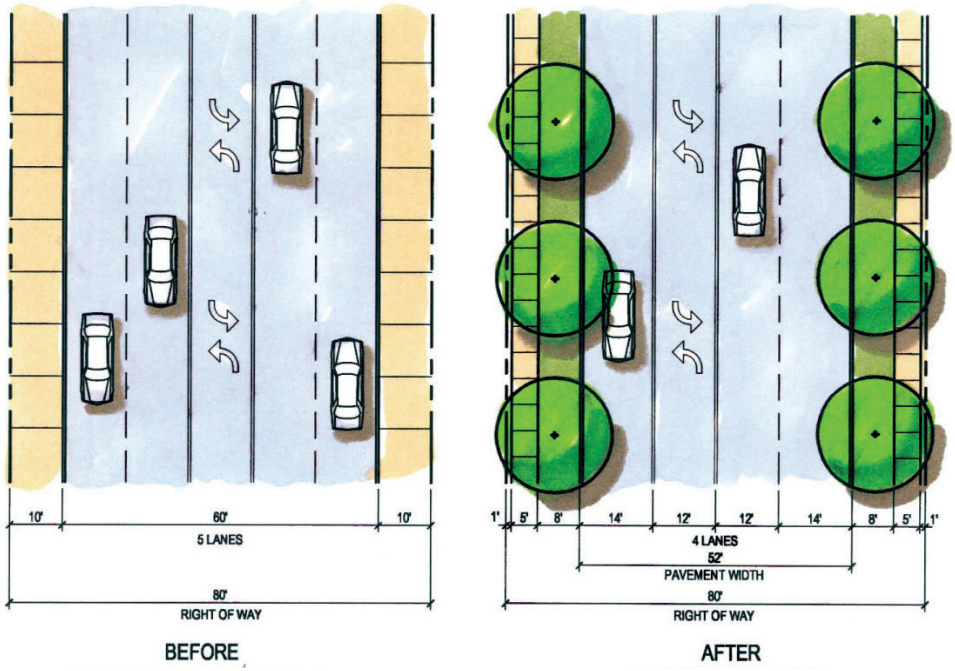

## {Four-lane Conversion to Complete Streets}

This concept applies to existing four-lane streets, often found in urban or transitional contexts. These streets typically provide on-street parallel parking and sometimes were "streetcar strips" with a linear development pattern that combined residential, commercial, and sometimes industrial uses. Four-lane sections create rear-end collision hazards, and are infrequently used in new street development. This concept converts the four-lane section to a more contemporary three-lane facility, providing excellent bicycle and pedestrian facilities in the process.

***Retrofit Features:***

- 3-lane section with continuous left-turn lane replaces narrow 4-lane section.
- Defined bicycle lanes between parallel parking and moving lanes. 5-foot minimum width is necessary to prevent hazards to cyclists from opening car doors.
- Nodes may also be used in parking lanes to provide additional street landscaping.
- Eight to 10-foot sidewalk setback with regular street tree-planting.
- Wider sidewalks, up to 10 feet depending on land use context. 5 foot sidewalks are adequate in residential areas.

*Existing*



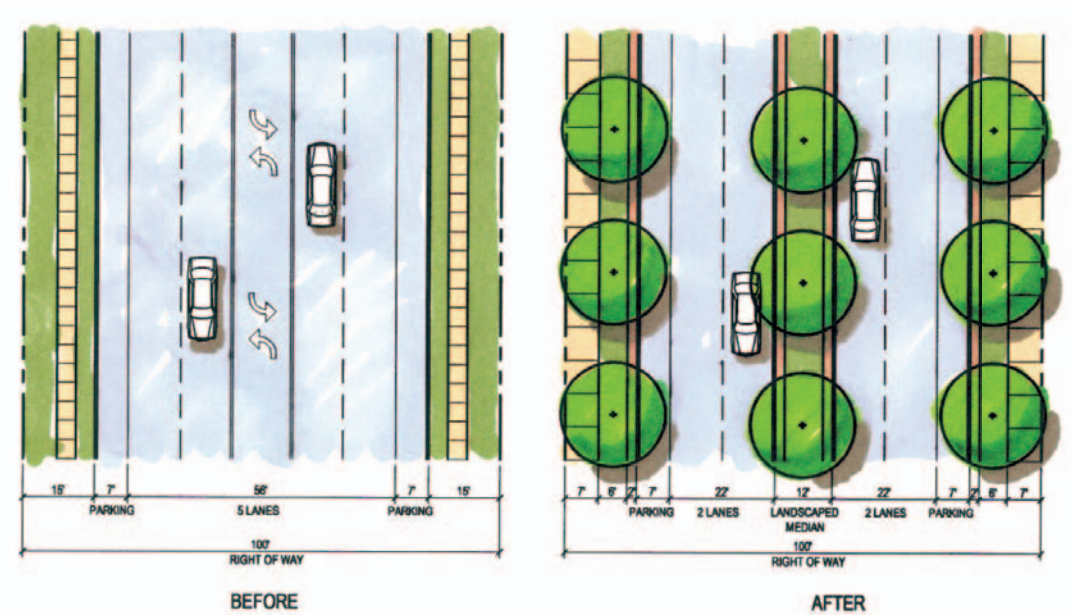

## {Asymmetrical Conversion of Five-Lane Corridors}

This recommendation also applies to major street corridors with five-lane facilities, where five lanes are no longer necessary, but left turn movements should be preserved. The concept is appropriate when peak hour loads in one direction may exceed the capacity of a three-lane facility. The concept realigns curbs to provide two moving lanes in a dominant direction, along with a continuous left-turn lane.

***Retrofit Features:***

- Asymmetrical section with 2 moving lanes in a dominant direction and continuous left-turn lane.
- Pedestrian domain is modified to provide ideal 8 foot sidewalk setback with regular street tree planting.
- Continuous 5-foot sidewalk may be built adjacent to property line.

*Existing*



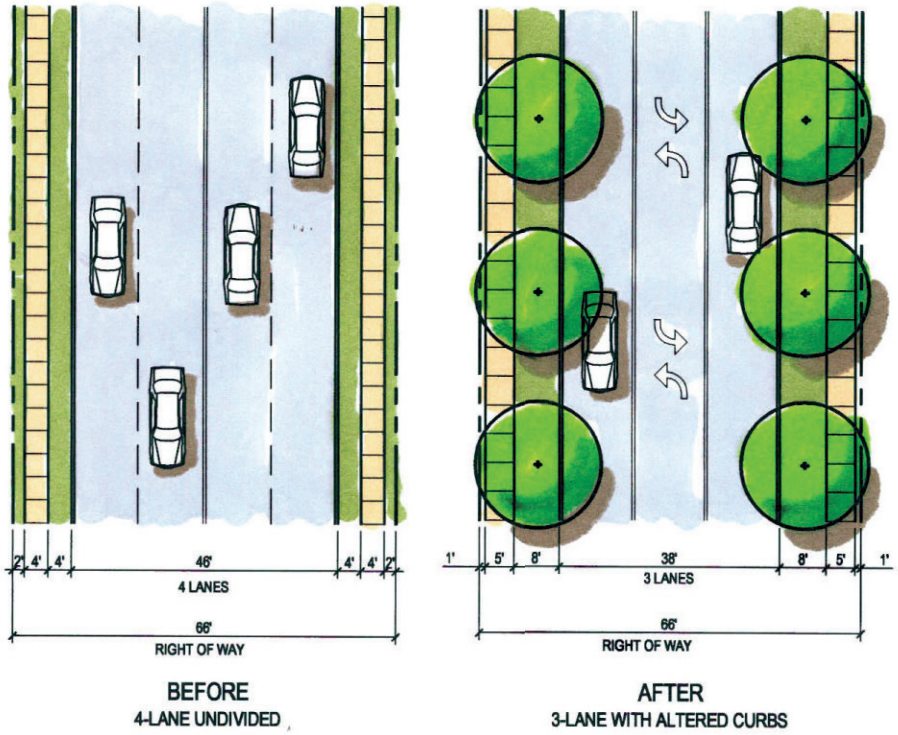

## {City Boulevard}

This recommendation also applies to major street corridors with five-lane facilities with on-street parking. The design concept provides a landscaped median and greater sidewalk setback, while retaining parallel parking and existing curb lines. Parallel parking may be replaced by bicycle lanes when retaining parking is not necessary.

***Retrofit Features:***

- Green median to replace center left turn lane.
- Two 11-foot lanes in each direction
- On-street parallel parking is retained. In places where parking is not necessary, parking may be replaced by a bicycle lane.
- Sidewalk setback increased to 8 feet, including a curbside maintenance strip.
- Sidewalk built adjacent to property line.

*Existing*



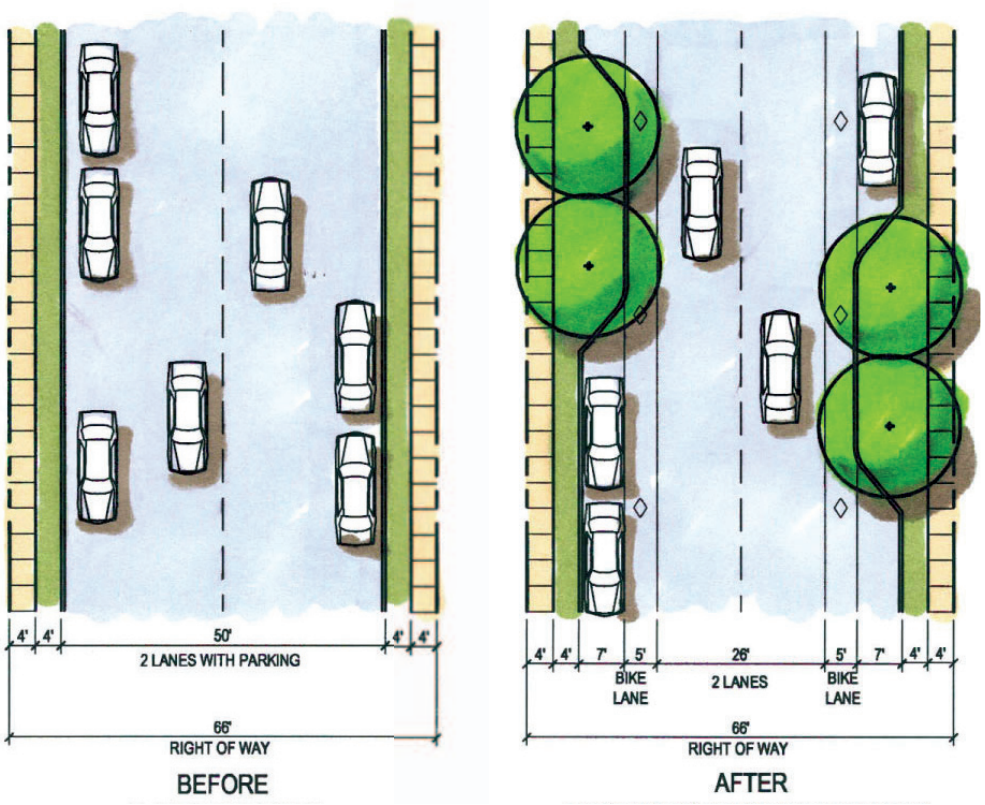

## {Three-Lane Conversion in Narrow Right-of-Way}

This concept converts four-lane urban facilities in the traditional 66-foot right-of-way to 3-lane facilities with improved street landscaping. Wider moving lanes are provided to accommodate shared bicycle use.

***Retrofit Features:***

- Three-lane section replaces four-lane configuration.
- 11-foot turning lane and 13–14-foot moving lanes with adequate width for shared bicycle use.
- Sidewalk setback increased to 8 feet.
- 5-foot sidewalk may be built adjacent to property line.

*Existing*




## {Streetcar Avenue Enhancement}

This concept applies to Omaha's wide, two-lane streetcar avenues. It maintains current curb lines, using the technique of parking lane nodes to provide space for additional street landscaping. The concept also uses the relatively wide street channel to provide bicycle lanes along these important corridors.

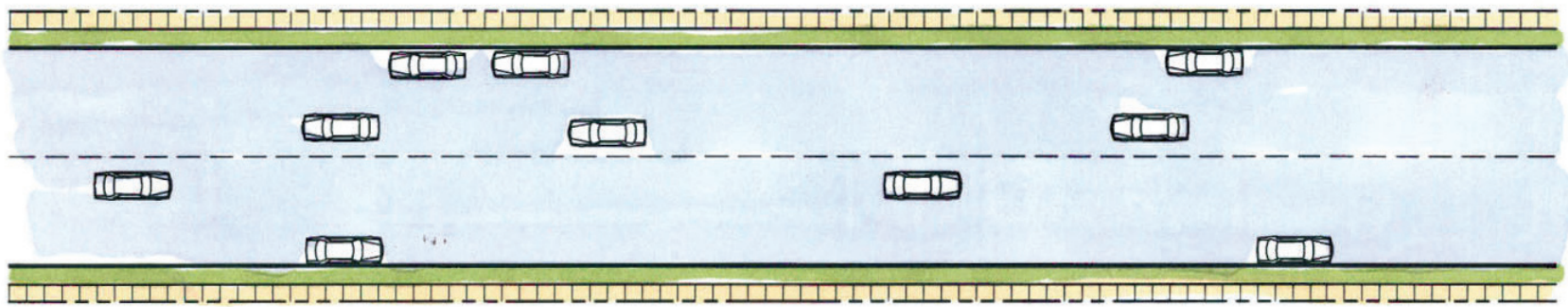
***Retrofit Features:***

- Wide moving lanes are defined at 12–13-foot widths.
- Bicycle lanes provided.
- Landscaped nodes extend into the existing parking lane at regular intervals, providing a place for street trees. Extension of node is 6–7 feet from the existing curb face.
- Existing curb lines and sidewalks are retained. Different street contexts may provide different design possibilities.

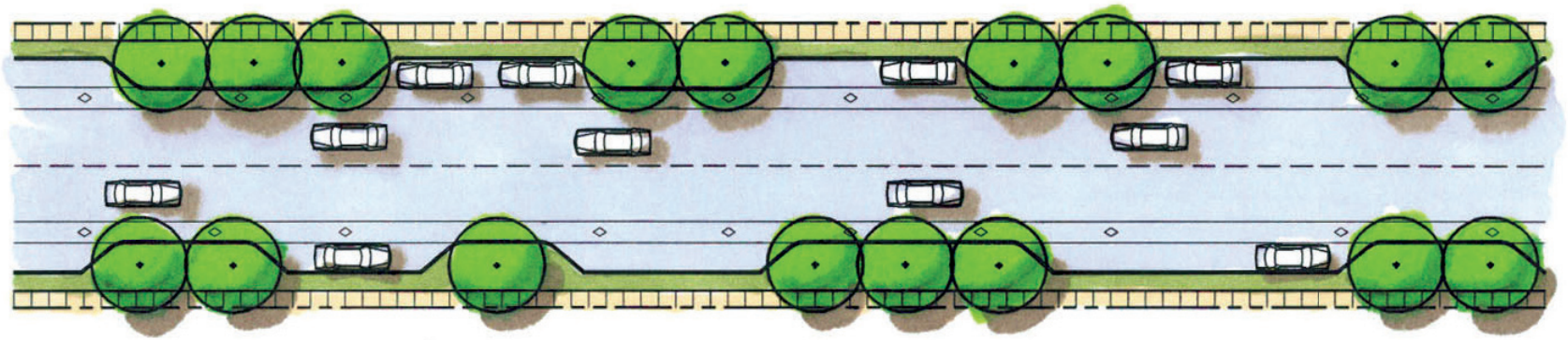
## {Streetcar Avenue Enhancement}

### Corridor Plan

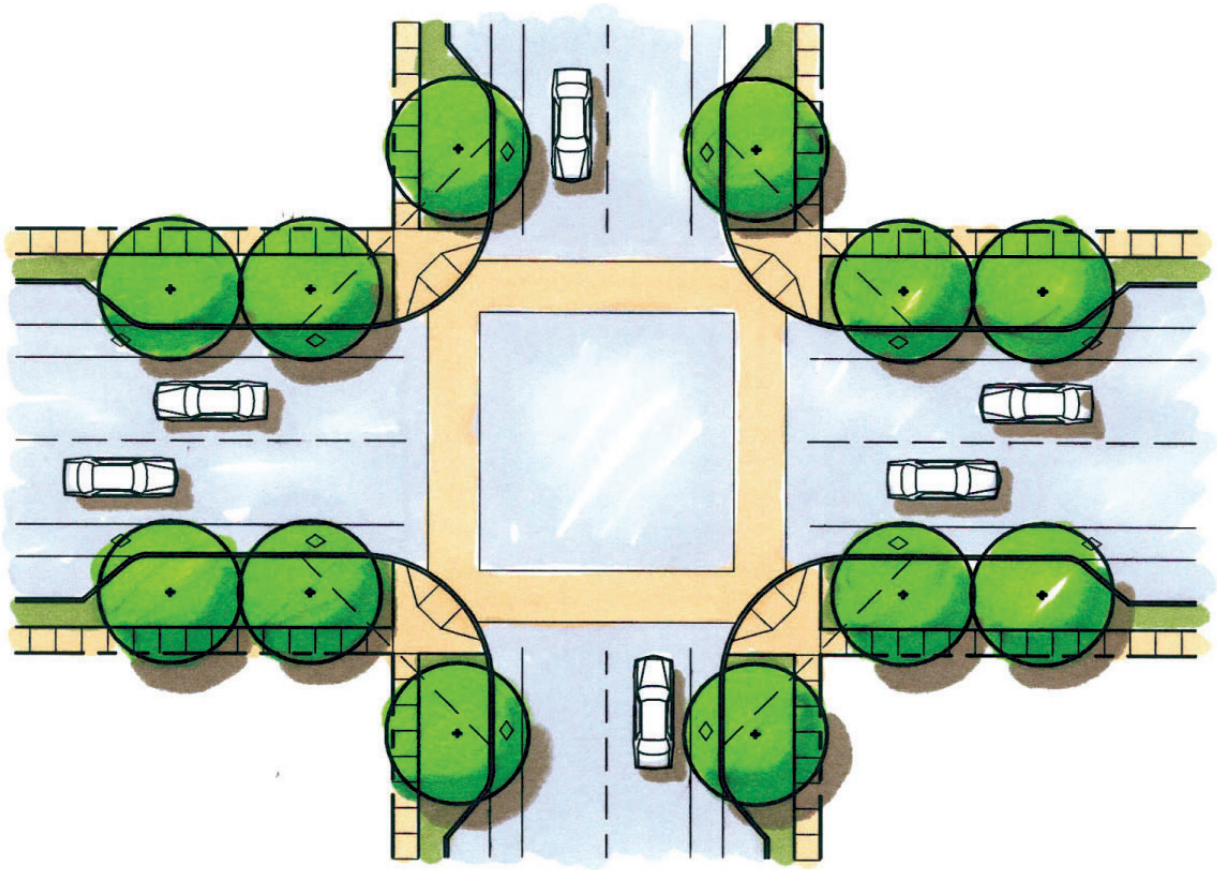
The drawing below illustrates a streetcar avenue corridor, showing a potential street landscape pattern. The concept of parking lane nodes can also be applied to other retrofit projects that involve streets with on-street parallel parking.



BEFORE
4-LANE WITH PARKING



AFTER
2-LANE VARIABLE CURB WITH BIKE LANES,
CHANNELIZED MOVING LANES & CORNER NODES



TREE NODES AT CORNERS FOR STREETS WITH PARALLEL PARKING

## {Intersection Nodes}

Intersection nodes may be installed at intersections of major streets that provide on-street parking. These nodes decrease crossing distances for pedestrians, protect parking lanes, and help to slow traffic at intersections. They are often used in main street settings to set off diagonal parking, and are sometimes installed on streets with parallel parking. These nodes an important opportunity for street landscaping, further calming traffic and defining intersections as points of refuge.

***Retrofit Features:***

- Corner nodes extending to edge of parking lane.
- Street landscaping may include both overstory trees and ground cover on node returns.
- More formal landscaping, paving, and street furniture may be used in main street districts.
- Color or texture changes used to define pedestrian crosswalks and places of potential pedestrian/ vehicle conflict.
- Bicycle lanes maintain continuity at nodes.
- Keep tall plantings and visual obstructions outside of sight triangles at street intersections.

## {Retrofit Case Studies}

*This section applies the Green Streets retrofit concepts to specific situations in Omaha's street network. The settings considered include:*

- ***144th Street***, a divided major arterial in a suburban context. 144th was conceived as a parkway street, and a master plan for its development and landscaping was developed in 1989. Some aspects of the plan, including development of a major multi-use trail for its entire length, have been implemented. However, many of its landscape recommendations, which included the definition of outdoor "rooms" at intersections, were not executed and street landscaping has been relatively ineffective.
- ***Cuming Street***, a major divided arterial in an urban context, featuring a narrow concrete median and on-street parking that converts to a moving lane during rush hours. With the redesign of the north Downtown and airport access street systems with Qwest Center and riverfront development, Cuming is now a principal connection to the airport and North Downtown area.
- ***84th Street*** between Center Street and Interstate 80, a 1950s era commercial strip with poor landscaping and confusing intersecting street patterns.
- ***42nd Street*** south of Center Street, a four-lane major arterial with adjacent residential land use.
- ***Leavenworth Street*** between 31st Street and Saddle Creek Road, a four-lane streetcar strip with on-street parking that also serves as a major bicycle route into downtown and an approach to the University of Nebraska Medical Center. Leavenworth Street was a major area of focus for the Destination Midtown Plan.
- ***Harrison Street*** east of Seymour Smith Park, a congested and narrow two-lane facility scheduled for widening to three lanes.
- ***Blondo Street*** from 66th to 72nd Streets, a three-lane minor arterial that was reconstructed and widened from two lanes during the 1990s.
- ***32nd Avenue***, a streetcar avenue that borders Hanscom Park.
- ***Farnam*** and ***Harney Streets*** west of 20th Street, currently a one-way pair with a comparatively wide pedestrian domain.
- ***Tomahawk Boulevard***, a divided neighborhood parkway in the Maple Village neighborhood.

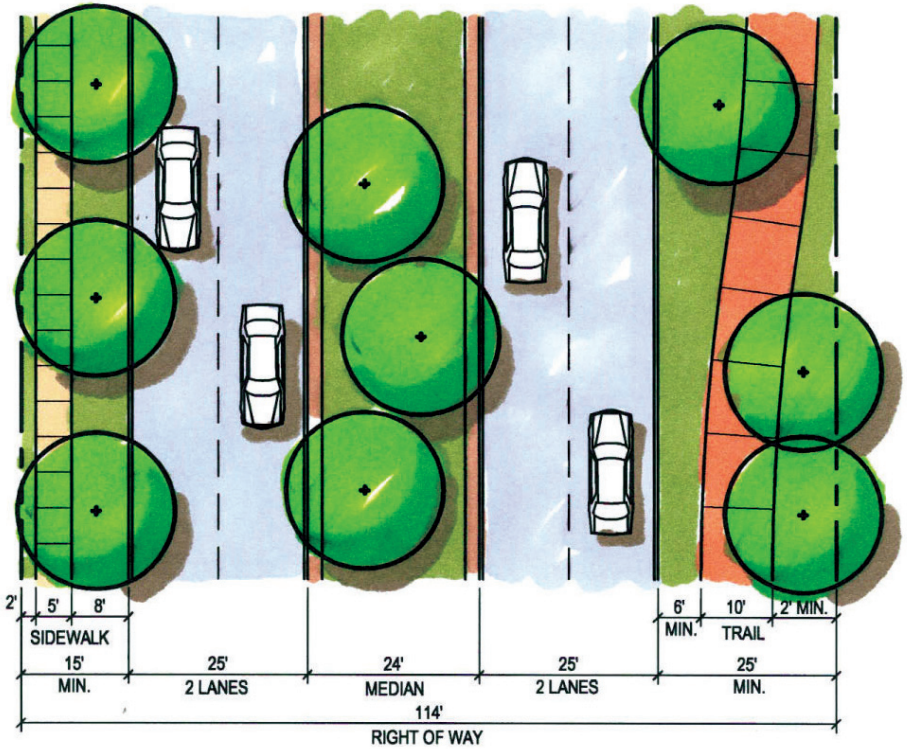
*Existing*

## {144th Street}

### L Street *to* Q Street

***Typical Section and Concept:***

- Undulating trail on one side of wide right-of-way.
- Minimum trail setback of 6 feet, within a 25-foot pedestrian domain.
- Informal landscape pattern consistent with higher traffic speeds.
- Landscaping is used to define intersections as outdoor rooms consistent with 1989 plan concept.
- Much of the 144th Street corridor has a wider overall public domain, up to 250 feet in width. The L to Q segment has the narrowest right-of-way, because it was developed before the city began reserving dedications for full parkway development. Trail setbacks are much greater where available land expands. As a result, the 144th Street Trail is capable for functioning as a full multi-use trail, rather than as a sidepath.

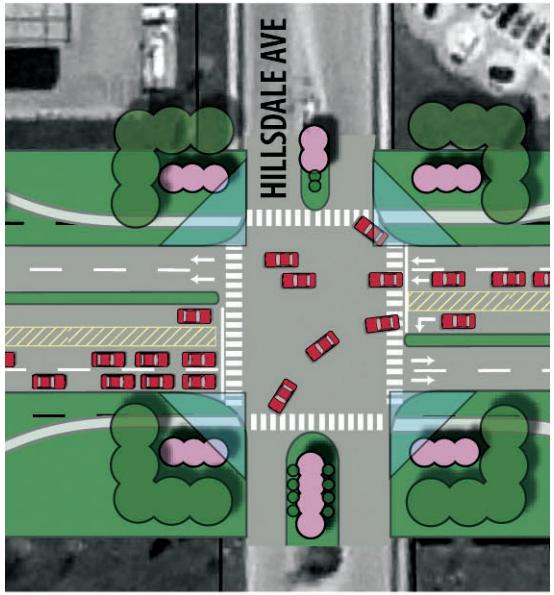


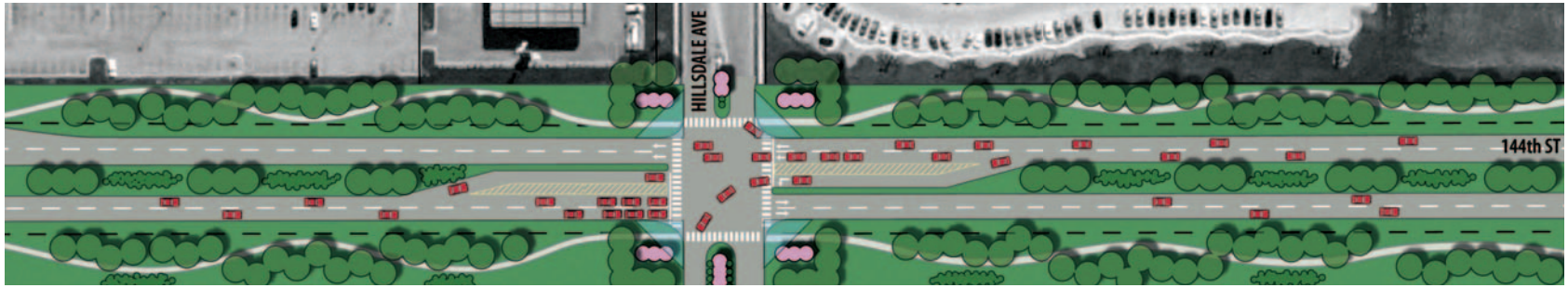

TRAIL ON ONE SIDE
4-LANE DIVIDED WITH 24' MEDIAN

## {144th Street}

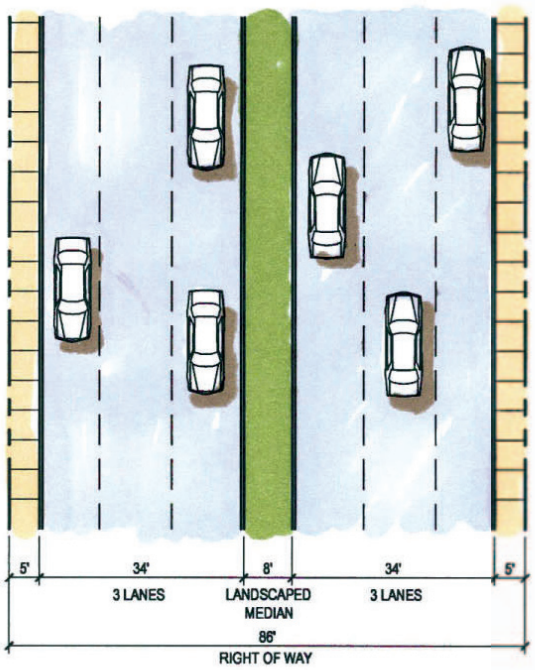
### L Street *to* Q Street

Linear Concept and Intersection Detail.

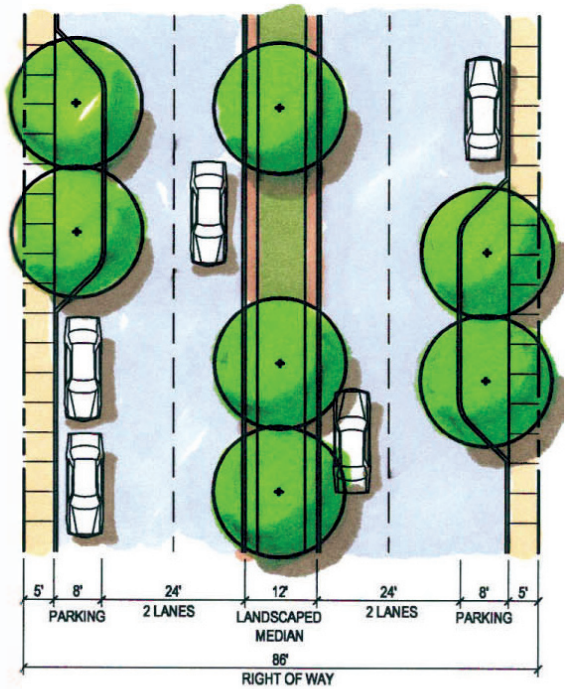


*Existing*




BEFORE




AFTER

## {Cuming Street}

### 30th *to* Saddle Creek Road

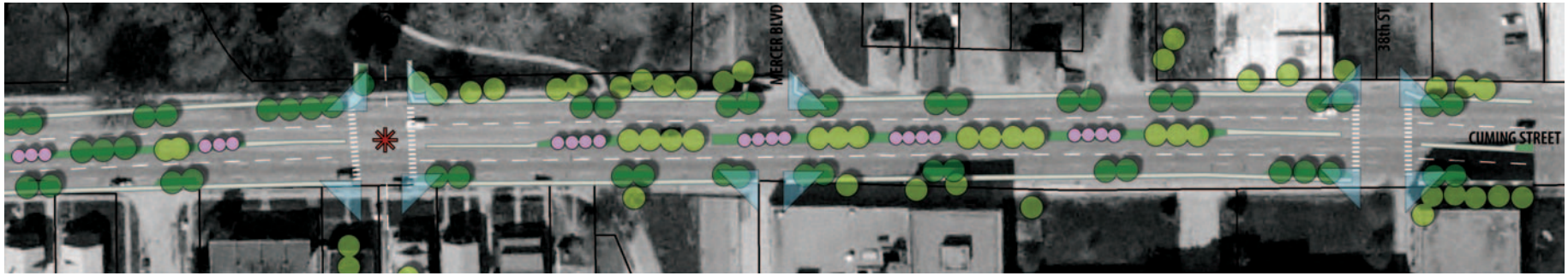
***Typical Section and Concept:***

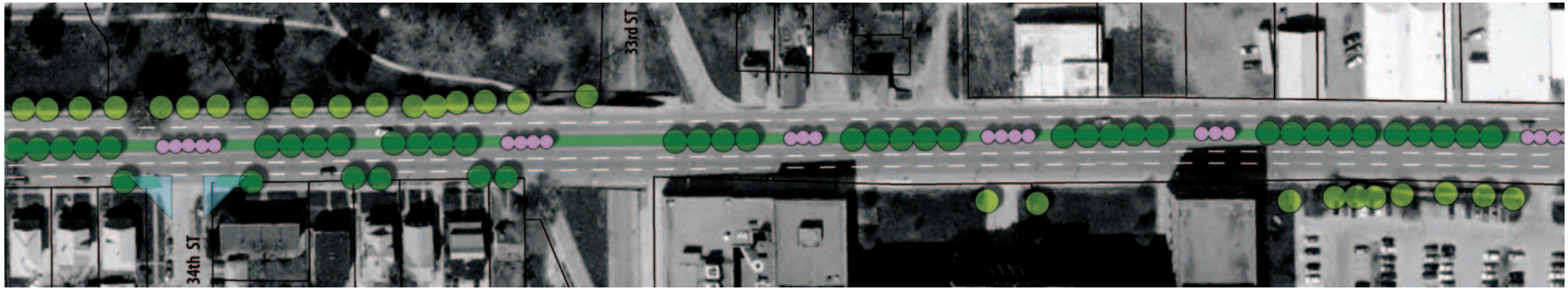
- Widening and landscaping of narrow concrete median.
- Two standard moving lanes in each direction to replace convertible parking lane and narrow existing lane widths.
- Parking lane nodes to provide locations for street trees.
- Curb line and sidewalk remain in current position.
- Project should also replace galvanized street lamps with a new standard that maintains continuity with the Abbott Drive/Cuming Street entrance to the city.

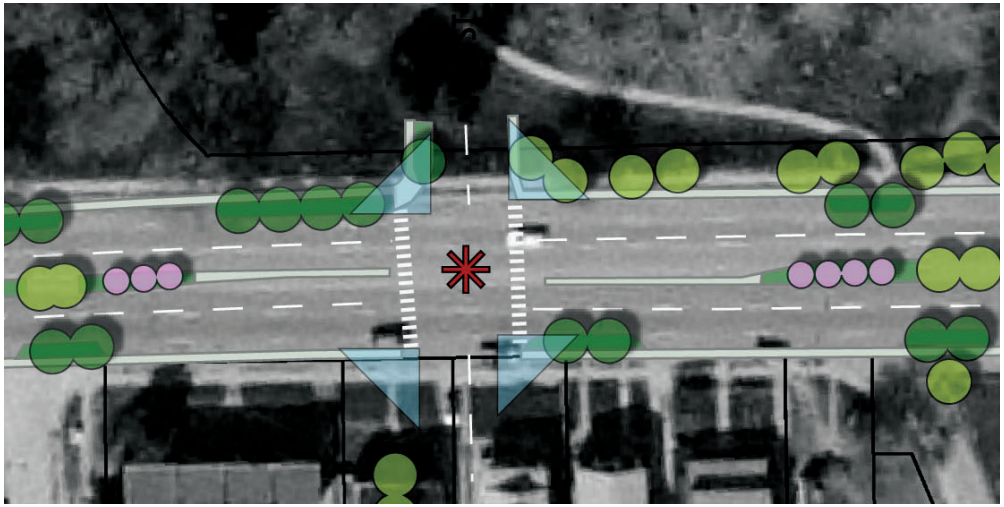
## {Cuming Street}

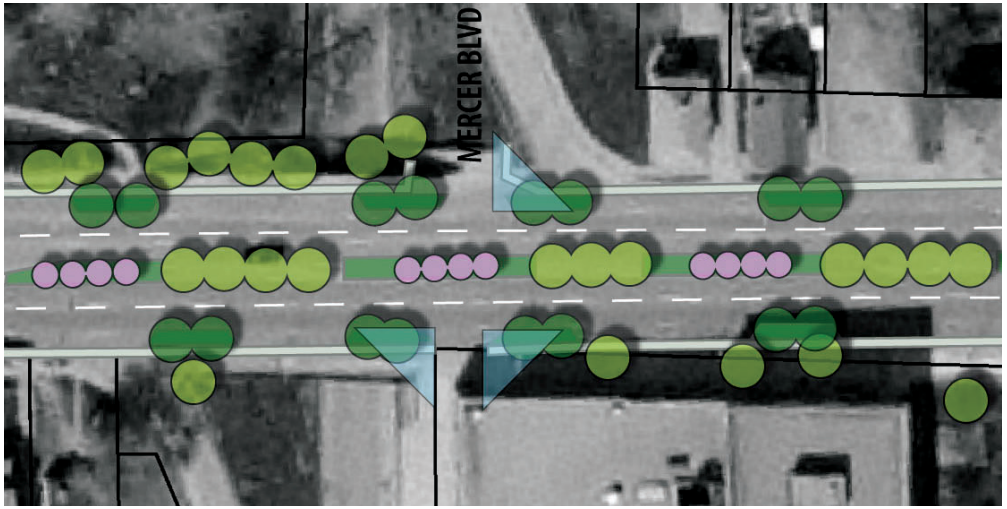
### 30th *to* Saddle Creek Road

***Proposed Cuming Street Retrofit:***
Linear Plans and Landscaping Concept.







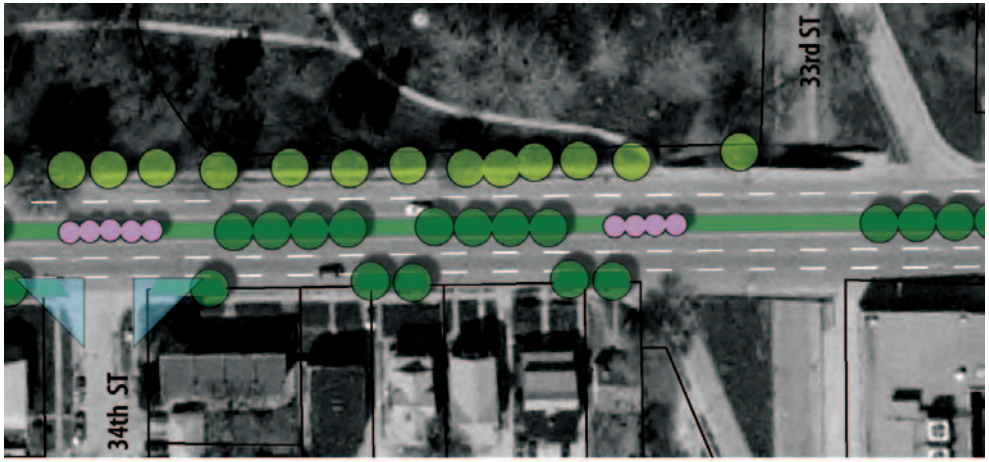

## {Cuming Street}

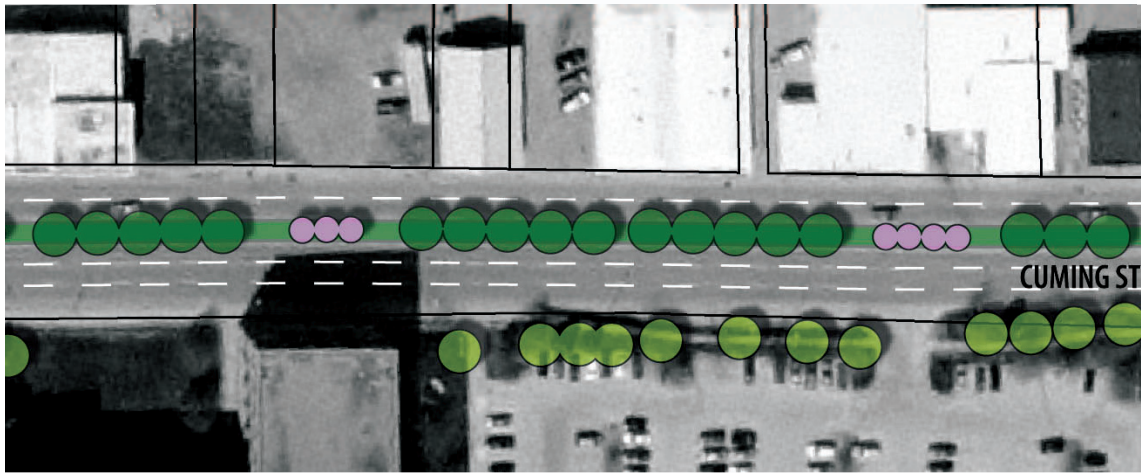
### 30th *to* Saddle Creek Road

***Cuming Street Retrofit***

***Top Left:*** Detail at 40th Street intersection. This intersection has some neighborhood business district characteristics at its south east corner and is one block north of the Cathedral Forecourt project.

***Bottom Left:*** Detail at the interface with the Mercer Park neighborhood.




## {Cuming Street}

### 30th *to* Saddle Creek Road

***Cuming Street Retrofit***

***Top Left:*** Detail at the 33rd Street intersection, one of Omaha's earliest grade separated and controlled access "interchanges."

***Bottom Left:*** Detail at the TAC building. Traffic loads here require that three through lanes be provided as traffic approaches the 30th Street intersection. The parking node concept may be used on the north side of the street.

## {Cuming Street}

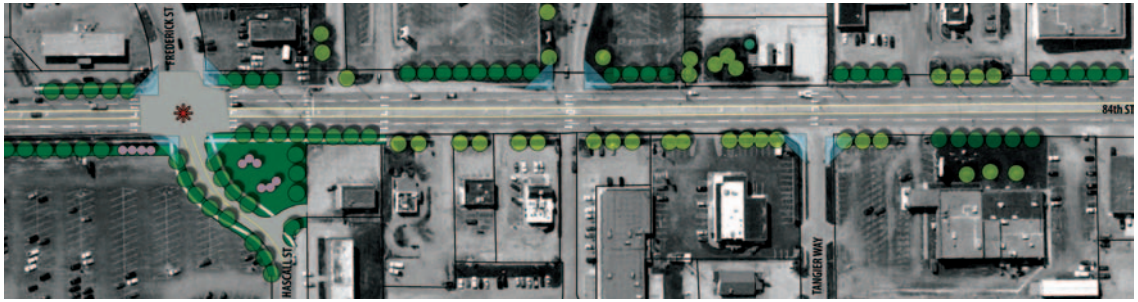
### 30th *to* Saddle Creek Road

***Cuming Street Before and After***

***Left:*** Cuming Street today west of 38th Street.

***Below Left:*** The same view showing proposed retrofit.

*Existing*

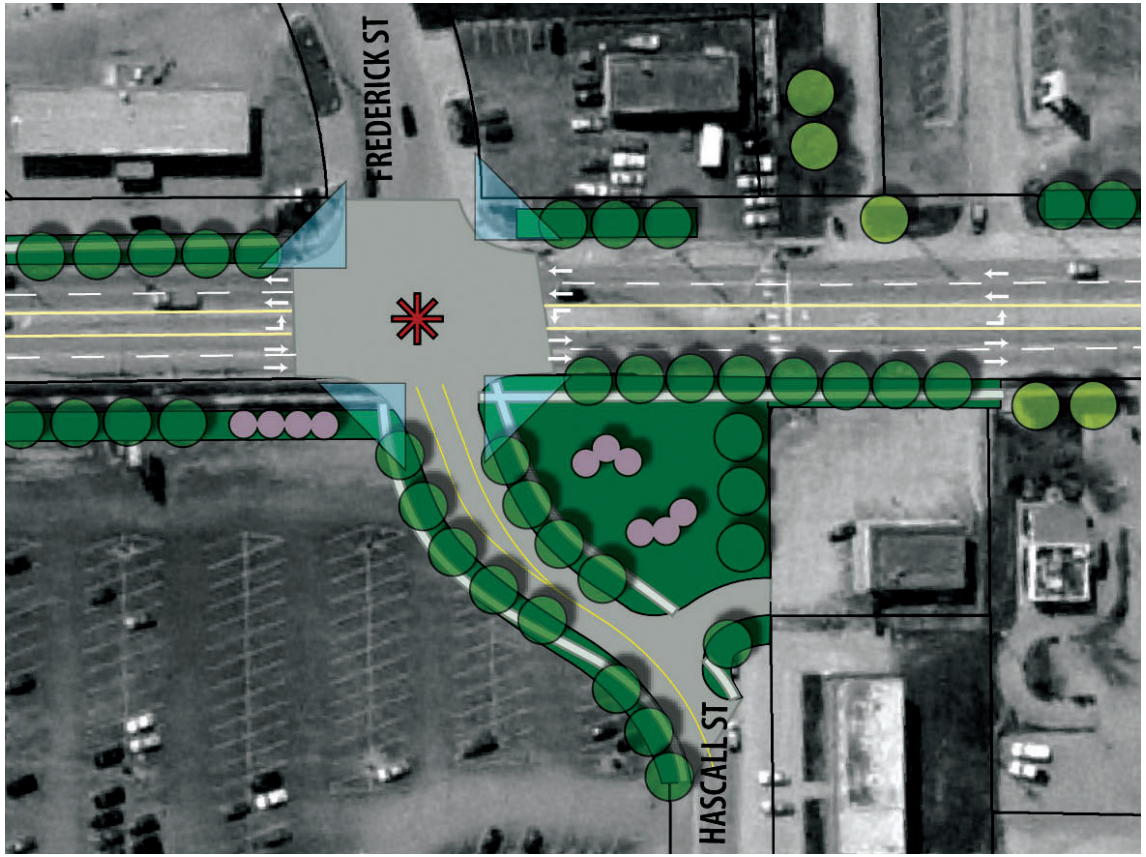



## {84th Street}

### Center *to* Interstate 80

***Concept:***

- Acquisition of unused, currently private parking areas for street landscaping and improved sidewalk.
- Sidewalk setback should be expended to a minimum of 8 feet. Street trees may be established between sidewalk and property line.
- Realignment of Hascall Street intersection with new traffic control, replacing confusing jog with safe, controlled four-way intersection.
- New open space, corridor image feature on former Hascall Street right-of-way.




## {84th Street}

### Center *to* Interstate 80

Detail of revised 84th Street and Hascall Street intersection.

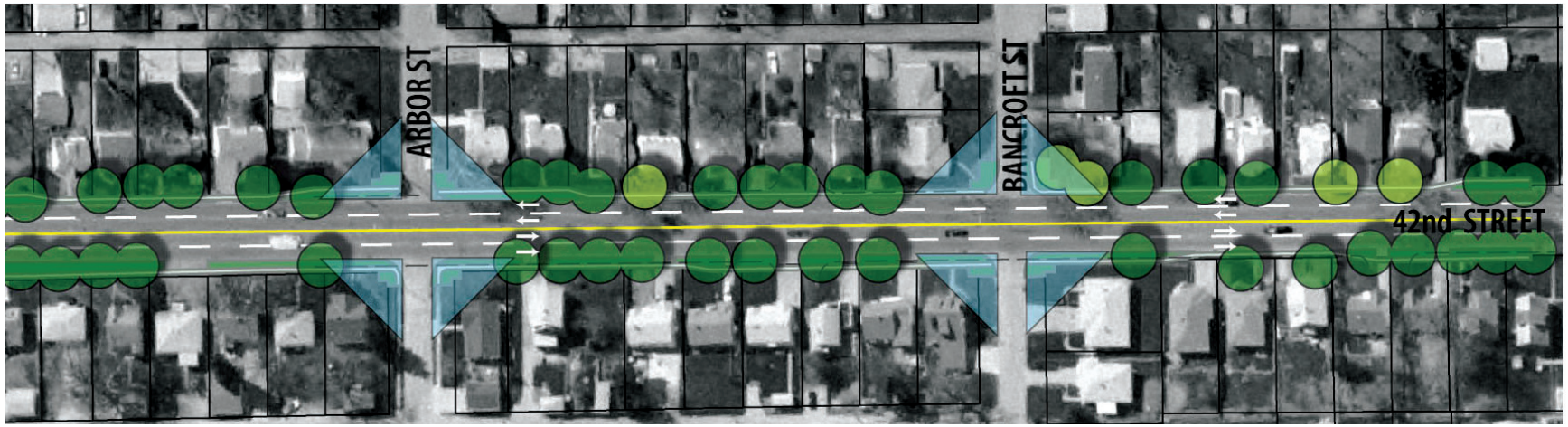
*Existing*

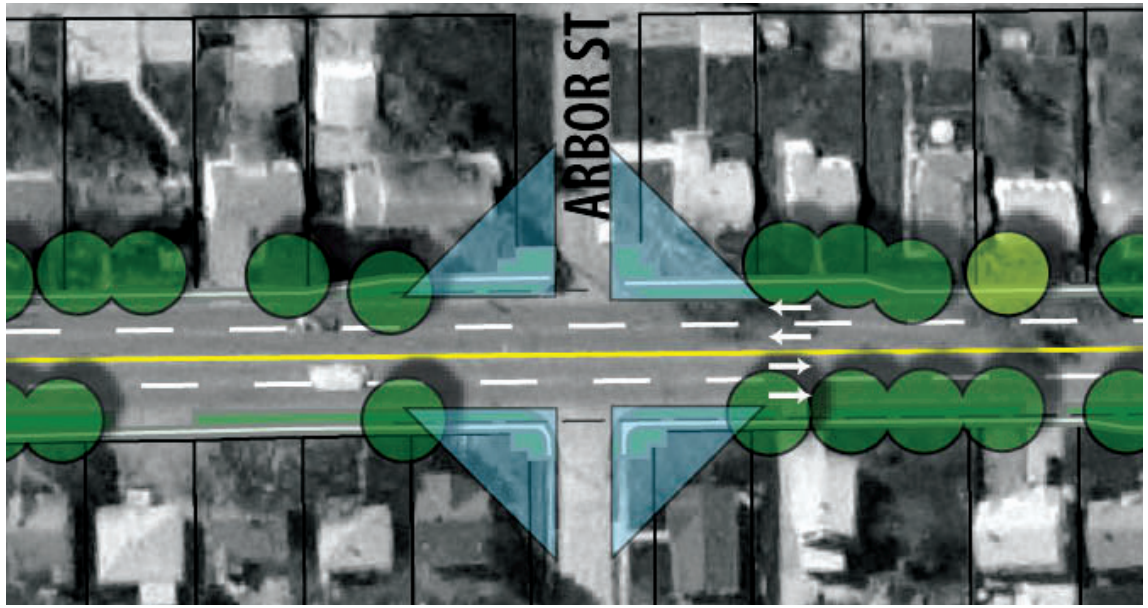
## {42nd Street}

### Center *to* Interstate 80

***Typical Section and Concept:***

- Voluntary acquisition where possible of additional right-of-way to provide street trees and greater sidewalk setback.
- Likely typical sidewalk setback is 6 feet.
- Reconstruction with ornamental retaining walls.
- Sidewalk alignment and setback may vary depending on individual site conditions.
- Benefit to adjacent homeowners is better buffering from street noise and more usable, if smaller, front yards.






## {42nd Street}

### Center *to* Interstate 80

***Plan detail at Arbor Street***

Sidewalk setback and location of landscaping and street trees will vary, depending on site conditions and individual property owner preferences. The 42nd Street program anticipates close cooperation with neighboring property owners.

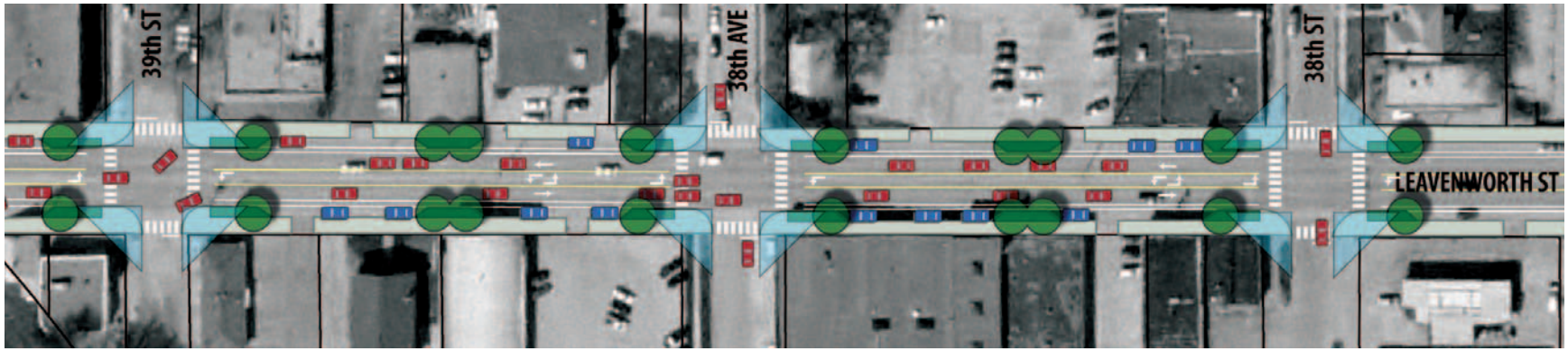
*Existing*

## {Leavenworth Street}

### 31st Street *to* Saddle Creek Road

***Typical Section and Concept:***

- Conversion of 4-lane undivided section to three lanes with bicycle lanes. Potential of Leavenworth to serve as a primary complete street access into Downtown.
- Retention of on-street parking.
- Street landscaping in parking lane nodes.
- Section may change at key intersections such as 42nd and 36th Streets. Here, bicycle lane merges to left of a right-turn only lane, with signs noting motor vehicle yield to bicycles.

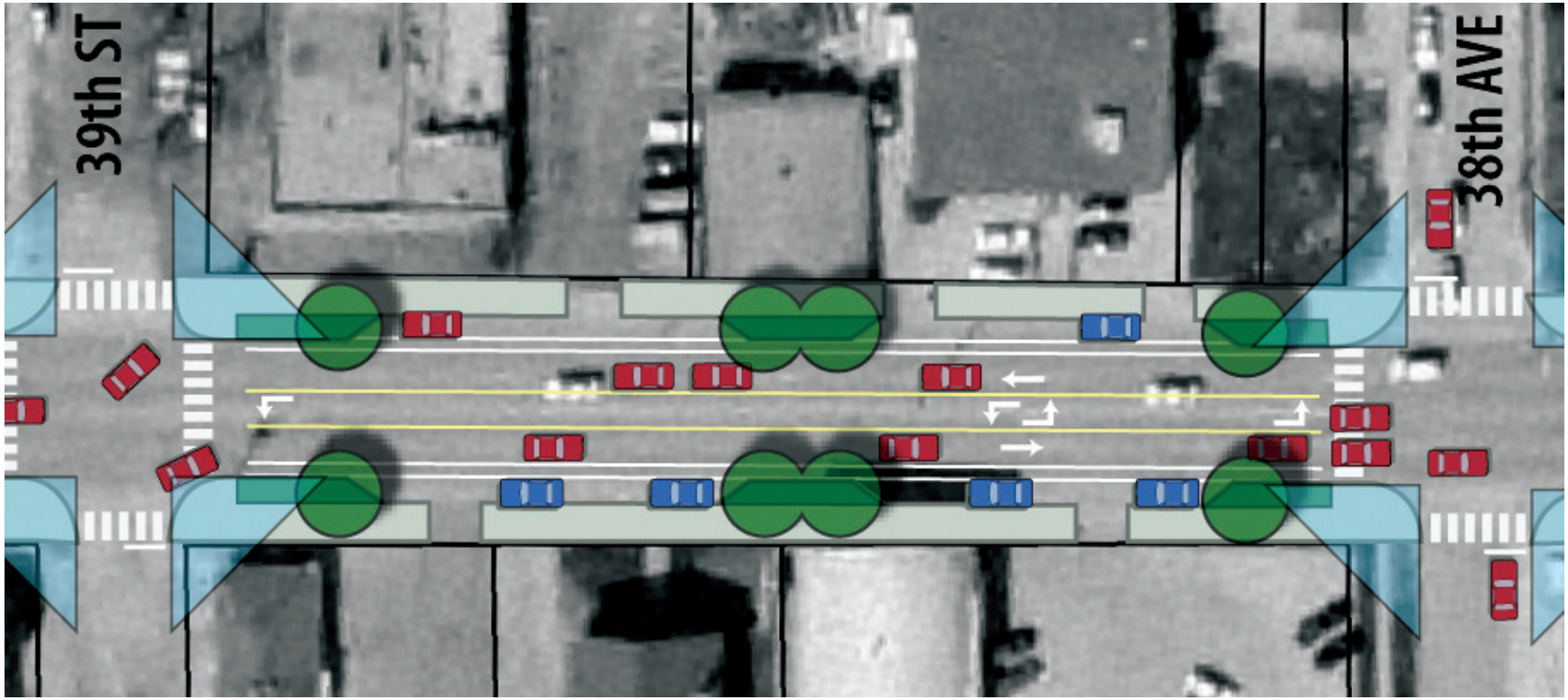


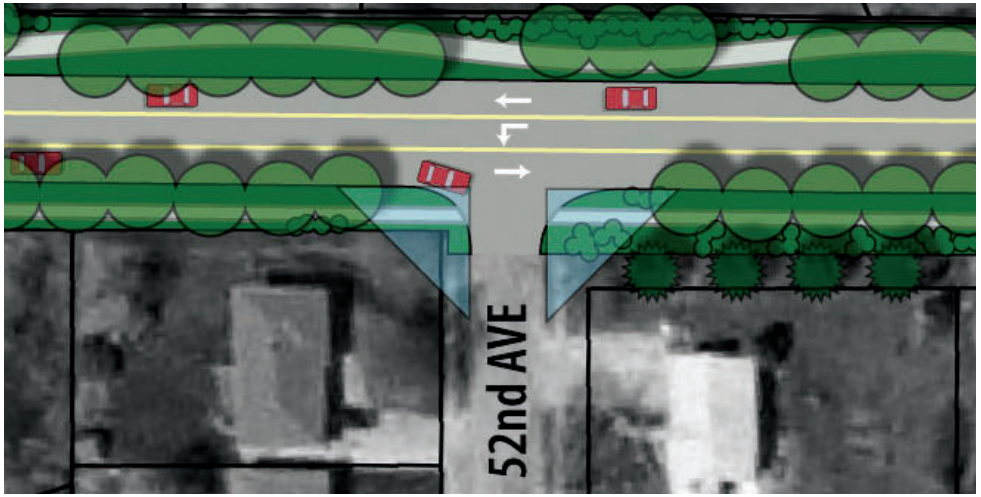
## {Leavenworth Street}

### 31st Street *to* Saddle Creek Road

***Plan detail at 39th Street***

Bicycle lanes provide access to Downtown. Street trees are established on parking lane and corner nodes, typically at intersections and at a mid-block location. Other street furnishings can improve the quality of this corridor, which will increase in public exposure as an approach to UNMC.



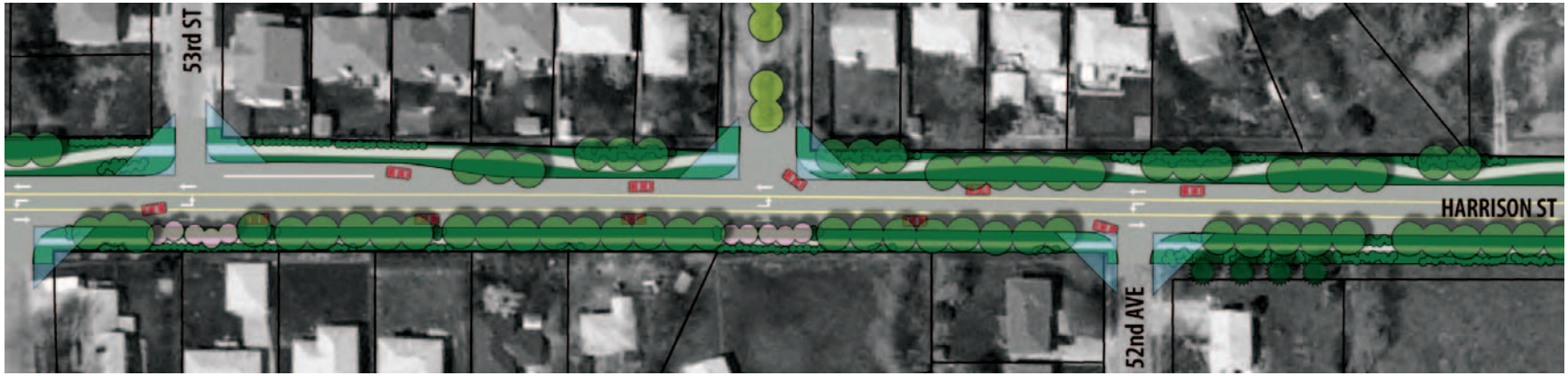



## {Harrison Street}

### 48th *to* 66th Streets

***Typical Section and Concept:***

- Narrow 2-lane rural section road is scheduled for widening to 3-lanes.
- Use of 3-lane prototype, with multi-use trail on north side and sidewalk with adequate setback for street trees on south.
- Lower level landscaping on north buffers residential backyards.
- Street will function as a major link to Keystone Trail and Seymour Smith Park. LaVista also is planning a trail connection at 66th Street through its recreational complex.



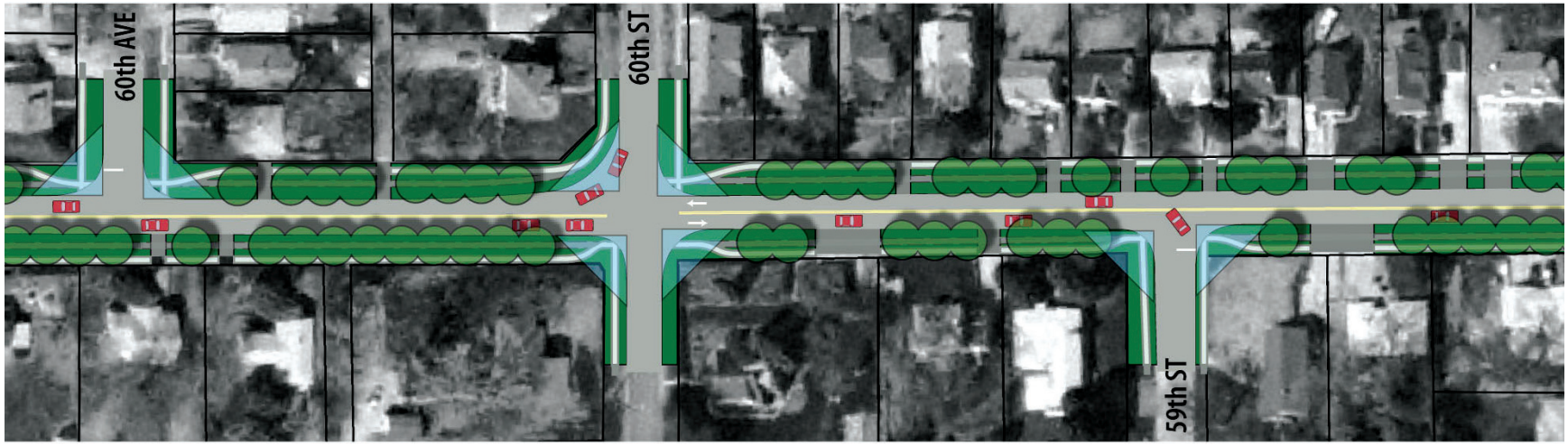
*Existing*

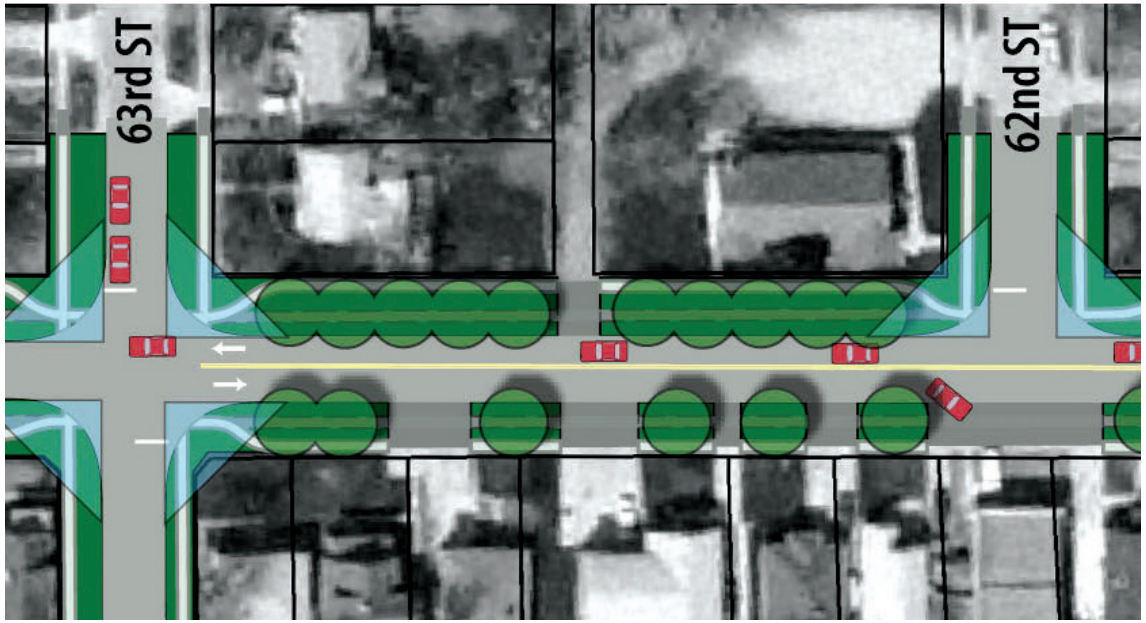
## {Blondo Street}

### 60th *to* 72nd Street

***Typical Sections and Concept:***

- Reconstruct sidewalk within existing right-of-way to provide sidewalk setback adequate for street trees.
- Sidewalk alignment may curve according to site conditions, driveways, and existing landscaping.
- Typical setback should be eight feet within existing 66-foot right-of-way.



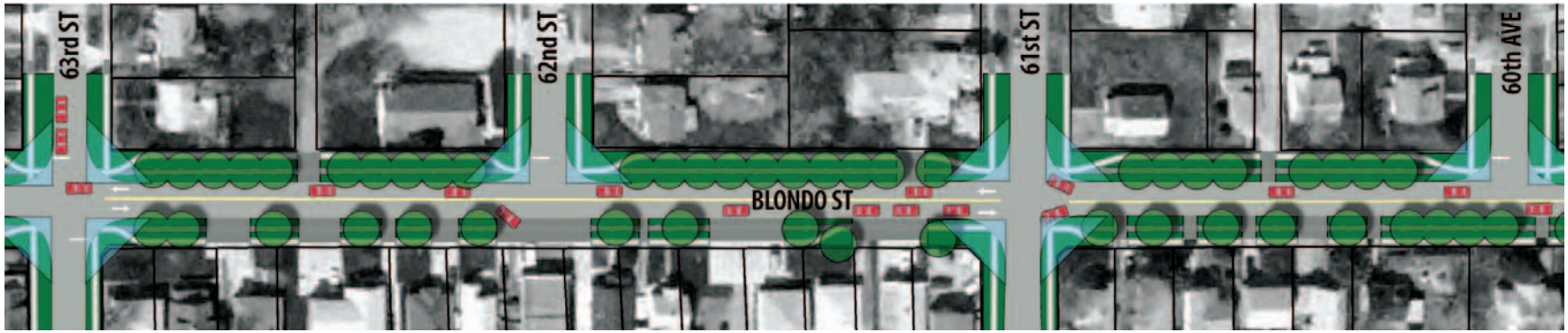



## {Blondo Street}

### 60th *to* 72nd Street

***Plan detail at 61st Street***

Sidewalk on north side is set back behind a row of street trees. Pattern on south side is individualized to curb cuts.



## {Blondo Street}

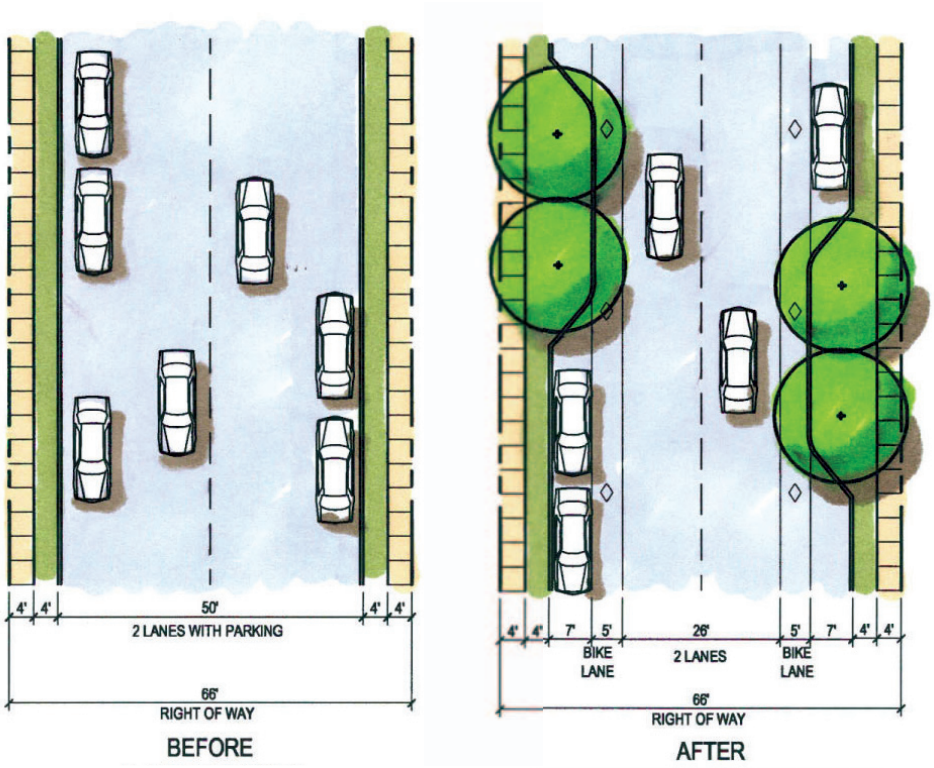
### 60th *to* 72nd Street

***Blondo Street Before and After***

***Above:*** Blondo Street in a two-lane section west of 60th Street.

***Below:*** The same view following proposed retrofit.

*Existing*

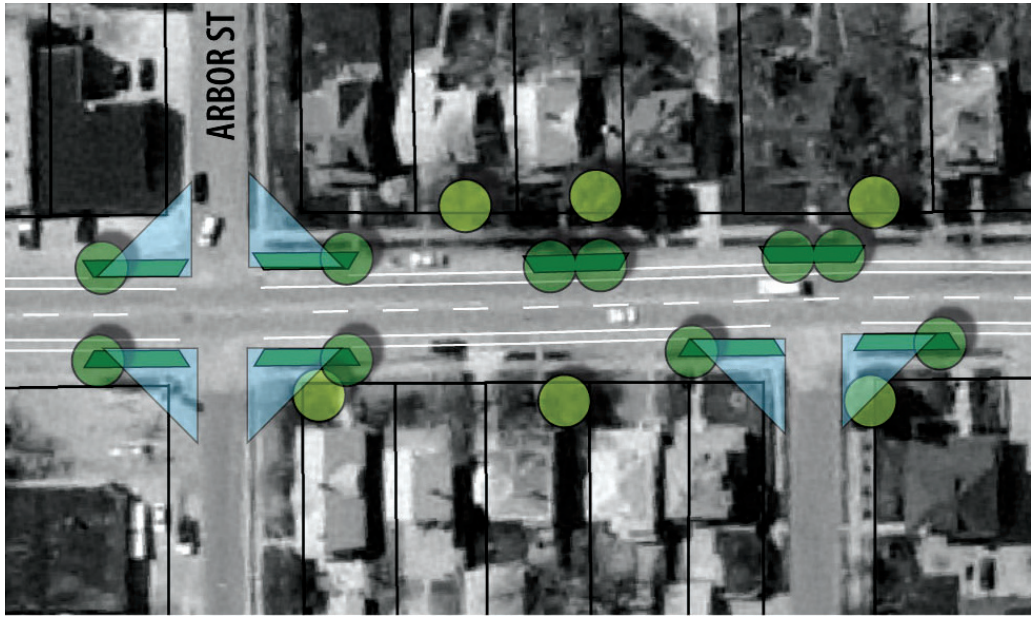



## {32nd Avenue}

### Woolworth *to* Vinton

***Typical Section and Concept:***

- Moving traffic lanes are defined by bicycle lane markings.
- Bicycle lanes established outside of parking lane.
- Parking lane nodes used to provide area for street trees.
- Curb line and existing sidewalk alignment remain.

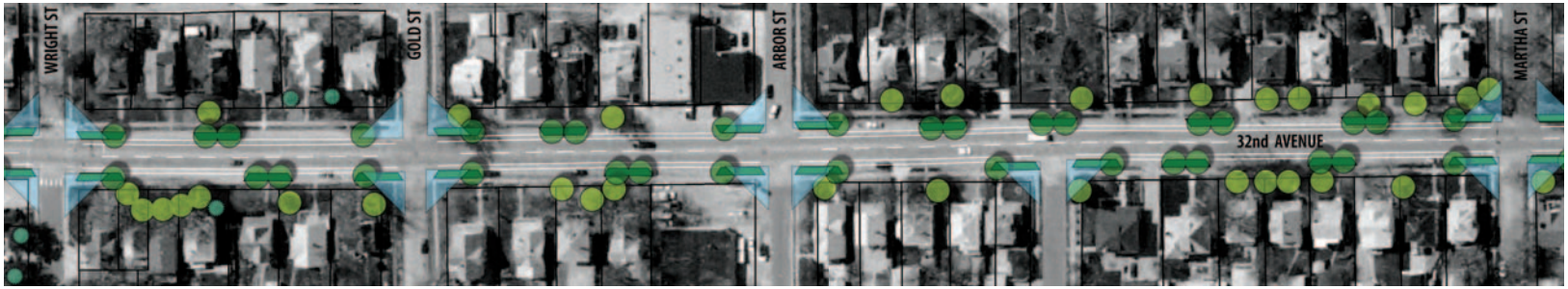



## {32ND AVENUE}

### WOOLWORTH *to* VINTON

***Left:*** Corridor plan illustrating areas for parking lane nodes.

***Below Left:*** Detail at the Arbor Street intersection. This former streetcar stop has a commercial cluster typical of an earlier transit-oriented era.



## {32nd Avenue}

### Woolworth *to* Vinton

***32nd Avenue Before and After***

***Left:*** The current view north of Arbor Street.

***Below Left:*** The same view following proposed retrofit.

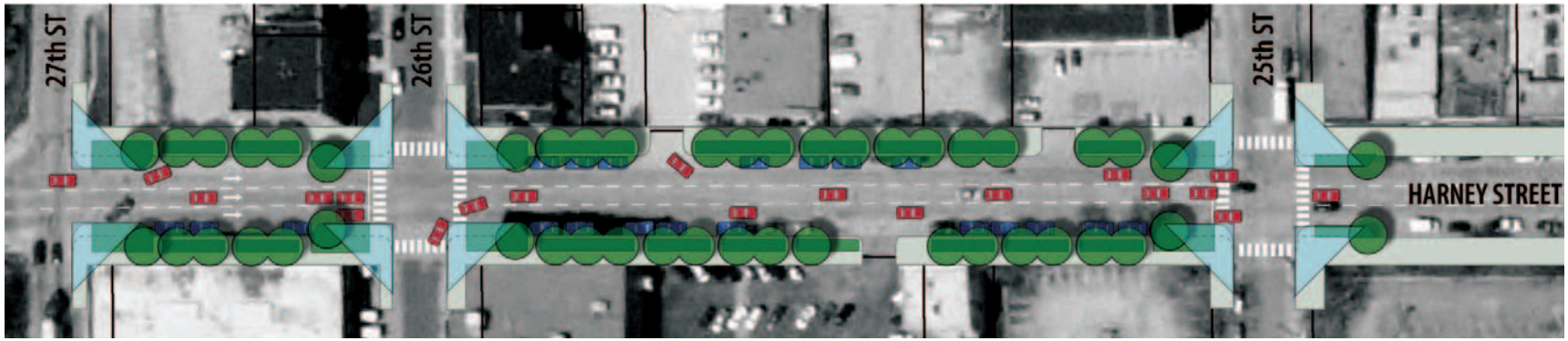
*Existing*

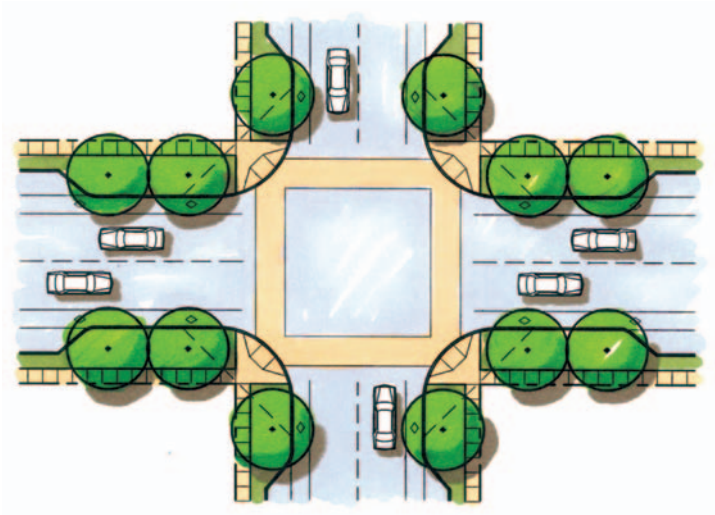
## {Farnam and Harney Streets}

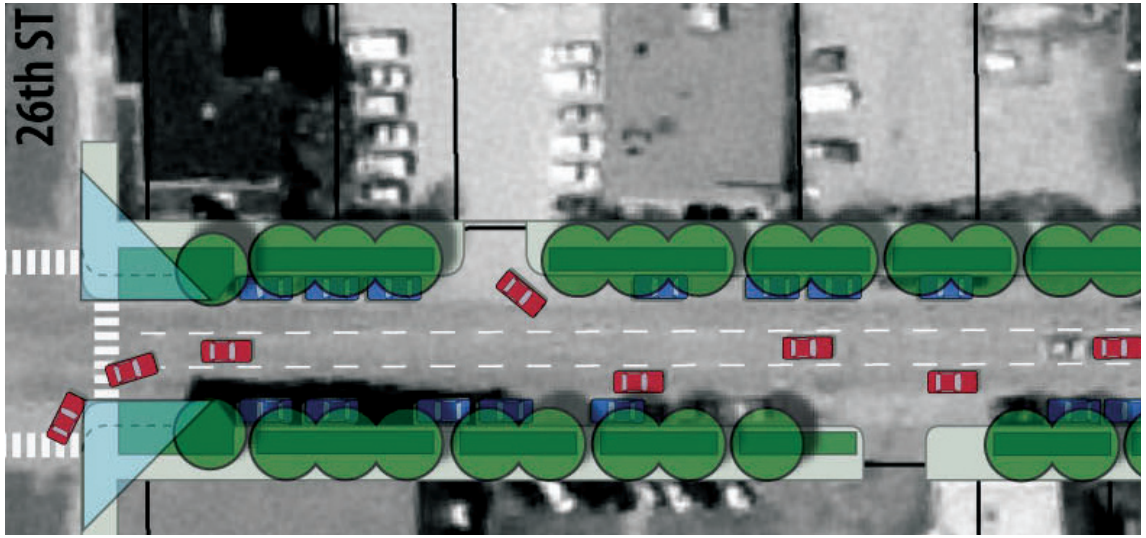
### West of 20th Street

***Typical Sections and Concept:***

- Corner nodes with street landscaping developed at intersections, following intersection retrofit concept.
- Planting beds to replace 20-foot sidewalks along the blocks. Resulting sidewalk against property line is 10 feet, with 8 foot planters and a 2–3-foot maintenance and access strip along curb.
- Regular street tree plantings located within planting beds.








## {Farnam and Harney Streets}

### West of 20th Street

***Harney Street retrofit***

***Above:*** Prototype intersection treatment.

***Below:*** Detailed plan east of 26th Street.

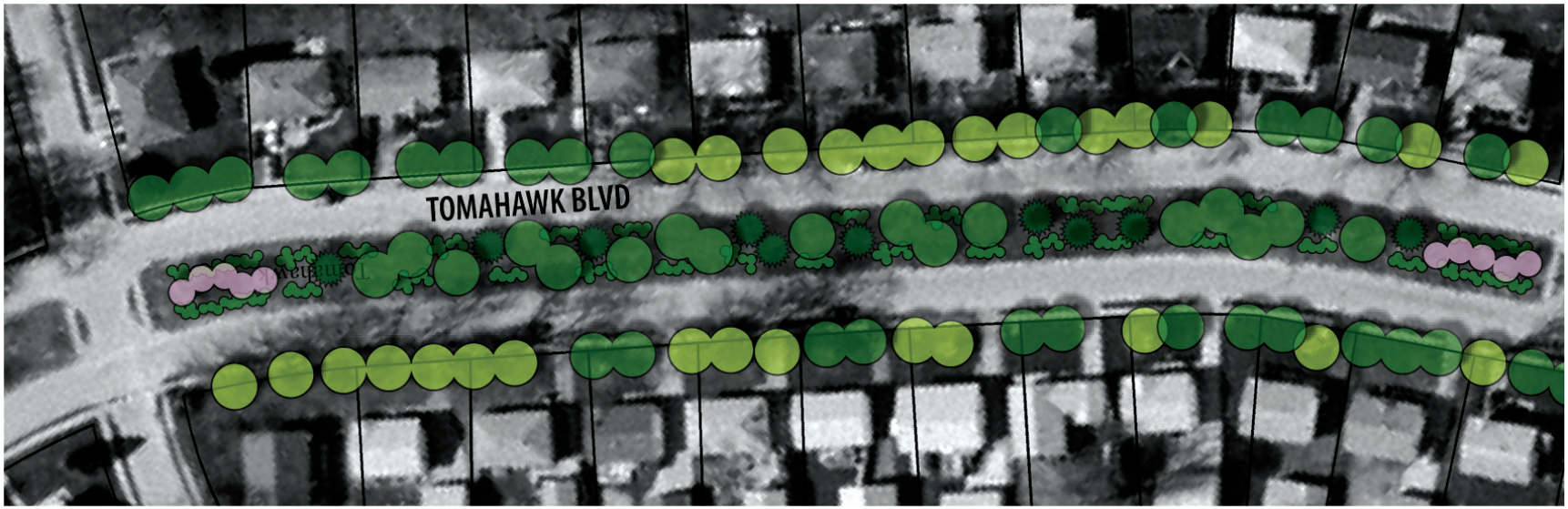
*Existing*

## {Tomahawk Boulevard}

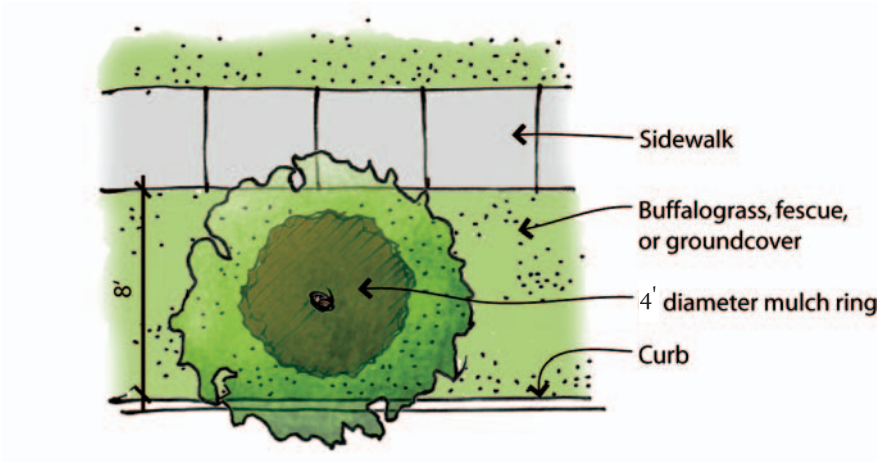
### West of 90th Street

***Concept***

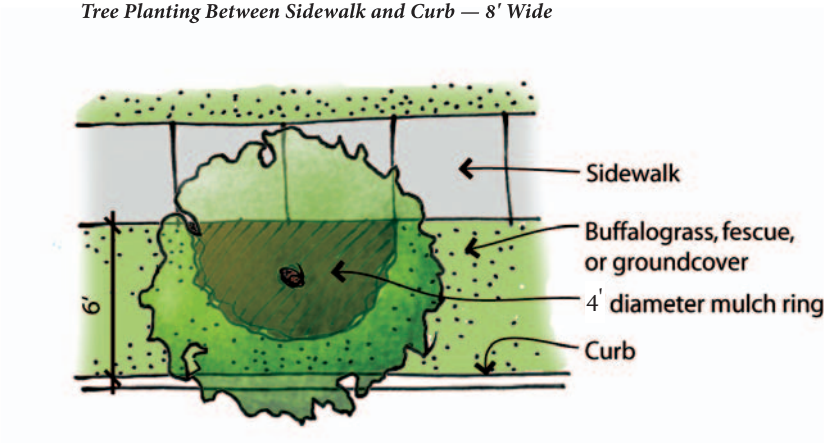
- Additional trees on private property, following a unified design for the boulevard.
- Informal plantings in median to augment existing landscaping. Landscaping will add lower-level plantings and ornamental grasses.



# Chapter v: {Installation and Maintenance Standards}




*Tree Planting Between Sidewalk and Curb — 8′ Wide*




*Tree Planting Between Sidewalk and Curb — 6′ Wide*

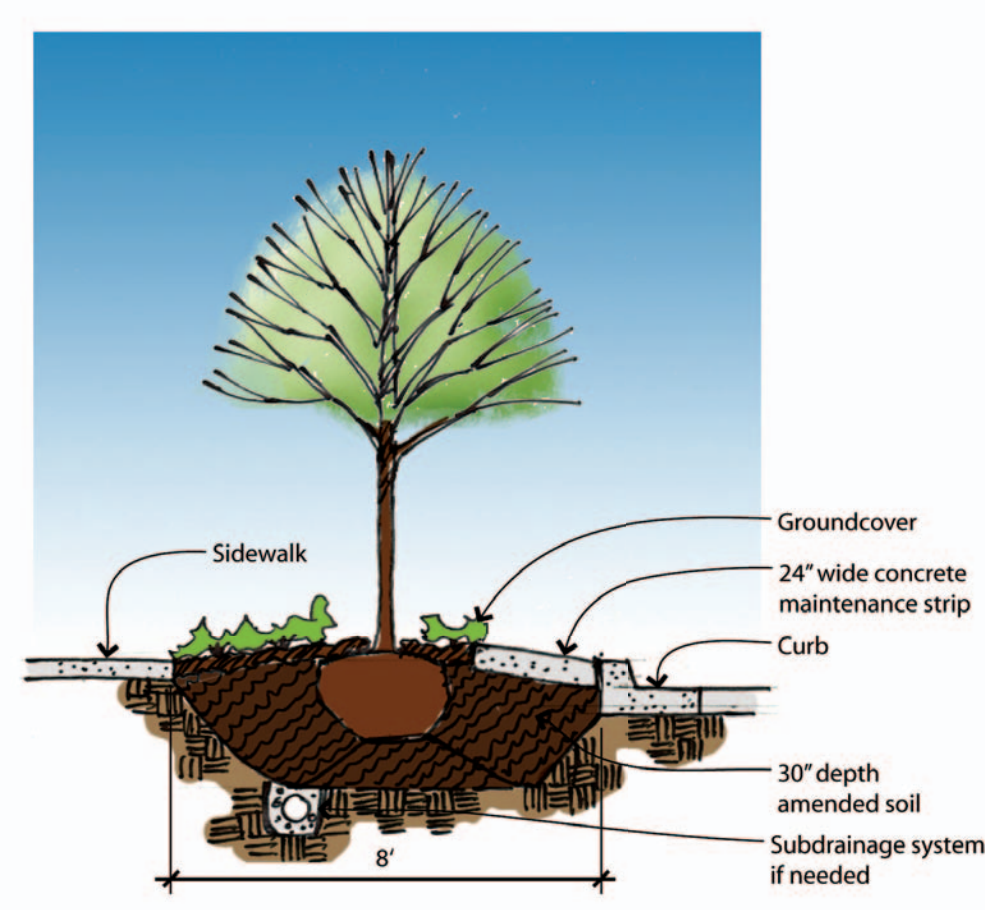
## Installation

With hundreds of miles of streets identified as green streets, we must look for the most cost effective ways to create the Green in green streets. Overstory trees are by far the best value. With their very long lives, ability to cover large areas, capacity to reach over street pavements, and low initial cost, overstory trees continue to give back significant returns on the investment made.

Without question the most desirable location for street trees is the area between the sidewalk and the street curb, defined as the parkway planting area. Trees in this location provide much needed separation between the pedestrian and the vehicle. Traffic slows naturally when trees limit the cone of vision, effectively creating the perception of a more narrow street.

Growing trees in this location is a challenge and takes careful planning. The primary consideration is one of space. It is critical that the tree selected is appropriate for the amount of space available both above ground and below ground. Above ground, the tree must not interfere with overhead utility lines, must be of suitable structure to be pruned with adequate clearance beneath its canopy and cannot interfere with critical site distances. Below ground the tree needs significant soil volume to grow. It is easy to overlook planting space, but the long term health of the tree is directly related to the amount and quality of the soil space that is available.

The distance between the curb and the walk needs to be a minimum of 6 feet—although 8 feet is preferred—in order to support a tree and provide enough space for the trunk and roots. The diagram below illustrate the recommended spacing of the tree with relationship to the curb and walk. Soil preparation should extend the entire width of the tree lawn and to a minimum depth of 30". The immediate area around the tree should be mulched. The remaining tree lawn may be planted with turf. Buffalo grass is a drought tolerant native grass that does well in this situation, especially in areas that are generally open and sunny. In areas that are mostly shade, turf may be planted with a fescue blend.



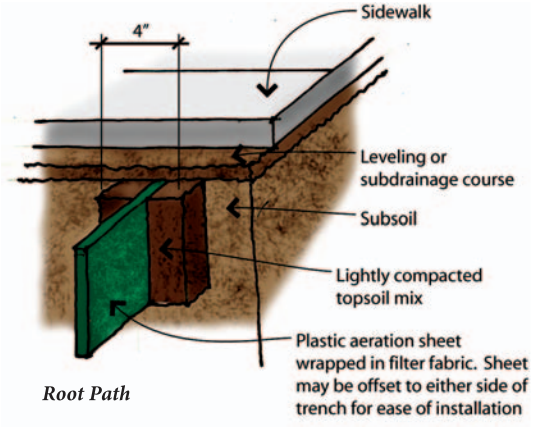

*Tree Planting Between Sidewalk and Curb.*

The recommended amount of soil volume to ensure a beautiful, healthy and vibrant tree (30 feet in canopy diameter) is 400 cubic feet. This is 2 cubic feet for every square foot of canopy. With a 36" planting depth, this requires 470 square feet of root space available and generally, a square or circular root space is more desirable than a long and narrow rectangular space. However, trees are adaptable and if we give them a space to fill with their roots, they typically will do so. Several techniques may be used to expand the available root zone for a street tree, including: providing structural soil under pavements, providing adjacent green space areas for root development, and providing paths for roots under pavements in order to encourage trees to reach available root space on the opposite side of a walk or drive. A landscape architect can provide direction on the best way to provide necessary soil volume to a planted tree.

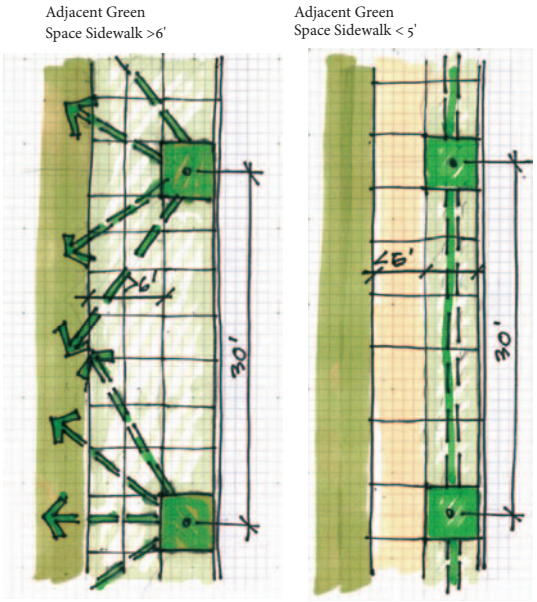
'Structural Soil' is a designed medium of stone and soil which can meet or exceed pavement design and installation requirements while remaining root penetrable and supportive of tree growth. It was developed by Cornell University Urban Horticulture Institute. This strategy of providing soil volume is used under pavements in urban areas and is used for connecting tree wells within a streetscape environment.

Root paths are constructed by trenching a 4" wide by 14″ deep trench fully connecting two soil areas. A 1" thick × 12" tall plastic aeration sheet is inserted along the length of the root path. Top soil or amended soil is lightly compacted around the aeration sheet, filling the trench completely.

Root paths may be used to connect trees planted in paved parkways to adjacent greenspace. Root paths should be placed no more than 4 feet on center in a radial pattern from each tree to the adjacent greenspace.




*Root Path*



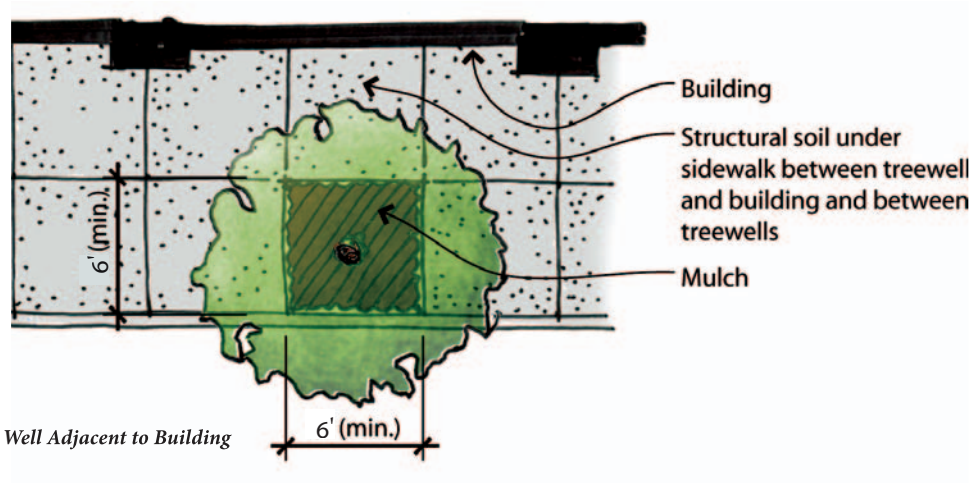

*Root Paths*

*Root Paths may be used to connect tree pits to each other.*

Where the paved parkway—the distance from the back of the curb to the edge of the building—is less than 9' wide no street tree should be planted. However, trees may be planted at intersections and bump out areas. This technique will be well used in retrofit situations. See page 106.

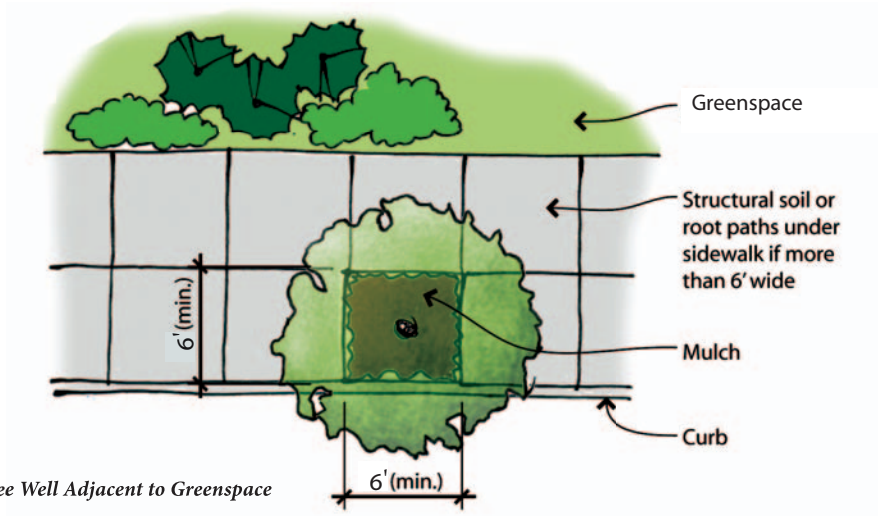
Where the paved parkway is between 9' and 12' wide trees shall be planted in topsoil backfill using a structural soil system between tree pits under pavement areas.

Structural soil—minimum 30" depth—is required under the sidewalk regardless of sidewalk width where trees are planted and there is a structure on the other side of the sidewalk. In such cases root paths are not allowed except to link the parkway planters to each other.




*Tree Well Adjacent to Building*

Structural soil or root paths are not necessary between tree pits and the greenspace if the sidewalk width is 6 feet or less where trees are planted in tree pits and there is greenspace with root access on the other side of the sidewalk. Structural soil or root paths are required between tree pits and the greenspace if the sidewalk width is greater than 6 feet where trees are planted in tree pits and there is greenspace on the other side of the sidewalk. In all cases involving tree pits with grates, structural soil or root paths are required between containers.




*Tree Well Adjacent to Greenspace*

It is far more important to provide excellent growing space for a few trees that thrive per block than to have a block full of trees planted in impossible growing conditions.

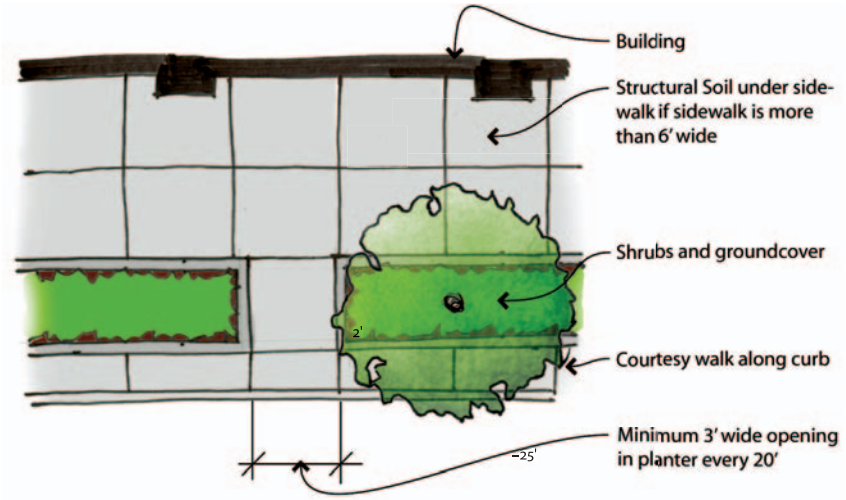
These two photos show the effects of tree growth and appearance with different soil conditions. The photo on the left shows a quality soil condition, where the soil is open to the air, is raised above the subgrade and is large enough to provide adequate moisture. The vegetation and mulch beneath the canopy contributes to the health of the trees by reducing the glare and heat from pavements.

The photo below shows the same species of tree, planted at the same time in a very different soil condition. Unlike the trees on the left, these trees appear to be sick, stressed, and dying.

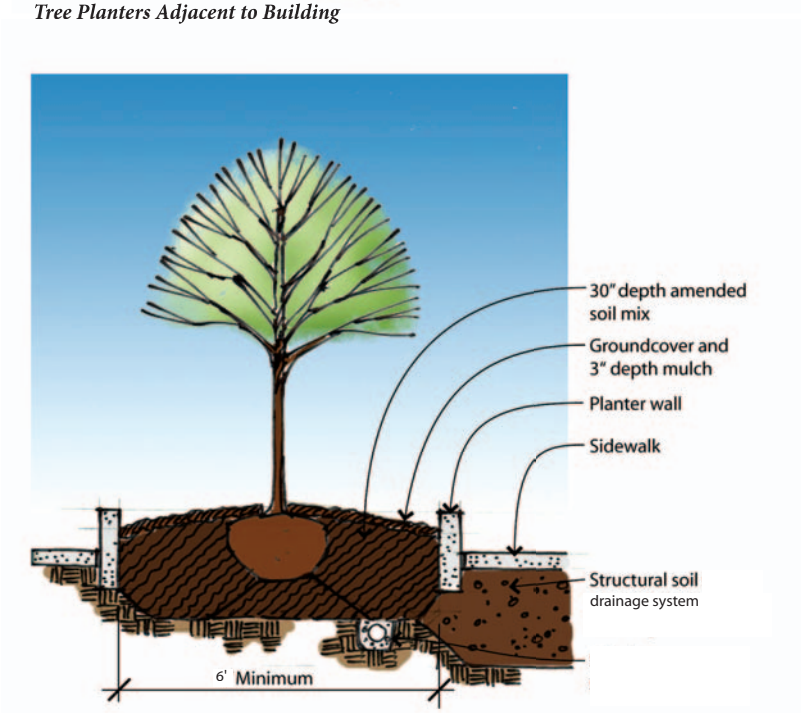
## Trees in Planters

Where the paved parkway is 12' wide or greater, street trees should be planted in a parkway planter using a continuous structural soil system. Planting beds are to be at least 6' wide, and should not exceed 20–25' long. A minimum 3' wide walkway should interrupt the planting area and this pattern or dimension should vary with the pattern of on-street parking. Ground cover rather than turf should be used in planting beds.

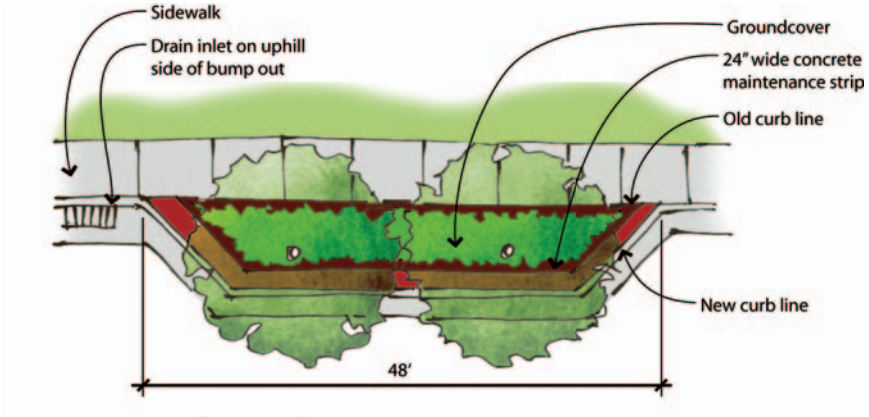
Structural soil or root paths are required below sidewalks slabs between parkways where trees are planted in continuous planters and a greenspace on the other side, when the sidewalk is 6' wide or greater. The adjacent greenspace needs to be wider than 6'.



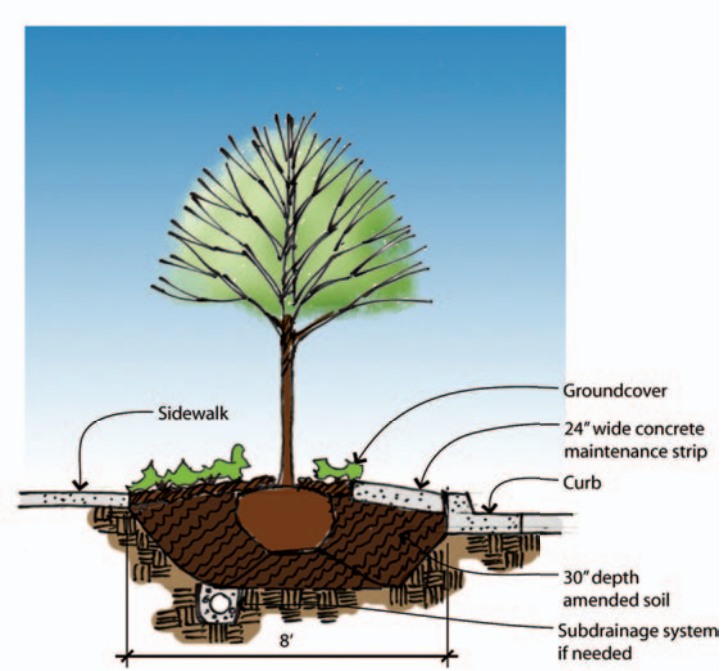

*Tree Planters Adjacent to Building*




*Tree Planter Section*




*Tree Planting "Bump Out" Plan*




*Tree Planting "Bump Out" Section*

## Trees in Retrofit Areas

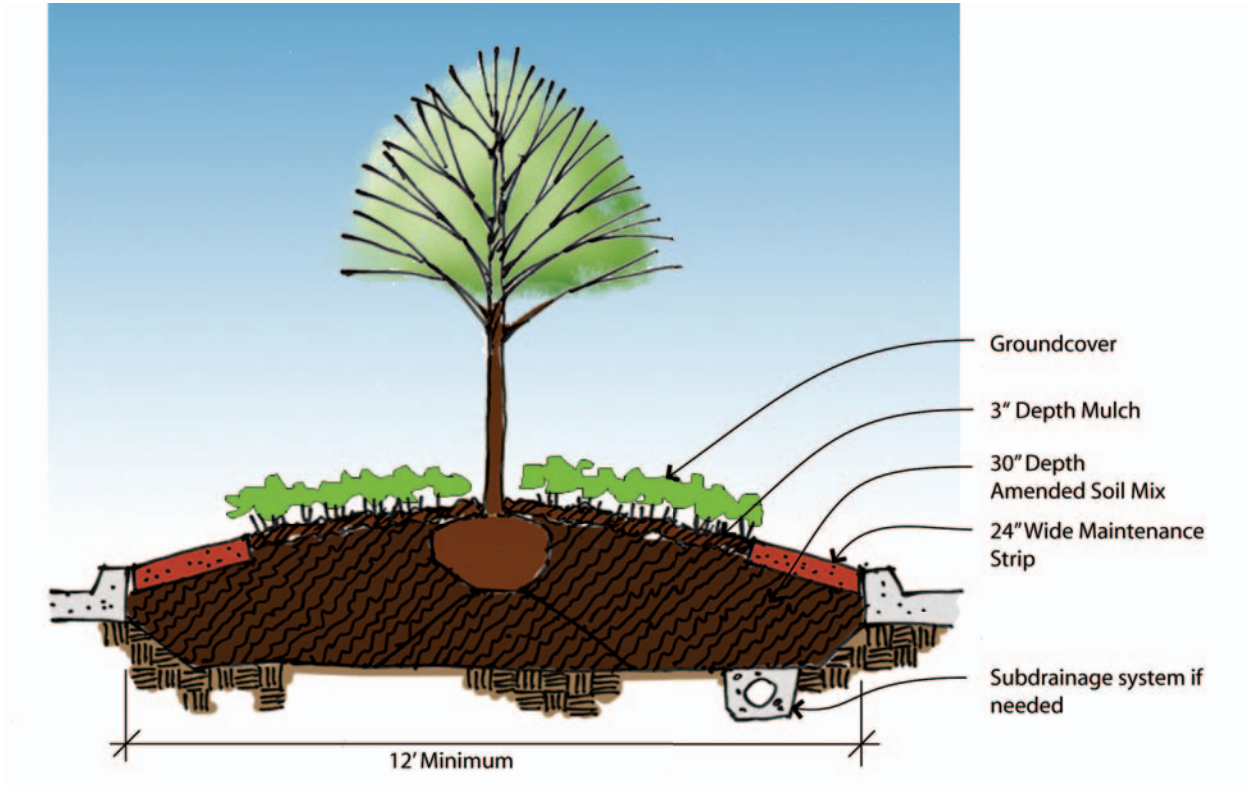
These planting details are for parking lane and corner nodes in retrofit situations. Structural soil should be placed under the adjacent walkways and if there is adjacent greenspace to the sidewalk, root paths should extend under the sidewalk to that greenspace. Subsurface drainage may not be required if percolation tests indicate adequate soil percolation.

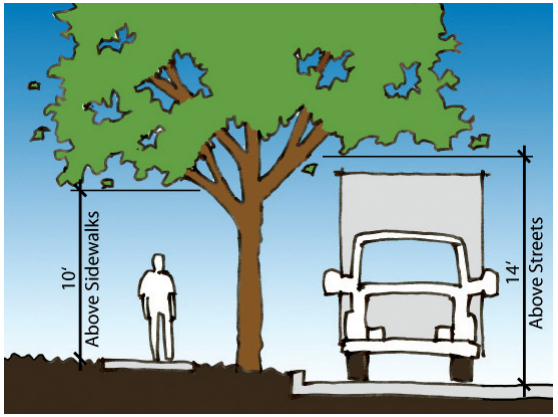
## Trees in the median

The impact of well planted and thriving trees in a roadway median is unparalleled. The effect of a green median is significant in the ability to break up an expanse of pavement. This planting site is a real challenge relative to proper drainage, road salts and chemical applications and having enough quality soil volume to support the tree.

In medians that are over 12 feet wide, successful planting is possible. Generally, the construction soil that is within the median after street construction should be removed to a 30" depth and an amended soil mix brought in to support tree growth. Percolation testing of the subsurface solid should be done prior to the installation of any planting in order to establish water infiltration rates. If these tests confirm that there is adequate soil percolation, subsurface drainage may not be necessary.

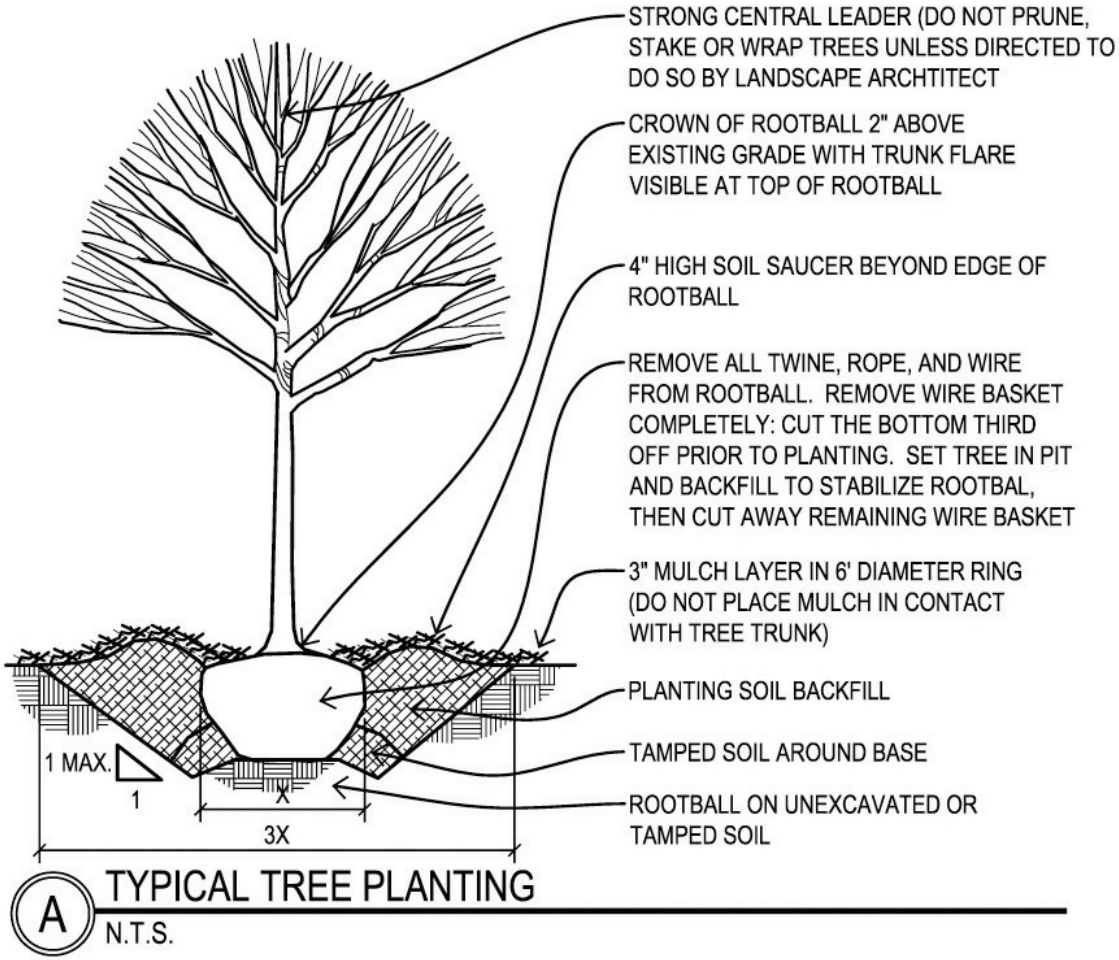
Trees, shrubs, groundcovers, and grasses should be selected that are adapted to Nebraska's climate and are able to survive and thrive without supplemental irrigation. Trees should be selected from the list provided.






***Limb Heights above Sidewalks & Streets***

As trees grow to maturity, it is important to prune them to accommodate pedestrians and vehicles along the street. The Omaha City Code requires a 10 foot clearance above sidewalks and a 14' clearance above streets. Selecting trees with ascending or vase-shaped mature canopies rather than broad or pyramidal forms, will help alleviate the need for pruning.



## Plant types

***Approved Street Trees***

The following trees are approved for placement along the Public Right of Way. Other cultivars and the straight species of plants listed may also be acceptable, providing they match the aesthetic and functional characteristics of their established group. Species with similar characteristics are grouped to provide visual continuity to the street segments while allowing for horticultural diversity.

### {Group 1}

***Large Trees with Round Canopies and Coarse Textured Foliage***

*Acer x freemanii* 'Jeffersred'
Autumn Blaze Maple

*Acer x freemanii* 'Celzani'
Acer Wigrum Black Maple

*Aesculus glabra*
Ohio Buckeye

*Aesculus hippocastanum*
Common Horsechestnut

*Platanus x acerifolia* 'Bloodgood'
Bloodgood London Plane Tree

*Platanus x acerifolia* 'Columbia'
Columbia London Plane Tree

*Platanus x acerifolia* 'Liberty'
Liberty London Plane Tree

*Platanus x acerifolia* 'Yarwood'
Yarwood London Plane Tree

*Platanus occidentalis*
American Planetree

*Quercus macrocarpa*
Bur Oak

*Quercus rubra*
Red Oak

*Quercus alba*
White Oak

*Quercus bicolor*
Swamp White Oak

*Quercus robur*
English Oak

*Quercus muhlenbergii*
Chinkapin Oak

### {Group 2}

***Large Trees with Round Canopies and Fine Textured Foliage***

*Cladrastis kentukea*
Yellow Wood

*Gleditsia triacanthos* var. *inermis*
Thornless Honeylocust

*Gleditsia triacanthos* var. *inermis* 'Christie'
Halka Honeylocust

*Gleditsia triacanthos* var. *inermis* 'Moraine'
Moraine Honeylocust

*Gleditsia triacanthos* var. *inermis* 'Shademaster'
Shademaster Honeylocust

*Gleditsia triacanthos* var. *inermis* 'Imperial'
Imperial Honeylocust

*Gleditsia triacanthos* var. *inermis*
Thornless Honeylocust

*Gymnocladus dioicus*
Kentucky Coffee Tree

*Phellodendron amurense* 'Macho'
Amur Cork Tree Macho

*Phellodendron amurense* 'His Majesty"
Amur Cork Tree His Majesty

*Phellodendron amurense*
Amur Cork Tree

*Sophora japonica* 'Regent'
Regent Scholar Tree

*Sophora japonica*
Japanese Pagoda Tree, Scholar Tree

*Sophora japonica* 'Halka'
Millstone Scholar Tree

*Ulmus parvifolia* 'Dynasty'
Dynasty Elm

## {Group 3}

***Large Trees with Oval Canopies and Fine Textured Foliage***

*Celtis occidentalis* 'Prairie Pride'
Prairie Pride Hackberry

*Celtis occidentalis* 'Chicago Land'
Chicago Land Hackberry

*Celtis occidentalis* 'Windy City'
Windy City Hackberry

*Metasequoia glyptastroboides*
Dawn Redwood

*Quercus imbricaria*
Shingle Oak

*Robinia pseudoacacia* 'Bessoniana'
Purple Robe Locust

*Taxodium distichum*
Bald Cypress

*Tilia cordata* 'Chancellor'
Chancellor Littleleaf Linden

*Tilia cordata* 'Glenleven'
Glenleven Littleleaf Linden

*Tilia cordata* 'Greenspire'
Greenspire Littleleaf Linden

*Tilia cordata* 'Olympic'
Olympic Littleleaf Linden

## {Group 4}

***Large Trees with Oval Canopies and Coarse Textured Foliage***

*Catalpa speciosa*
Catalpa

*Ginkgo biloba*
Ginkgo

*Ginkgo biloba* 'Autumn Gold'
Autumn Gold Ginkgo

*Gleditsia triacanthos inermis* 'Skyline'
Skyline Honeylocust

*Liriodendron tulipifera*
Tulip Tree

*Quercus coccinea*
Scarlet Oak

*Quercus velutina*
Northern Black Oak

*Tilia americana* 'Redmond'
Redmond Basswood

*Tilia sp* 'Sterling'
Sterling Linden

*Tilia sp* 'Green Meadows'
Green Meadows Linden

*Tilia Tomentosa*
Silver Linden

*Ulmus* 'Frontier'
Frontier Elm

*Ulmus* 'Discovery Elm'
Discovery Elm

*Ulmus* 'Morton Glossy'
Morton Glossy Elm

## {Group 5}

***Large Trees with Spreading Canopies and Fine Textured Foliage***

*Celtis occidentalis*
Hackberry

*Celtis Occidentalis* 'Magnifica'
Magnifica Hackberry

*Ulmus* 'Accolade'
Accolade Elm

*Ulmus americana* 'Delaware #2'
Delaware American Elm

*Ulmus americana* 'Washington'
Washington American Elm

*Ulmus* 'Princeton'
Princeton Elm

*Ulmus wilsoniana* 'Prospector'
Prospector Elm

*Ulmus* 'Morton Plainsman'
Vanguard Elm

*Ulmus* 'Sapporo'
Autumn Gold

## {Group 6}

***Large Trees with Columnar Canopies***

*Carpinus betulus* 'Fastigiata'
Upright European Hornbeam

*Ginkgo biloba* 'Lakeview'
Lakeview Ginkgo

*Ginkgo biloba* 'Princeton Sentry'
Princeton Sentry Gingko

*Pyrus calleryana* 'Capital'
Capital Callery Pear

*Pyrus calleryana* 'Chauticleer'
Chanticleer Pear

*Quercus robur* 'Fastigiata'
Upright English Oak

*Quercus robur* 'Long'
Regal Prince Oak

*Quercus robur* 'Asjes'
Rosehill Oak

*Taxodium distichum* 'Shawnee Brave'
Bald Cypress

## Plant types

***Approved Ornamental Trees***

The following ornamental trees are approved for placement within medians at divided roadway sections, accent areas and under powerlines.

### {Group 1}

***Small Trees with Round Canopies***

*Acer ginnala*
Amur Maple

*Crataegus phaenopyrum*
Washington Hawthorn

*Crataegus punctata inermis* 'Ohio Pioneer'
Thornless Ohio Pioneer Hawthorn

*Koelreuteria paniculata*
Goldenraintree

*Malus baccata* 'Jackii'
Jackii Crabapple

*Malus* 'Professor Sprenger'
Professor Sprenger Crabapple

*Malus* 'Sugartyme'
Sugartyme Crabapple

*Malus x zumi* 'Calocarpa'
Calocarpa Crabapple

*Robinia pseudoacacia* 'Inermis'
Globe Locust

*Syringa reticulata* 'Summer Snow'
Summer Snow Japanese Tree Lilac

### {Group 2}

***Small Trees with Oval Canopies and Dense Branching***

*Acer platanoides x truncatum* 'Norwegian Sunset'
Norwegian Sunset Maple

*Acer platanoides x truncatum* 'Pacific Sunset'
Pacific Sunset Maple

*Acer campestre* 'Deborah'
Deborah Hedge Maple

*Amelanchier* 'Autumn Brilliance'
Autumn Brilliance Serviceberry

*Amelanchier* 'Snow Cloud'
Snow Cloud Serviceberry

*Amelanchier* 'Spring Flurry'
Spring Flurry Serviceberry

*Malus* 'Adams'
Adams Crabapple

*Malus* 'Centurion'
Centurion Crabapple

*Malus* 'Indian Summer'
Indian Summer Crabapple

*Malus* 'Prairie Fire'
Prairie Fire Crabapple

*Malus* 'Purple Prince'
Purple Prince Crabapple

*Malus* 'Robinson'
Robinson Crabapple

*Prunus virginiana* 'Shubert'
Shubert Choke Cherry

*Syringa reticulata* 'Ivory Silk'
Ivory Silk Japanese Tree Lilac

*Syringa reticulata* 'Regent'
Regent Japanese Tree Lilac

## Green Streets Maintenance

The care and ongoing maintenance of the tree and supporting landscape is of major importance. A well maintained landscape is one that commands respect and projects beauty, where as a poorly maintained landscape is one that speaks to neglect and abuse and can in fact greatly downgrade the overall impression of a city or public space.

The proper maintenance of a tree is critical within the initial period of planting. Without consistent watering of new plant material major portions of the plantings will die. Omaha's climate cannot be relied upon to provide consistent rains. If proper establishment maintenance of the tree plantings cannot be provided, it is futile to plant.

The City of Omaha has used several different strategies in the past to provide the necessary maintenance of the public landscape of streets with mixed results. This Green Streets plan proposes to use the best of these approaches and is broken into two categories.

For those streets that are the most intensively planted, using a private contractor to install the trees and provide ongoing maintenance works well. An example of this type of landscape is the Abbott Drive Corridor connecting downtown Omaha to the Airport. Here we have a landscape that consists not only of overstory shade trees, but includes large plantings of shrubs and perennials, grasses, and a median that is primarily shrubs and perennials as well. The exception to the Abbott Drive system is that we would not include a full irrigation system for the right of way. Instead we would develop a xeriscape/ low water requirement planting palette that would require an initial period of watering after which the plants would thrive with only occasional watering.

In order to ensure the success of this type of intensive planting, this plan proposes the development of a privately held and maintained fund for planting and maintenance. The City would provide oversight on the design, installation, and maintenance, with the strong private partner administering the fund and soliciting private contributions for the installation and maintenance of the green street. A private landscaping company would contract to provide the ongoing maintenance of this landscape.

For those street segments that are primarily planted with trees only, using a contractor to plant the trees and then providing direct maintenance by city crews has proven to be the most effective method of ensuring success and establishment of the trees. Over the first 5 years of the planting, these city crews would water, weed, prune and care for the new trees on a frequent schedule. As the plantings begin to establish themselves and thrive, the schedule of watering can move to one of infrequent waterings only during the most significant dry periods, however ongoing maintenance is still required to keep the landscape in a healthy and safe condition.

*So how does a city meet the challenges of finding the resources necessary to maintain a lively and green system of public streets*? In a period of overall diminishing city staff and reducing budgets, it is a real challenge to find funds for new programs and initiatives. This plan recommends that maintenance for the initial period of 3 to 5 years be included in the up-front funding costs of the capital investment. In this way, we can be assured that each of the streets that are planted will have the care that is imperative at that initial period.

Today's cost of maintaining an intensive landscaped street such as Abbott Drive averages $20,000 per year per mile. The chart that follows illustrates the tasks included. If a full irrigation system were implemented, the costs increase by about $10,000 per year per mile.

### Landscape Maintenance Schedule

***January–March***
Remove litter from planting beds and right of way once each month. Remove any debris caught in trees and shrubs. Prune any damaged branches as needed.

***April–October***
Remove litter from planting beds once each month Begin mowing turf grass areas this month on a 10 day minimum cycle. Replenish mulch to a full design depth in all shrub beds and tree bases in April. Begin watering as required. For each week that there is less than ½" of rain for the week, apply 1" of water the entire shrub bed length and width. Apply 1" of water over the entire root zone of each tree. Monitor all planting beds for weedy conditions and take appropriate measures to maintain all plantings in a weed-free condition.

***November–December***
Remove litter from planting beds and right of way once each month. Remove any debris caught in trees and shrubs. Prune any damaged branches as needed.

The cost of maintaining a less intensive streetscape of newly planted trees only averages $5,000 per year per mile. This assumes that a city crew composed primarily of summer seasonal labor is employed for 6 months equipped with a watering truck, hand tools, and other incidental equipment. The seasonal crew would water trees, maintain mulch, prune branches as necessary, and remove litter within the plantings.