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Houf Peterson
Righellis Inc.**

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205 SE Spokane Street, Suite 200, Portland, OR 97202
PHONE: 503.221.1131 www.hhpr.com FAX: 503.221.1171

February 11, 2011

Kim McMillan
City of Tigard
13125 SW Hall Blvd
Tigard, Oregon 97223

Re: Alternative Analysis Report
Tigard Main Street – Green Street
RR xing to 99W
ODOT Project Key #15600

Kim

The Main Street project received funding through the Metro Transportation Priorities 2008-11 Program / Green Street Demonstration: Retrofit Application. The key points in the application states that the project be in accordance with the concept design developed through the Tigard Streetscape Design project. The Tigard Streetscape Design and the application list the widening of sidewalks to create a pedestrian friendly environment and green street components to treat, infiltrate, and detain storm water prior to discharge into Fanno Creek as pertinent features. The application also states that impervious surface area is to be reduced through the green street treatments by up to 10,000 square feet.

The existing configuration of the roadway, with building faces at the back of the sidewalk in several locations, prevents roadway or sidewalk widening for a majority of the project length. See the attached existing conditions strip map and section drawing. The 70 foot wide roadway section consists of two lanes of traffic, with parking on both sides of the street, and sidewalks typically 8' wide. The travel lanes are 13' wide adjacent to the 8' wide parallel parking, and 17' wide adjacent to the 16' angled parking. Incorporating wider sidewalks and green street treatments will require the reduction in the roadway travel lane widths and/or parking widths between the curbs.

The alternative analysis effort listed in the WOC included the preparation of strip maps and sections for three (3) project alternatives with Green Street Streetscape Improvements including the following alternatives:

1. Current Roadway Section.
2. Roadway Section with no angled parking and added bike lane.
3. Roadway Section with no angled parking and increased pedestrian corridor.

The alternative analysis also included analysis of roundabout at the south west end of Main Street, at Maplewood Drive. The task included preparation of sketches and evaluation of the various options for the roundabout configuration including mini, urban compact and urban single, and the various locations available. From this initial analysis a preliminary plan will be developed of the proposed configuration including the following considerations:

1. ODOT design parameters related to 99W intersection.
2. City design parameters related to circulation and access.



3. Traffic analysis for the PM Peak hour utilizing the NCHRP report 572 method and analysis procedure manual (Ch 7, section 7.3.6) to determine the most efficient roundabout configuration.
4. Traffic analysis using Synchro/Sim traffic for the 99W/Main Street intersection to analyze intersection operations (v/c) and 95th percentile queuing as it pertains to its interaction with the roundabout.
5. Access to adjacent properties.
6. Pedestrian and bicycle accessibility requirements.
7. Downtown entrance landscape treatment possibilities.

Alternative Main Street Configurations

Alternative configurations were prepared with variations in the parking configuration, sidewalk widening, landscape treatment, and traffic lanes, with the goal to impact the total parking count as little as possible while meeting the requirements of the Trimet application and the vision from the Tigard Streetscape Design. Widening of the roadway footprint is not proposed with this project. Preliminary plans were developed with 60°, parallel, and 45° parking configurations, 0 to 4' sidewalk widening, linear and bulb out green street treatments, two lanes of vehicular traffic, and the elimination of the center left turn lane at Burnham Street. The results of the various configurations were presented to the City Center Advisory Committee and at Open Houses for review and comment from the CCAC commissioners, business owners, and the general public. The City also established a Parking Discussion Group to review the alternative configurations for their input.

The various options discussed below all include the median treatment at Maplewood.

Green Street Treatments

The initial step in the alternative analysis is to add green street treatments to the existing roadway configuration. The landscape features of a Green Street add to the aesthetics of the street as well as provide for treatment of storm water runoff from the street and sidewalks. The runoff needs to be intercepted in the gutter before it flows into the catch basins and enters the pipe system. In order to provide treatment the facility needs to either be long and narrow or short and wide. A linear facility works best when retrofitting a street with existing slopes and curbs. The linear landscape features described below will provide the primary area for storm water runoff treatment facilities for the street and sidewalks. The bulb out landscape features at driveways, intersections and crosswalks are not ideally suited for treatment; however they will reduce the impervious area and provide enhanced aesthetics. These facilities also provide speed control by narrowing the vehicular lanes and improve pedestrian safety by reducing the crosswalk length. The linear and bulb out green street features were incorporated into the street section with the various parking configurations listed below.

Parking Configurations

The existing parking configuration for Main Street from the RR to 99W consists of 27 parallel parking stalls on the south side and a mix of 11 parallel and 39 angled parking stalls on the north side, for a total of 77 stalls per the Downtown Parking Existing Conditions Analysis. The angled parking stalls are at 60 degrees to the curb. Sixteen additional parallel stalls exist on Tigard, Electric and Burnham Streets adjacent to the project. Additional on street parking on Burnham may be available when the street is completed. The 285 off street public and private parking stalls were not affected by this analysis.

Option #1: Current 60° Parking with Green Street Streetscape

The current roadway section, with two lanes, 60° angled parking on the north side and parallel parking on the south, will provide a single 2.5' wide sidewalk widening by tightening the lane widths. Bulb out components were added at the intersections of Tigard, Burnham and Maplewood, and at the proposed crosswalks at Tigard, Burnham, Fanno Creek, and east of Maplewood. A landscape strip was also installed at the west end of the parking strip on the south side of the road.



This configuration does not provide for treatment of storm water with landscape planters. Treatment will need to be provided with filter catch basins. This option does not achieve the sidewalk widening or green street goals listed in the application or the Tigard Streetscape Design. Therefore this option is not feasible and a strip map was not prepared. See the attached street section for dimensions. This option is a basis for comparison of the various configurations for parking, sidewalks, and storm water treatment. This impacts the parking by eliminating 3 stalls from the existing 60° configuration with the new bulb outs for green street treatments. It is assumed that the current pull out bus stops will be moved into the travel lanes and be replaced with parking stalls, and the center turn lane at Burnham will be removed. See the attached street section for dimensions.

Option #2: Bike Lanes with No Angled Parking and Green Street Streetscape

Designated bike lanes are typically 6' wide lanes between the parking and travel lanes. The width of bike lanes with the two 12' wide through lanes totals 36' wide, leaving 18' for parking, sidewalk widening, and lineal treatment facilities. Parallel parking on each side leaves only 2' for green street treatments. Combining the bike lanes with the travel lanes for a shared configuration reduces the 18' lane to 15' wide. This provides for 4' wide green street treatments on both sides. However the lack of sidewalk widening does not meet the goal listed in the application. We propose that due to the low speed of the traffic with the proposed improvements; bicyclist can merge with the vehicular traffic safely, eliminating the need for designated bike lanes. A strip map for this plan was not developed further. See the attached street section for dimensions.

TIGARD MAIN STREET GREEN STREET - Alternative Matrix Table

Component	Green Street Treatment with			Maximum Parking Count
	Current Configuration	Bike Lanes	Increased Pedestrian Corridors	
Landscape Area	2500 sf	4000 sf	7000 sf	9000 sf
Storm Water Treatment	No	Yes	Yes	Yes
Sidewalk Width	8'	8'	12'	8'
Sidewalk Furniture	No	No	Yes	No
On Street Parking South Side	31 Parallel	33 Parallel	33 Parallel	33 Parallel
On Street Parking North Side	43 Angled 60°	27 Parallel	27 Parallel	32 Angled 45°
Total Parking	74	60	60	65
Bike Lanes	No	Shared	No	No
Speed Control	Yes	No	Yes	Yes
Crosswalks	Yes	Yes	Yes	Yes

Option #3: Increased Pedestrian Corridor with Dual Parallel Parking and Green Street Streetscape

This option widens the existing 8' wide sidewalks to 12' wide to meet the concept design developed through the Tigard Streetscape Design project. The width of two travel lanes plus 8' parallel parking



and 4' sidewalk widening on both sides, leaves 6' for green street treatments and curbs. This width can be enhanced to 8' wide for two linear treatment planters by reducing the parallel parking to 7' wide. The parallel parking stalls need to allow for the passenger in the vehicle to get out of the car safely when parked against the curb. Therefore the top of the curb is widened to 18" wide to allow for passengers to exit the car and walk to the landscape strip crossing. The 18" wide curbs against the parallel stalls leaves 30" for the available width of the linear treatment facility, the minimum amount. This option was enhanced with the addition of bulb outs at most driveways, increasing the total green street area, and improving the driveway transition, and improving speed control. This option reduces the Option #1 current parking by 14 stalls. This option is the recommended configuration for dual parallel parking. See the attached street section for dimensions.

Option #4: Maximum Parking with 45°/Parallel Parking with Green Street Streetscape

In order to maximize the parking we prepared a plan with 45° angled parking on the north side, leaving the parallel parking on the south side. This configuration adds 5 stalls to Option #3 dual parallel parking. To achieve this the sidewalk widening is eliminated on both sides of the road and the linear green street facility is reduced on one side from 4' to 3' including the curb. The increase in total green street landscape area is due to the deeper stall depth of parallel vs. angled parking, creating wider bulb outs. This option reduces the Option #1 current parking by 9 stalls. This option is the recommended configuration for angled parking. See the attached street section for dimensions.

Roundabout (Median Treatment) Purpose

The primary purpose of the proposed roundabout is to provide a turnaround at the southwest end of Main Street. There are no intersecting streets or blocks that provide a u-turn for circulation on this end of Main Street. Vehicles which desire to return back on Main Street for a destination in the opposing direction are required to use private properties or travel across 99W for a legal turn around. The secondary benefits of the roundabout are to provide an area for downtown Tigard signing and an entrance treatment, improve the safety of the Maplewood intersection, and slow traffic through the downtown area. A similar roundabout / turnaround will be considered for the opposite end of Main Street in the future.

Roundabout Optional Configurations

The Maplewood intersection is the logical location for a roundabout. Moving it closer to 99W will impact storage capacity for the westbound Main Street traffic. Moving it to the east would either put it closer to the bridge or create an offset configuration for the Maplewood access and impact more business access on both sides of Main Street. The proposed location will likely require the closure of one of two accesses to the property to the north which is impacted by losing five parking stalls. An access drive to the south is proposed to be relocated into the Maplewood Drive access as it is too close to the roundabout exit lane.

The configuration of the roundabout needs to provide a 20 mph route through the curves for through traffic, provide access to the apartments on Maplewood, and allow a turnaround for all vehicles typically present on Main Street. The outer curb radius of a mini roundabout is typically less than 80 feet. A traffic lane inside this circle will reduce the inner curb radius too much to allow a 180 degree turn by trucks. The foot print of the entire roundabout is smaller however the lack of providing a u-turn negates this.

A compact urban roundabout is slightly larger with an outside radius of 80 feet to 100 feet. We have completed a conceptual layout for this type of roundabout and have concluded that it will provide the necessary turn around and access capabilities, and provide a center island for landscaping. A WB-40 moving van will be able to make the necessary turns into and out of the apartment complex in all directions.

A standard single lane roundabout uses an outside curb radius of more than 100 feet. It will improve the turning radius for u-turns and truck access; however it will require a larger footprint, impacting adjacent properties more with minimal benefit and increase speeds.

The location of the compact urban roundabout was selected with the least amount of impact onto adjacent properties. The proposed location places the outer radius of the roundabout tangent to the current curb returns at Maplewood Drive. Moving the roundabout to the south will require substantial reconstruction of the access into the apartment complex and parking area due to the sharp curvature of the access just into the site. Shifting the roundabout to the north increases the impact to the parking lot for the property, likely requiring total acquisition of the property. The proposed location will reduce the parking for the north property from 10 to 5 stalls which is appropriate for the size of the building, and will limit the amount of reconstruction to the Maplewood access. See the attached concept plan.

Roundabout Traffic Analysis

The proposed roundabout location was evaluated to determine if it impacted the 99W traffic signal to the west. ODOT reviewed the analysis and expressed concerns on the possibility of vehicles turning left from the Maplewood intersection, blocking the east bound Main Street traffic. Based on the chance that this could create a back up onto 99W the roundabout was revised into a median treatment as discussed below.

Median Treatment

The configuration of the roundabout transformed into a median treatment to lessen the possibility of backing westbound traffic up and to improve the flow of Main Street traffic through the intersection. Traffic exiting Maplewood is proposed to remain as a stop controlled movement and the Main Street left turn and u turn movement is proposed as a yield controlled movement. The installation of the median in Main Street at the Maplewood intersection will not adversely affect the 99W intersection as the 99W and Maplewood intersections will function similar to the current operation. The vehicle queue for the Main Street west bound left, through and right turning vehicles is not reduced. The delay for vehicles wishing to make the new u-turn or make a left turn into or out of Maplewood will have the same delay as they have today. The benefits of providing a u-turn throughout the day will allow better use of parking from one side of the street to the other. The median will reduce traffic speeds and provide aesthetic enhancements for the downtown businesses. See the attached concept plan.

Roundabout Impacts

The accessibility of pedestrians and bicycles has not been impacted by the median treatment. Sidewalks with ADA accessibility are provided continuously through the median treatment and along Main Street. A cross walk has been integrated into the layout just east of the roundabout to facilitate a safe crossing of Main Street. With the upgrade of the ADA ramps and installation of the cross walk, the pedestrian accessibility has been improved. The length of the pedestrian route has increased slightly but will not deter or create a short cut potential. Bike facilities are not currently provided and designated lanes are not proposed. The median treatment provides 15' wide lanes to allow for shared usage of vehicles and bikes.

Vehicle safety will be increased by providing a safe refuge for a vehicle making the left or u-turn on the west and east end of the median. Safety will also be improved by reversing the flow of traffic in the loop around the brew pub and the Karate center and by combining this access with the apartment access.

Recommended Main Street Configuration

The dual parallel parking configuration meets the long range goal stated in the Tigard Streetscape Design report better than the 45° parking option, however, the CCAC and the Parking Discussion group favor the 45 degree parking configuration. The primary difference between the two options is

the 5 parking stalls gained with the 45° parking configuration, offset by the addition of sidewalk widening on both sides of the street from Burnham to Maplewood with the dual parking configuration. Storm drain treatment can be achieved in either configuration. The convenience of maneuvering into and out of a 45° parking stall is easier than a parallel stall, only if there is only one parallel stall available. The 70% usage of the parking spaces from the parking study indicates that there will be adequate parking capacity with the dual parking configuration. The improved usage of off street parking through better signage as presented by the parking consultant will reduce the need for on street parking.

The median treatment will provide the desired u turn capability without impacting the 99W traffic signal capacity. The impacts from the median treatment include acquisition of a sliver of right of way and 5 parking stalls from the acupuncture business, a sliver of right of way across the frontage of the access to the apartment complex, and revisions to the loop drive around the brew pub and Karate businesses. The median treatment will create an island in the center of the street which can be enhanced to provide a landscape entrance feature. The costs associated directly with the median treatment are approximately \$100,000. We recommend the installation of the median to enhance the Main Street circulation, as a location for downtown Tigard signage, and for entry treatment aesthetics.

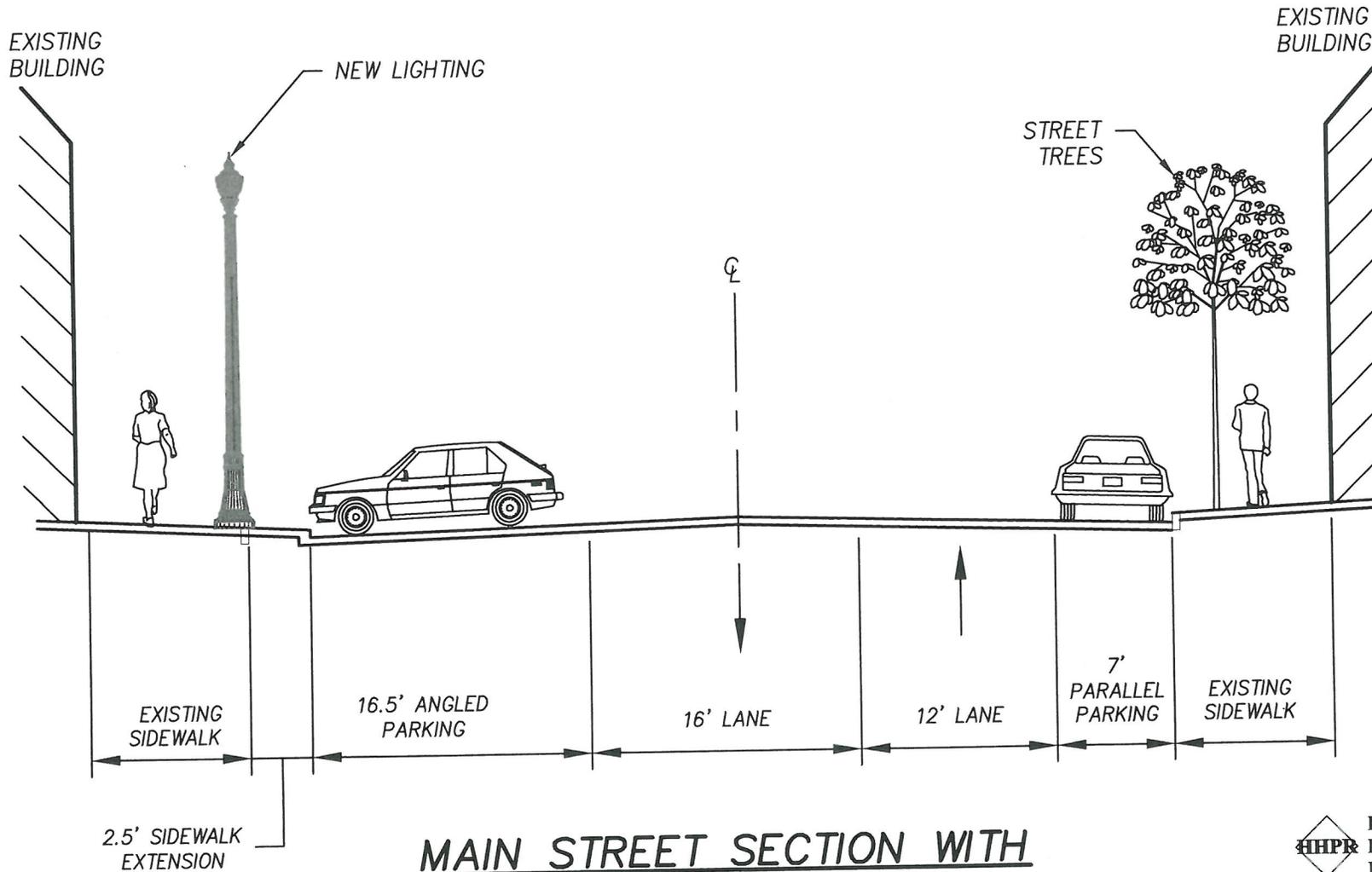
Sincerely,
HARPER HOUF PETERSON RIGHELLIS, INC.



Gary Alfson, PE
Associate Principal

City of Tigard **Main Street** **Green Street**

www.tigard-or.gov/mainstreet

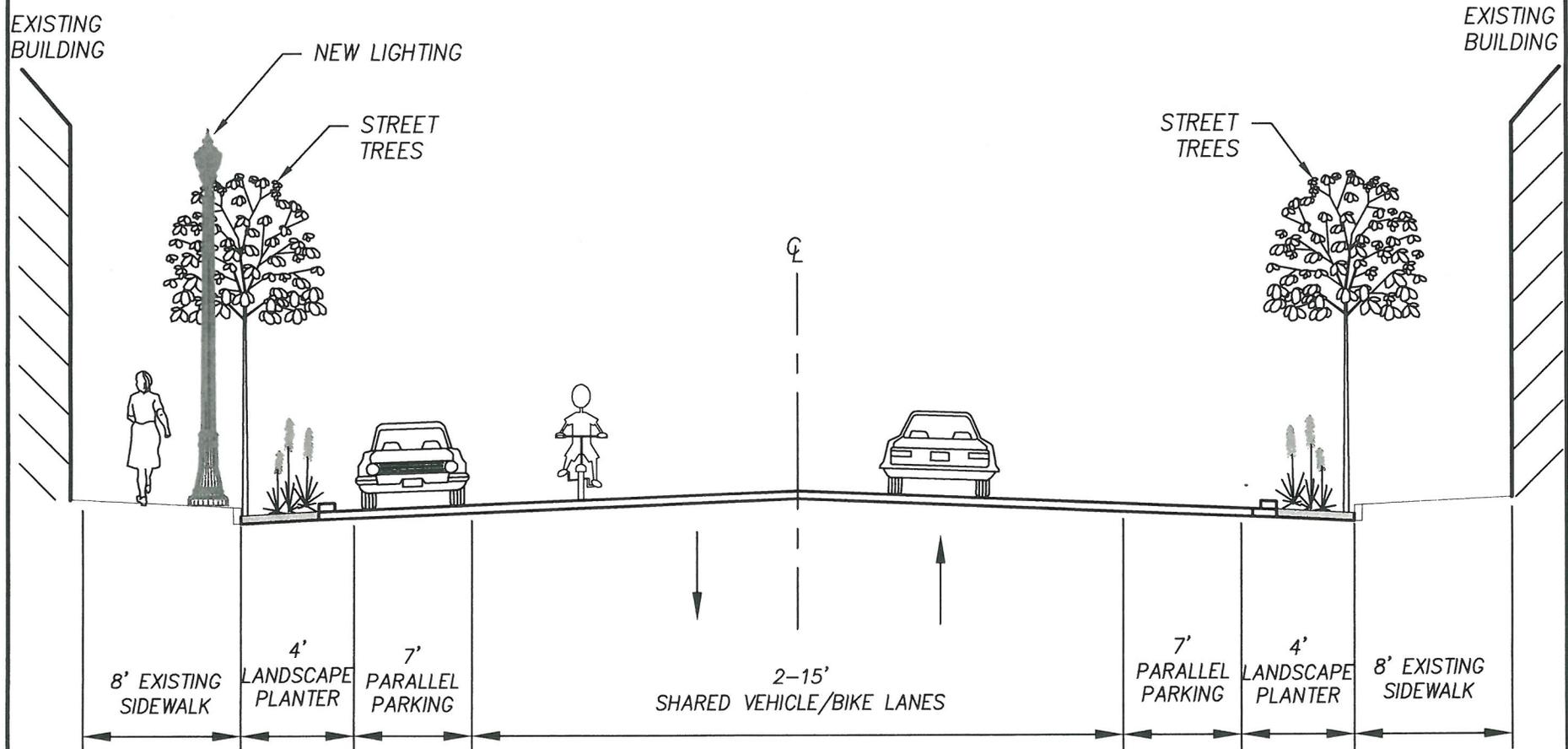


**MAIN STREET SECTION WITH
60° ANGLED PARKING**

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

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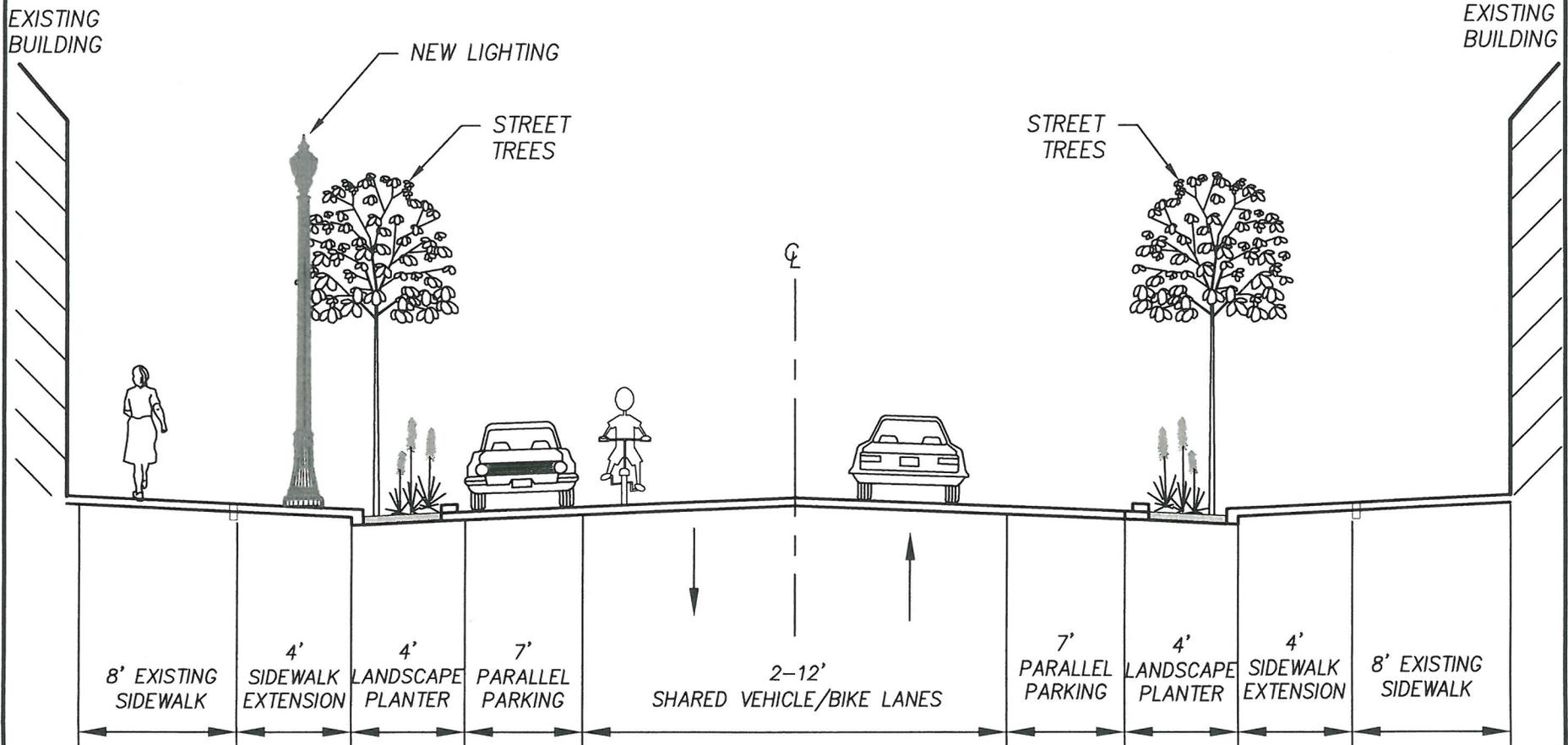


GREEN STREET SECTION
WITH BIKE LANES AND
DUAL PARALLEL PARKING

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LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97203
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

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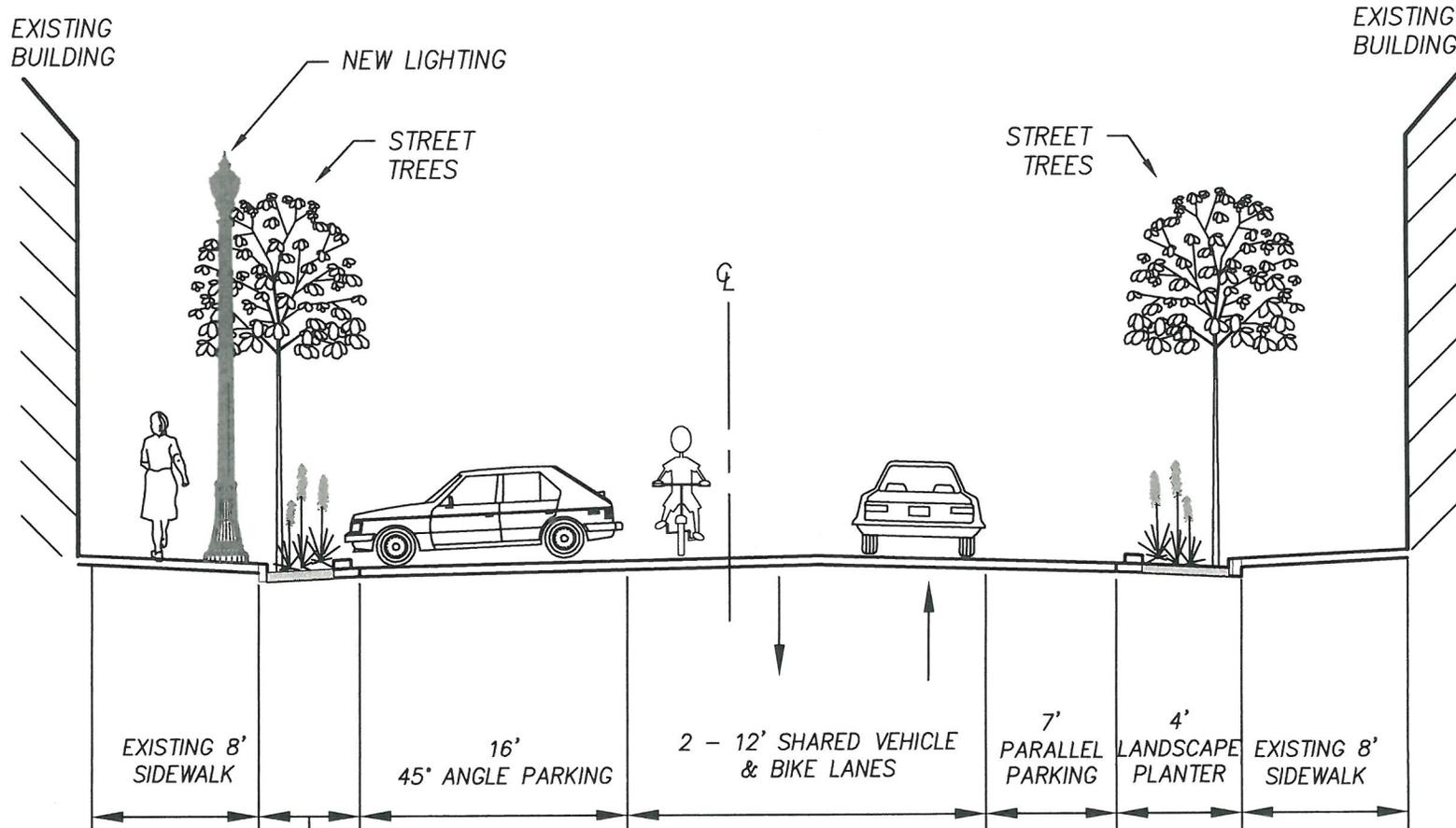
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GREEN STREET SECTION
DUAL PARALLEL PARKING

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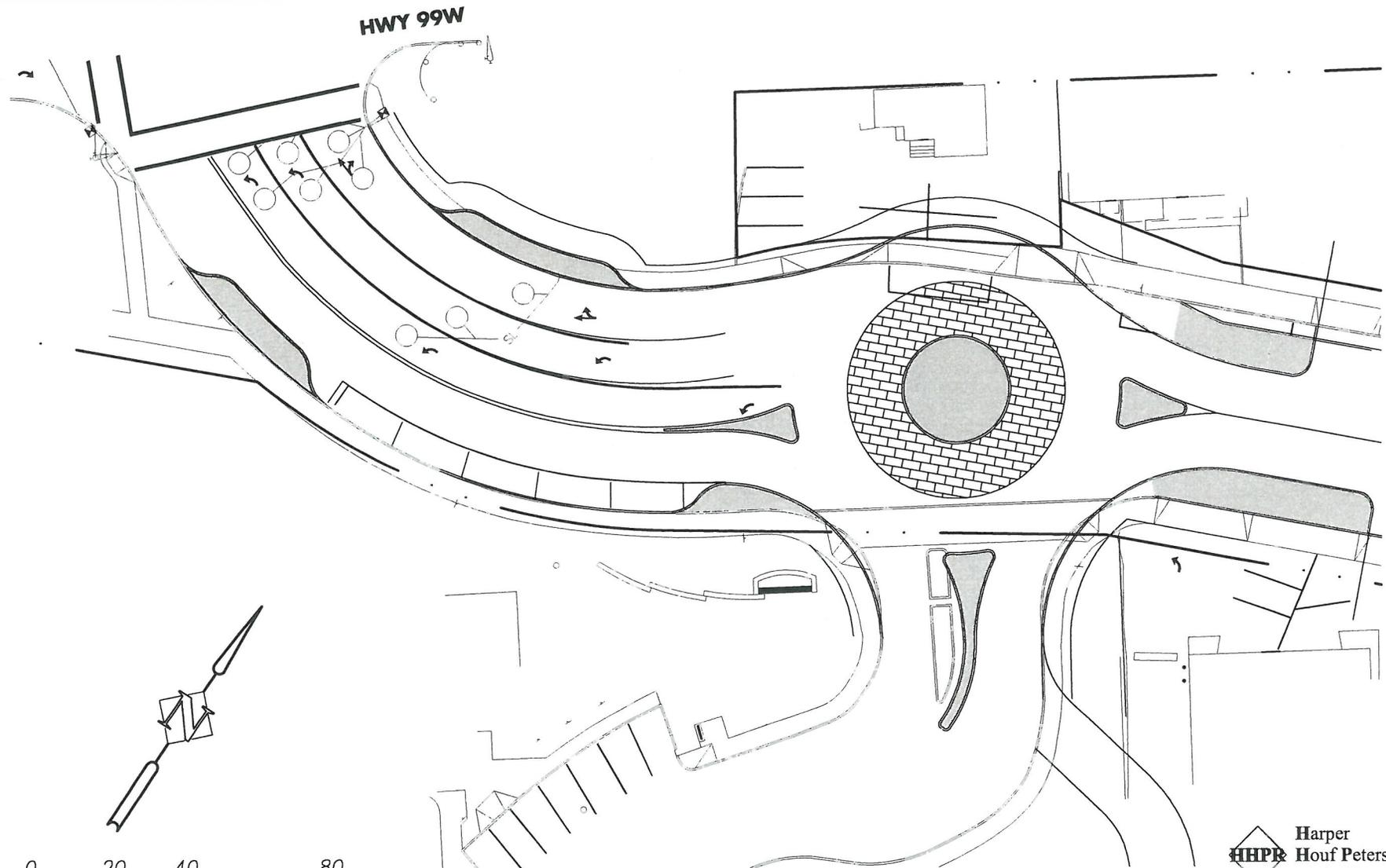
GREEN STREET SECTION
45° ANGLE PARKING

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Houf Peterson
Righellis Inc.

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LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97203
phone: 503.221.1131 www.hpr.com fax: 503.221.1171

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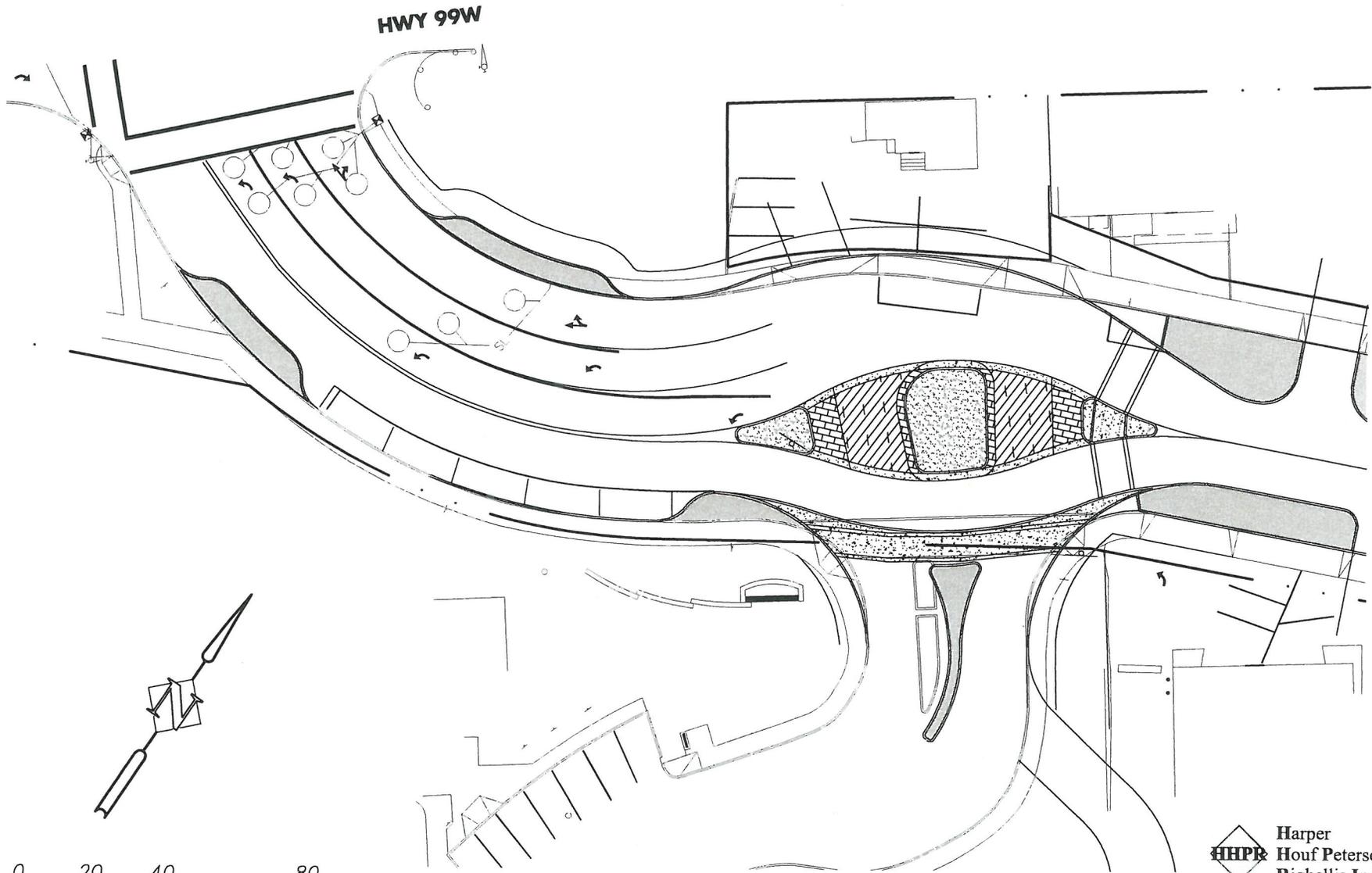


ROUNDABOUT OPTION

Harper
HHP Houf Peterson
Righellis Inc.
ENGINEERS-PLANNERS-
LANDSCAPE ARCHITECTS-SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhp.com fax: 503.221.1171

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www.tigard-or.gov/mainstreet



PROPOSED MEDIAN TREATMENT

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171