Harper Houf Peterson Righellis Inc.

ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

November 4, 2024
Project No.: DCO-04

MEMORANDUM

TO: Cody Smith, PE, County Engineer / Assistant Director, Deschutes County Road Department
Blaine Wruck, PE, Transportation Engineer, Deschutes County Road Department

FROM: Nicolas Speros, PE, Associate Principal, HHPR
Ben Austin, PE, Principal, HHPR

SUBJECT: NW Lower Bridge Way / NW 43rd Street Intersection Improvements
Roundabout Size and Location Alternatives Analysis and Recommended Option to Advance to Construction

Introduction and Purpose

This memorandum (Phase 2 memo) summarizes the alternatives analysis performed to determine the preferred roundabout location for the NW Lower Bridge Way and NW 43rd Street intersection improvements project.

The Project Location is shown on Attachment 1

Earlier this year, an initial alternatives analysis was performed and summarized in a memorandum (Phase 1 memo) to determine the type of intersection improvement that would be implemented at the project intersection.

The Phase 1 memo considered three intersection improvements alternatives:

- Option 1 – Expanded Right Turn Channelization for Lower Bridge Way west-bound traffic
- Option 2 – Road Realignment to make the north and east legs the through direction
- Option 3 – Install a Single Lane Roundabout

Graphics and detailed descriptions of each option is provided in the Phase 1 memo, hereby included by reference, in Appendix 1.

Based upon the analysis provided in the Phase 1 memo and a subsequent public open house and public comments collected, Option 3, a single lane roundabout was determined to be the preferred intersection improvement option to advance to design.

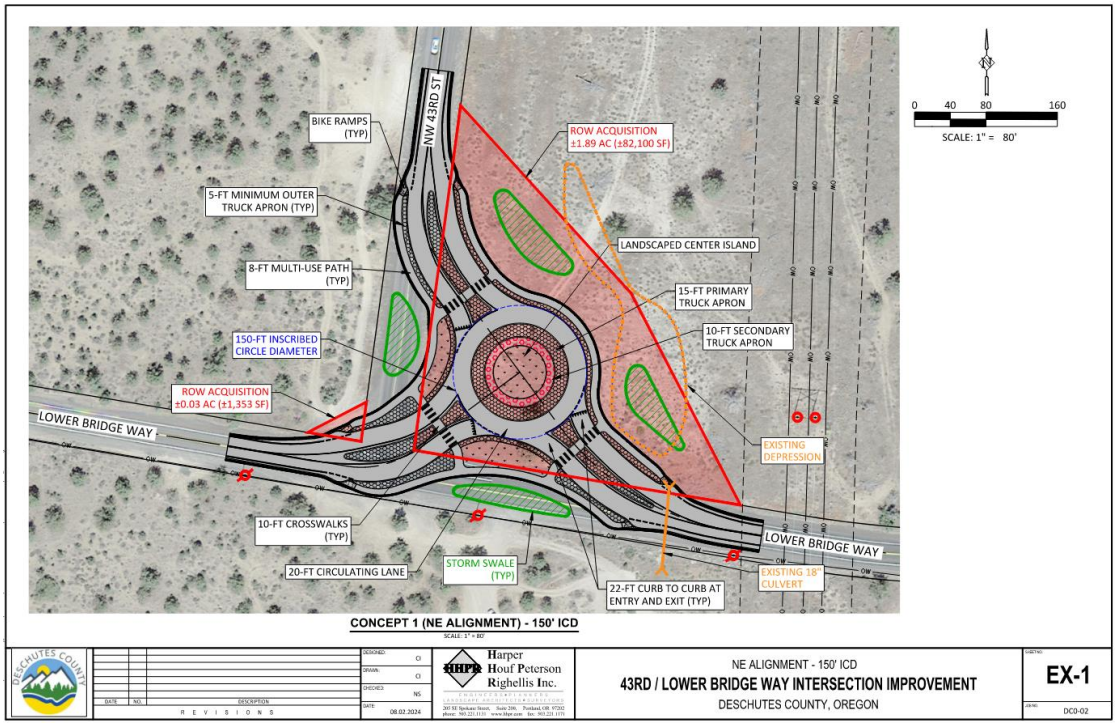
The scope of the current alternatives analysis summarized in this memo, was to consider three roundabout locations.

The overall goal of the project remains the same - to improve safety for vehicle and bicycle traffic, and provide related pavement markings, signage, and illumination as may be required for the selected improvement option.

The three roundabout locations with informational callouts are conceptually shown on Attachments 2-4. They can generally be summarized as follows:

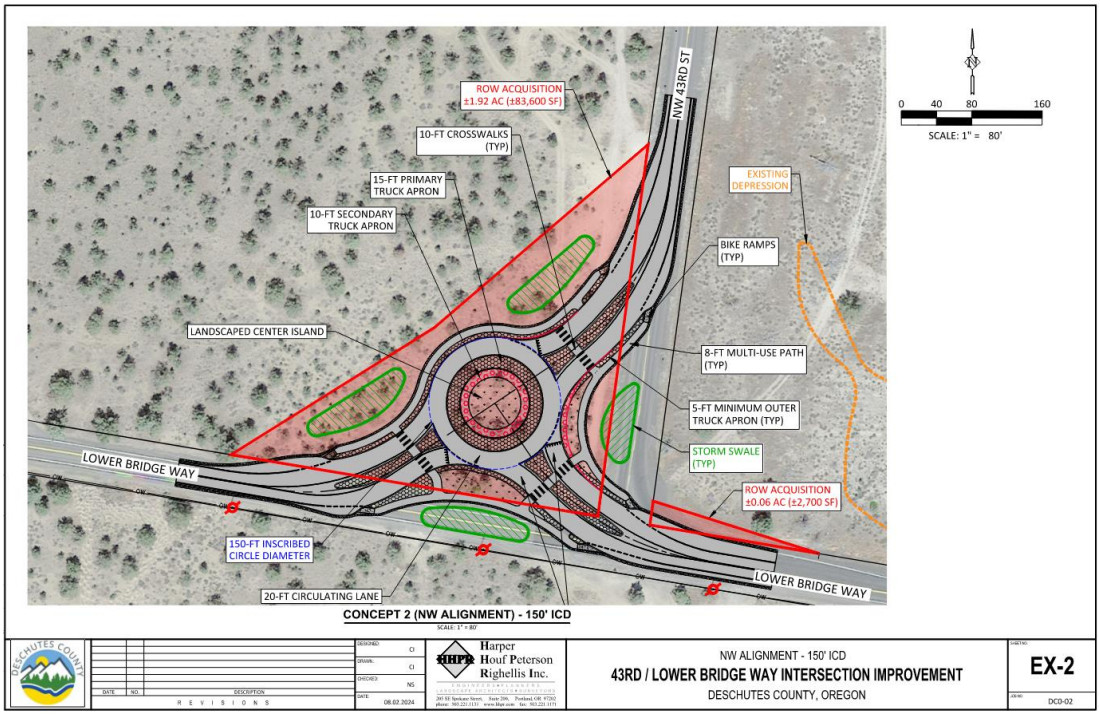
Option 1 – Roundabout in Northeast (NE) Location, N-E legs through direction

This option installs a new offline roundabout northeast of the existing intersection and results in the North and East legs becoming the through direction. Notably, the north and east legs have the highest traffic volumes.



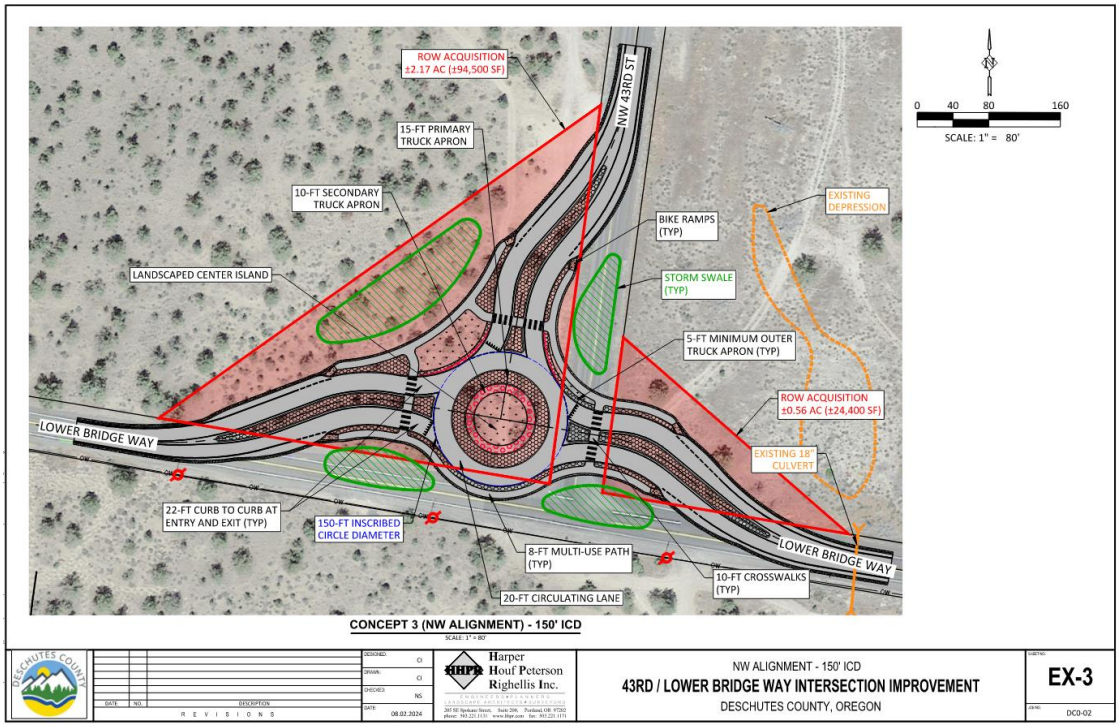
Option 2 – Roundabout in Northwest (NW) Location, N-W legs through direction

This option installs a new offline roundabout northwest of the existing intersection and results in the North and West legs becoming the through direction.



Option 3 – Roundabout in Northwest (NW) Location, E-W legs through direction

This option installs a new offline roundabout northwest of the existing intersection and results in the East and West legs becoming the through direction, similar to the existing condition.



The following factors were considered for each option and are briefly discussed below.

1. Traffic Operations and Safety
    a. Design and Accommodation Vehicles
    b. Fastest path analysis
    c. Multimodal safety

2. Impacts
    a. ROW / BLM
    b. BPA
    c. PGE
    d. Pacific Power

3. Cost and Constructability
    a. Stormwater Management
    b. Construction Staging / Schedule
    c. Earthwork
    d. Construction Cost

1. Traffic Operations and Safety

All options meet baseline operations and safety. This is primarily because all options considered have the preferred 90-degree and 180-degee deflections between approach legs consistent with ODOT Design Manual Figure 8-35 for three legged approaches. These approach angles provide for more consistent speed and deflections.

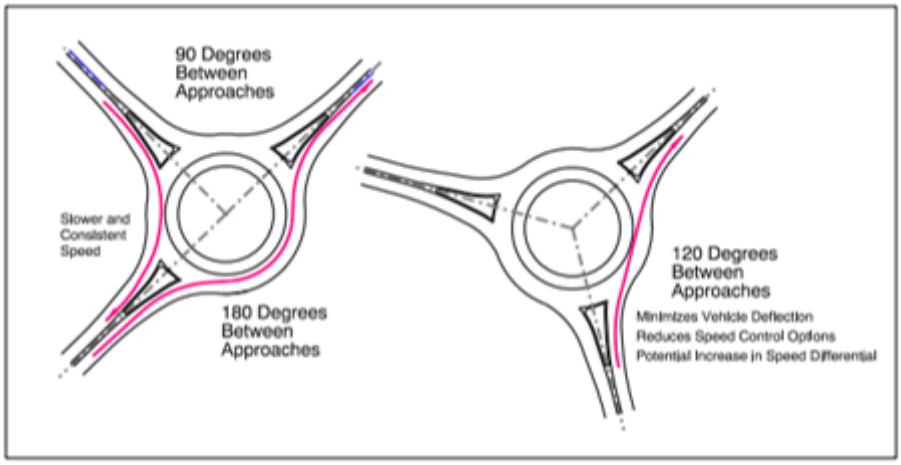


Figure 8-35: Three Legged Approaches

By their nature, roundabouts with 3 or 5 (or more) approaches can be difficult to provide appropriate deflection, speed control and right turning radii. Roundabouts with only three approaches may have large angles between approaches allowing for less deflection and higher entrance and exit speeds. Roundabouts with five or more approaches present challenges not so much in achieving deflection, but in providing sufficient turning radii at some or all right turn movements, as well as challenges providing preferred entry design. For roundabouts with three approaches, in order to achieve appropriate deflection and speed control, it is preferred, as much as possible, to align two of the approaches at 180 degrees with each other and the third approach at 90 degrees with the other two rather than aligning all three at 120 degrees with each other. Figure 8-35 depicts three legged roundabout approach alignment.

1a. Design and Accommodation Vehicles

The primary design vehicle is assumed to be a WB-50 with accommodation for a WB-67 and also a WB-109D (double trailer). All three locations accommodate the WB-67 with a 20' circulatory lane and 15' interior truck apron.

For the larger WB-109D vehicle, the following approximate modifications would be required:

For Option 1 (NE location) requires an additional 5' interior truck apron.

For Options 2 and 3 (NW locations), requires an additional 10' interior truck apron and also exterior truck aprons for the entries and exits.

Design and Accommodation Vehicle Summary
All options can accommodate the larger WB-109D vehicle with additional truck aprons, however only Option 1, does not need additional external aprons for the entry and exit turning movements.

Truck turning template exhibits for the WB-67 and WB-109D vehicles are provided in Appendix 2.

1b. Fastest Paths

As noted prior, due to the 90 and 180-degree approach leg geometry, acceptable fastest paths are expected to be achievable for all three roundabout locations considered.

The preliminary analysis shows that the inner circulatory speeds, which are relatively fixed based on the ICD, were below 20 mph. Initial entry and exit speeds were higher than desired, but can be mitigated with refinements in roadway geometry. During the design phase reversing curve geometry will be added to the approaches to reduce vehicle speed entering and exiting the intersection.

Fastest Path Summary
A fastest path analysis does not provide a meaningful differentiation between the roundabout locations due to the similar 90 and 180-degree approach leg geometry.

1c. Multi-modal Safety

Multimodal safety is important to consider at this intersection, primarily due to the Sisters to Smith Rock Scenic Bikeway (STSRSB) route along existing Lower Bridge Way (the east and west legs).
To facilitate cyclists navigating the intersection, crosswalks have been provided for all approaches as well as an 8' shared use path adjacent to all improvements with a 5' setback from curb line. The west to east travel direction will have no conflict points for cyclists that elect to use the multi-use path.

Cyclists traveling in the east to west direction will have a conflict point with the north leg for all layouts.

Line of sight for drivers exiting the roundabout is largely dependent upon the relationship of the entry and exit leg geometry of the driver and the circulatory travel path taken. Option 1 (NE layout) provides the best line of sight for drivers exiting the roundabout to see cyclists before reaching the conflict point (crosswalk).

Line of sight and traffic calming for vehicles entering the roundabout is dependent upon the approach leg geometry which can be improved by refining the geometry of the approaches for all layouts, which will be completed in the design phase.

Multi-modal Safety Summary
Option 1, relative to the other options, provides the best driver line of sight visibility to the primary conflict point, which is cyclists crossing the north leg in the east to west direction.

To enhance vehicle and multi-modal safety, the final design of the selected Option should review and analyze adding additional length and curvature to the splitter islands, or in combination with a painted traversable median, to promote traffic calming for the north and east legs, which are the primary travel directions, and most likely to have vehicles traveling at higher speeds due to the longer straight approaches to the intersection. The west leg should also be reviewed for similar improvements as needed, in conjunction with the existing horizontal curve west of the intersection that may already provide some traffic calming for vehicles traveling east bound.

2. Impacts

In addition to traffic operations and safety, impacts to adjacent property owners and utilities was also considered.

2a. ROW / Bureau of Land Management (BLM) Impacts

As noted in the Phase 1 memo, the intersection is surrounded by USA owned (BLM managed) land on all sides and any new right of way easement will need to be acquired from BLM.

HHPR and Deschutes County staff have met with BLM staff to discuss the acquisition process and have determined that additional right of way will be required to complete the project. An Environmental Assessment (EA) and NEPA analysis will be required to complete this process.

Although Options 1 and 2 have smaller acquisition footprints (approximately 2 acres each) compared to Option 3 (approximately 3 acres), the process would apply equally to all options being considered.

In addition, although the Deschutes County Road Department will have to follow the standard road right of way acquisition process, as a local government agency there will be no charge for the easement. Therefore, the difference in footprint areas required between the three locations is not a meaningful criteria to select the preferred option.

BLM Impact Summary
BLM impacts are not meaningfully different between the three options.

2b. Bonneville Power Administration (BPA) Impacts

As noted in the Phase 1 memo, the BPA has a 230 kV transmission facility crossing Lower Bridge Way approximately 900' east of the existing intersection in a generally north-south direction within a 125' wide right of way easement. HHPR and Deschutes County staff met with BPA staff to discuss potential impacts and the BPA review process if needed. BPA staff were supportive of constructing a new roundabout at the project intersection because of the potential traffic calming it would provide relative to the existing condition.

The three locations considered for the roundabout placement will not require any improvements within BPA's easement, no BPA permit will be required, and is therefore not a factor in selecting the preferred option.

Coordination during construction may be required to communicate any impacts to traffic and easement access.

BPA Impact Summary
The existing BPA transmission lines and easement has no impact on any of the three options.

2c. Portland General Electric (PGE) Impacts

As noted in the Phase 1 memo, and depicted on the option graphics, PGE has a 230 kV transmission facility crossing Lower Bridge Way approximately 500' east of the existing intersection in a north-south direction within a 125' wide right of way easement.

HHPR and Deschutes County staff met with PGE staff on November 11, 2023, to discuss potential impacts of the proposed options (Phase 1) and PGE review process. PGE staff present included:

- Scott Stocker, PE, Transmission Engineer, Maintenance Engineering, scott.stocker@pgn.com, 503-709-9438

PGE was supportive of the roundabout concept as it would support traffic calming for vehicles in proximity to their easement access point.

Option 1 (NE location) will potentially require coordination for minor pavement improvements within the PGE easement area and a crossing application may be required, depending on final geometry, but is not anticipated to be significant factor in the design and construction of the project.

Option 2 and 3 (NW locations) improvements do not extend that far east and the PGE easement will not be a factor.

Coordination during construction will be required to communicate any impacts to traffic and easement access for all options.

PGE Impact Summary
Only Option 1 will potentially include improvements within the PGE easement area and require a crossing license but is not anticipated to be significant factor to the project design, permitting and construction process.

2d. Pacific Power Impacts

As noted in the Phase 1 memo, and depicted on the option graphics Pacific Power has poles/overhead wires along the south side of Lower Bridge Way that crosses the road to the north side approximately 1,400' east of the existing intersection. HHPR and Deschutes County has not met with Pacific Power, but the following generalizations can be made for all options:

- Impacts to facilities can be avoided and minimal coordination will be required.
- It is assumed that the existing Pacific Power facilities are in the County ROW and if the unneeded portion of existing Lower Bridge Way is vacated by the County, Pacific Power may need to make accommodations to obtain an easement or relocate their facilities to the new County road ROW location. PP would need to coordinate their crossings individually with BPA and PGE, as may be required.
- New roundabout illumination design and power service will need to be coordinated.

Pacific Power Summary
All options have similar, minimal to no, impacts to Pacific Power facilities. All options will need to coordinate new illumination.

3. Construction Cost / Constructability

The following cost and constructability issues were reviewed.

3a. Stormwater Management / Existing Culvert Impact

In general, stormwater management is not anticipated to be a significant design constraint for the project.

The anticipated scope of work is limited to standard roadside swales or filter strips to manage project stormwater.

Option 1 may require minor additional improvements and coordination to lengthen or replace the existing 18" culvert under the east leg of Lower Bridge Way but is not anticipated to be significant.

Stormwater Management Summary
Options 2 and 3 may avoid the coordination and design associated with the existing culvert, but the minor is benefit is not significant enough to meaningfully differentiate between the three options.

3b. Construction Staging

All three locations provide the benefit that the majority of the roundabout construction would occur off-line from the existing roadway. The completion of the approach legs and conforms to existing pavement could create more significant temporary traffic impacts.

During the initial construction phase, the majority of improvements would be built offline from the existing road in the NE or NW quadrant of the intersection. All three legs could remain open to two-way traffic, although the intersection would likely be signed as an all-way STOP to facilitate driver and construction crew safety and daytime lane closures could still be possible. The duration of this phase is anticipated to be in the range of ten to twelve weeks.

For subsequent construction phases, roadway construction would need to occur under traffic with reductions to one travel lane and alternating traffic. This would be managed with 24-hour flagging. The duration of this phase is anticipated to be in the range of approximately three to five weeks.

Temporary pavement widening or a shoofly detour could be considered to reduce impacts and help maintain two-way traffic, however the benefits would need to be considered relative to the cost.

Additionally, temporarily rerouting northbound and eastbound traffic along NW Ice Avenue and NW 27th Street, coupled with appropriate signage and traffic control measures, could potentially reduce traffic impacts and shorten the overall construction timeline.
As drivers may naturally choose this route as a detour, it will be important to either implement temporary traffic control measures, or restrict the route to local traffic only, to mitigate potential issues.

For Option 1, some additional limited construction coordination with PGE could be an additional requirement and Option 3 has the largest footprint which may take a slightly longer timer period to construct.

Construction Staging Summary
Construction staging differences are negligible between Options 1 and 2. Option 3 would be similar staging but could be a longer overall time frame because the scope of improvements is slightly larger, but primarily for offline improvements, so likely not significant enough to provide a meaningful differentiation between options.

3c. Earthwork

A preliminary earthwork analysis was performed for all three locations based upon available topographic survey information and high-level estimations for finish grade elevations. The approximate comparative results are summarized below:

- Option 1: Median earthwork volume
- Option 2: Lowest volume, approximately 1,000 CY less than median
- Option 3: highest volume, approximately 1,000 CY more than median

Earthwork Summary
The earthwork volumes are within the same range of magnitude and differences are not significant enough to provide a meaningful differentiation between options.

3d. Construction Cost

A high-level preliminary construction cost estimate was prepared for each option (assumed 150' ICD) and is summarized below.

- Option 1: $ 2.2 M
- Option 2: $ 2.2 M
- Option 3: $ 2.5 M

Construction Cost Summary

The cost difference is negligible between Options 1 and 2. The relative cost increase for option 3 is significant. The increase is primarily due to the larger footprint of improvements and increased earthwork in areas of embankment.

<u>Key Point Summary of Options Review and Recommendation for a Preferred Option</u>

A qualitative matrix of the Options summarized above is provided in Attachment 5 highlighting the relative difference in options.

- Traffic Operations is acceptable for all options considered with Option 1 requiring the least amount of additional truck apron to accommodate the WB-109D.

- Option 1 (NE Location) provides the best line of sight for driver visibility with the main conflict point of the STSRSB crossing the north leg.

- Differences in ROW / BLM impacts between the options are negligible.

- BPA impacts are negligible for all options.

- PGE impacts are negligible for Options 2 and 3. Minimal widening within the PGE easement may be required for Option 1, but coordination and permitting with PGE is not anticipated to be significant and PGE is supportive of the project.

- Pacific Power impacts are negligible for all options. All options will require coordination to provide new roundabout illumination.

- Stormwater management differences are negligible between Options 2 and 3. Option 1 may require minor additional improvements and coordination to lengthen or replace the existing culvert under the east leg of Lower Bridge Way but is not anticipated to be significant.

- Construction staging differences are negligible between Options 1 and 2. Option 3 would be similar staging but could be a longer time frame because the scope of improvements is slightly larger.

- Preliminary earthwork volumes were of the same range of magnitude for all options. Option 3 was the most (~ 6,500 CY) and Option 2 the least (~ 4,500 CY).

- Preliminary construction cost estimates were of the same range of magnitude for all options. Options 1 and 2 were both approximately $2.2M, while Option 3 was the most at approximately $2.5M. The additional cost is primarily due to the larger footprint of improvements and increased earthwork in areas of embankment.

Based on the information and analysis noted above and supporting documents, **Option 1 (NE Layout) is the recommended roundabout location to advance to final design and construction.**

Notable benefits of Option 1 (NE Location) include:

- Provides the best multi-modal safety at the main conflict point with the north leg
- Least amount of additional interior / exterior truck aprons, provides more standard appearance
- Tied for lowest cost with Option 2
- Connects the primary travel directions (between east and north legs) in the 180-degree through direction

Final design note:

As noted prior, to enhance vehicle and multi-modal safety, the final design of the selected Option should review and analyze adding additional length and curvature to the splitter islands to promote traffic calming for the north and east legs, which are the primary travel directions, and most likely to have vehicles traveling at higher speeds due to the longer straight approaches to the intersection. The west leg should also be reviewed for similar improvements as needed, in conjunction with the existing horizontal curve west of the intersection that may already provide some traffic calming for vehicles traveling east bound.

List of Attachments:

Attachment 1 - Deschutes County provided Project Location Map
Attachment 2 – Roundabout Option 1 (NE Location) Graphic
Attachment 3 – Roundabout Option 2 (NW Location) Graphic
Attachment 4 – Roundabout Option 3 (NW Location) Graphic
Attachment 5 - Options Matrix

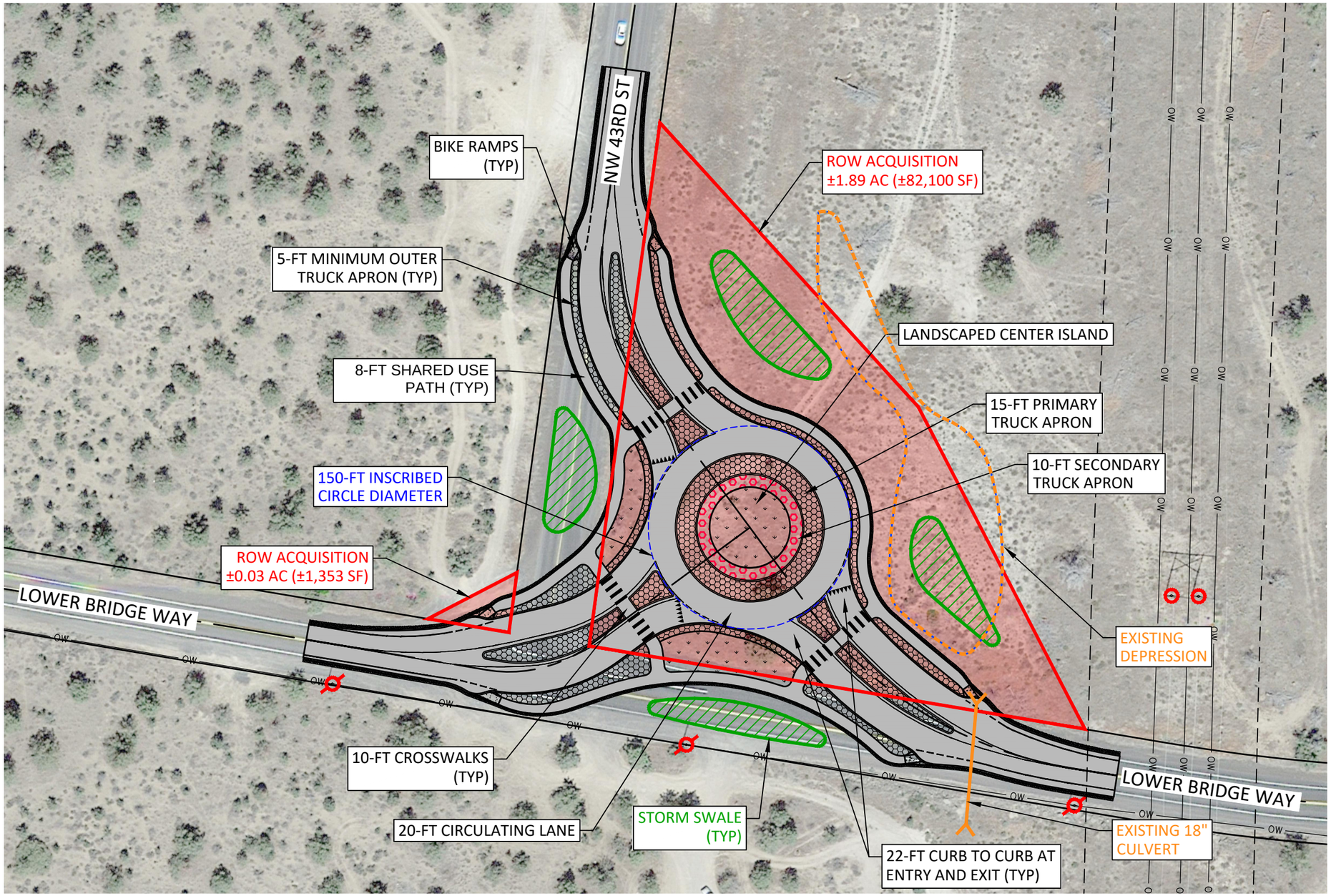
List of Appendices:

Appendix 1 - Initial Intersection Alternatives Analysis Memorandum (Phase 1 memo)
Appendix 2 - Truck Turning Template Exhibits

Attachment 1

Figure 1 – Project Location Map

Attachment 2



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SCALE: 1" = 80'

CONCEPT 1 (NE ALIGNMENT) - 150' ICD

SCALE: 1" = 80'

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NE ALIGNMENT - 150' ICD

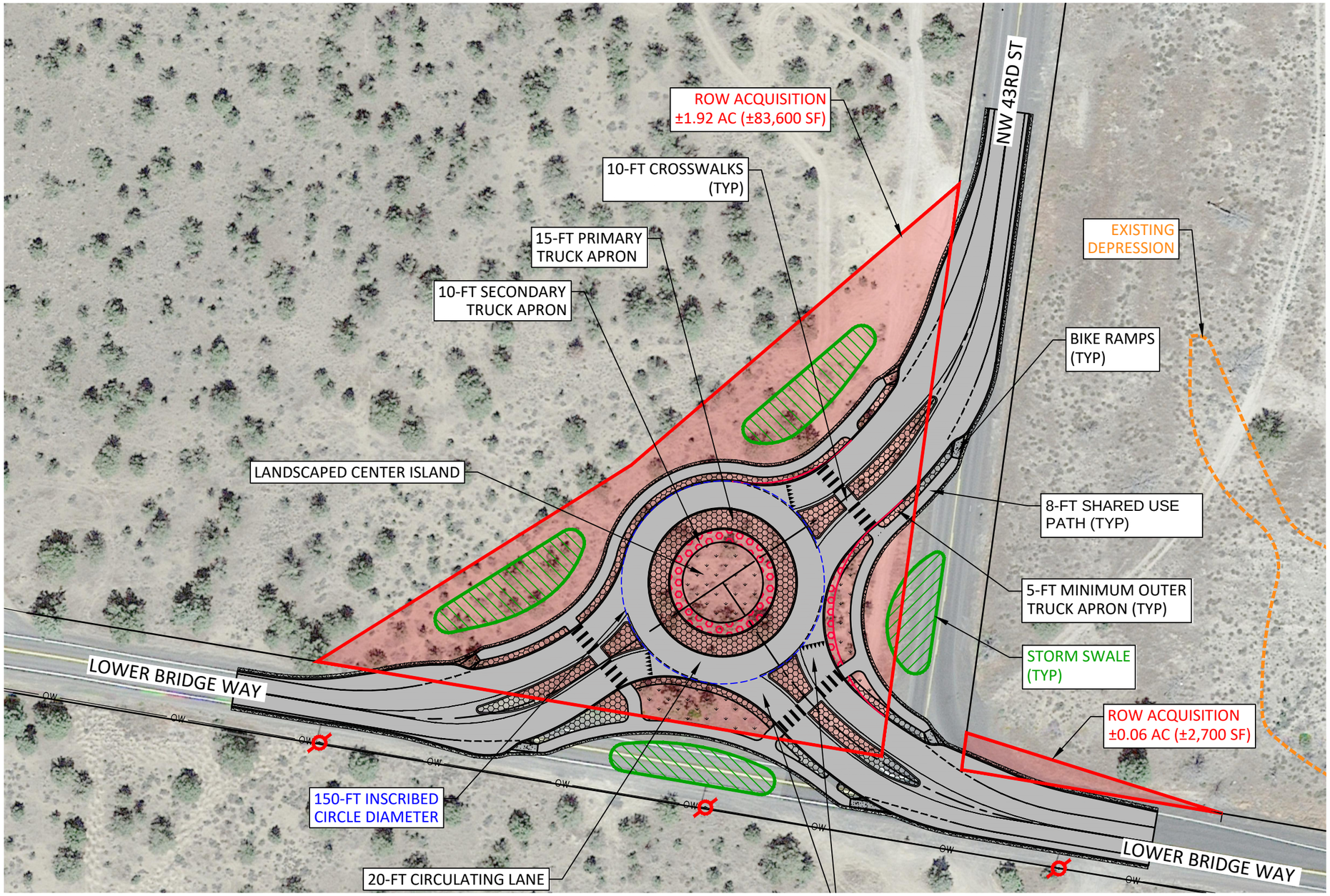
43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

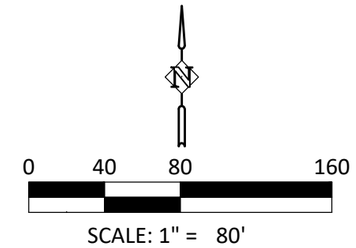
DESCHUTES COUNTY, OREGON

SHEET NO. **EX-1**

JOB NO. DC0-02

Attachment 3





CONCEPT 2 (NW ALIGNMENT) - 150' ICD

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NW ALIGNMENT - 150' ICD

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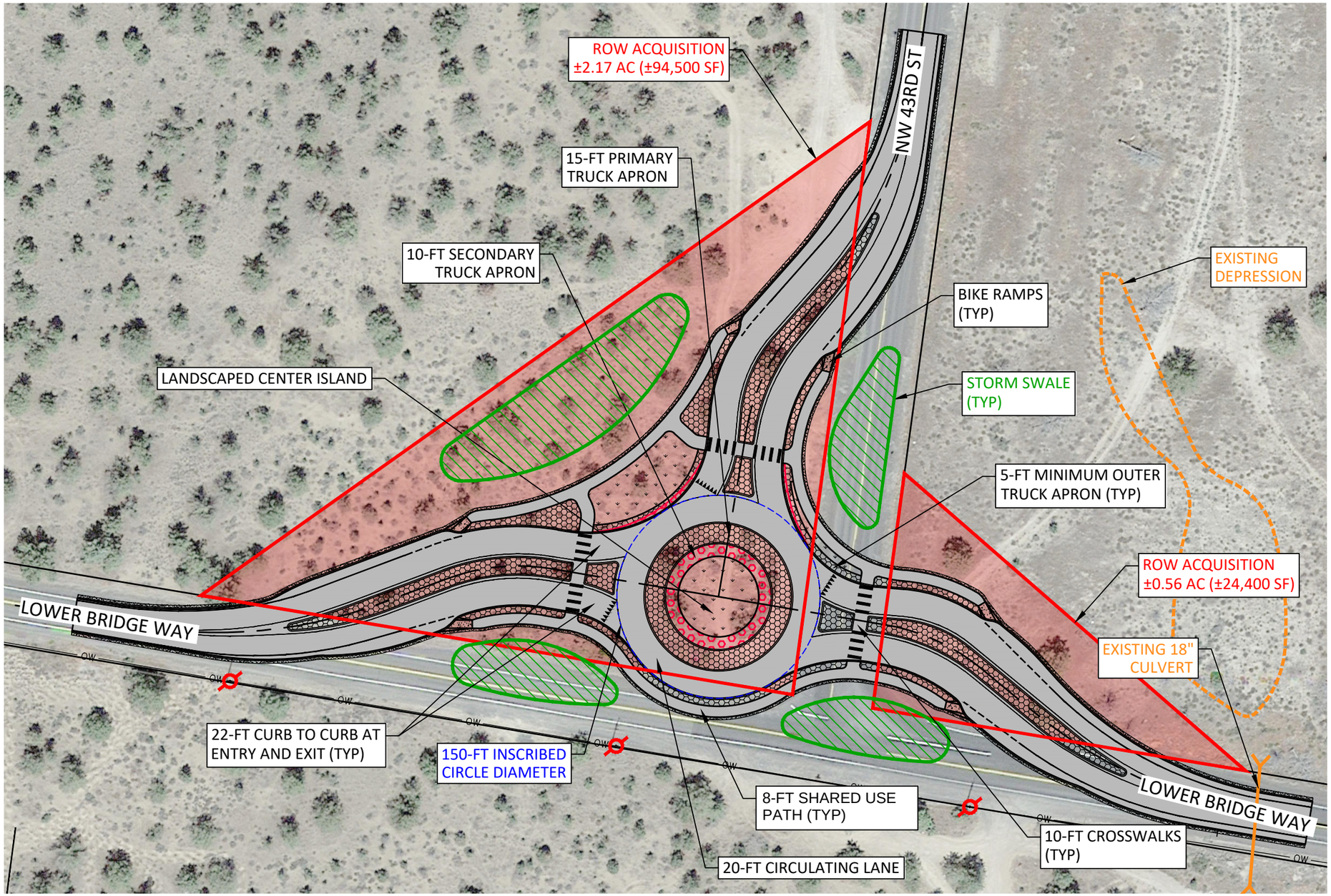
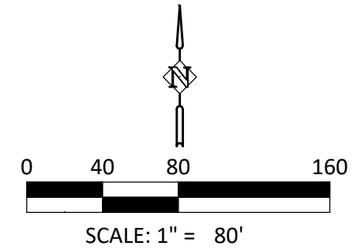
SHEET NO. **EX-2**

JOB NO. DC0-02

Attachment 4





CONCEPT 3 (NW ALIGNMENT) - 150' ICD

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NW ALIGNMENT - 150' ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

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SHEET NO. **EX-3**

JOB NO. DC0-02

NW Lower Bridge Way / NW 43rd Street Roundabout Analysis

Attachment 5

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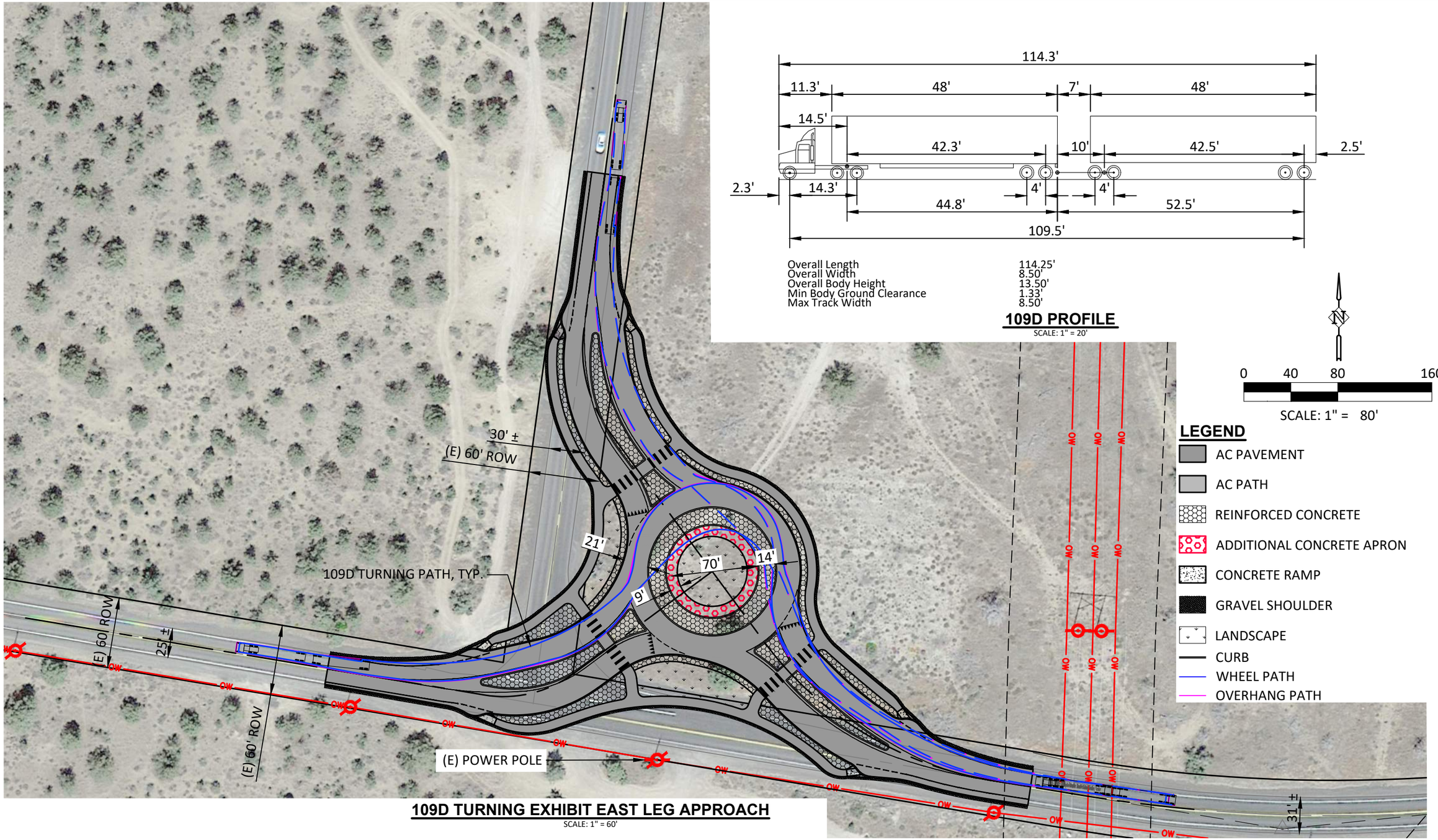
	Option 1 (NE location) N-E through direction	Option 2 (NW layout) N-W through direction	Option 3 (NW layout) E-W through direction
	150' Inscribed Circle Diameter (ICD)		
PRELIMINARY EVALUATION CRITERIA			
1. TRAFFIC OPERATIONS AND SAFETY			
1a. Design Path / Truck Turns - WB-67	Accommodates, no additional apron	Accommodates, no additional apron	Accommodates, no additional apron
1a. Design Path / Truck Turns - WB-109D	Accommodates, with additional interior apron (~ 820 SF)	Accommodates, with additional interior and exterior apron (~ 2,530 SF)	Accommodates, with additional interior and exterior apron (~ 2,220 SF)
1b. Fastest Path / Geometry (90° and 180° approaches)	acceptable	acceptable	acceptable
1c. Multi Modal Safety / Sight Lines for STSRSB E-W Direction	1st	3rd	2nd
2. IMPACTS			
2a. ROW / BLM Impact Area	~ 2 Acres	~ 2 Acres	~ 3 Acres
2b. BPA Impacts	n/a	n/a	n/a
2c. PGE Impacts	Minimal to none	n/a	n/a
2d. Pacific Power Impacts	Minimal to none	Minimal to none	Minimal to none
3. COST / CONSTRUCTABILITY			
3a. Stormwater Management / Existing Culvert Impact	No design issues Existing low point / culvert extension	No design issues	No design issues
3b. Construction Staging / Schedule	~ Primarily offline	~ Primarily offline	~ Primarily offline / likely longer schedule (larger footprint of improvements)
3c. Earthwork	Median	Lower by ~ 1,000 CY	Higher by ~ 1,000 CY
3d. Construction Cost	~ $2.2 M	~ $2.2 M	~ $2.5 M
PRELIMINARY SUMMARY			
RESULTS	1st	2nd	3rd

Appendix 2a

Option 1 (NE Layout)
N-E Through Direction

WB-67 and WB-109D
Truck Turning Movements



109D TURNING EXHIBIT EAST LEG APPROACH

SCALE: 1" = 60'

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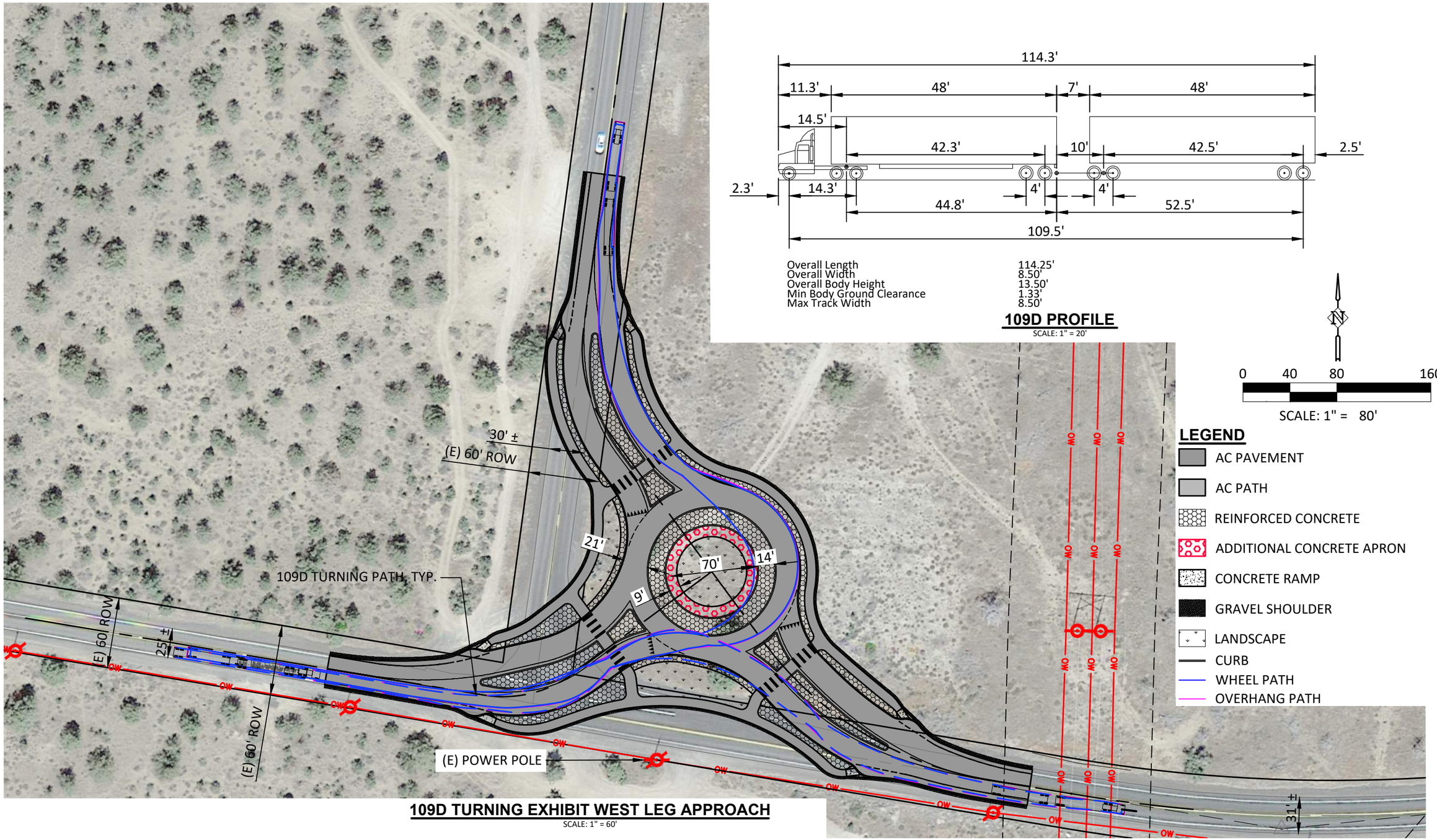
NE ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

SHEET NO. EX1.0

JOB NO. DC0-02



109D TURNING EXHIBIT WEST LEG APPROACH

SCALE: 1" = 60'

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NE ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

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SHEET NO. **EX1.1**

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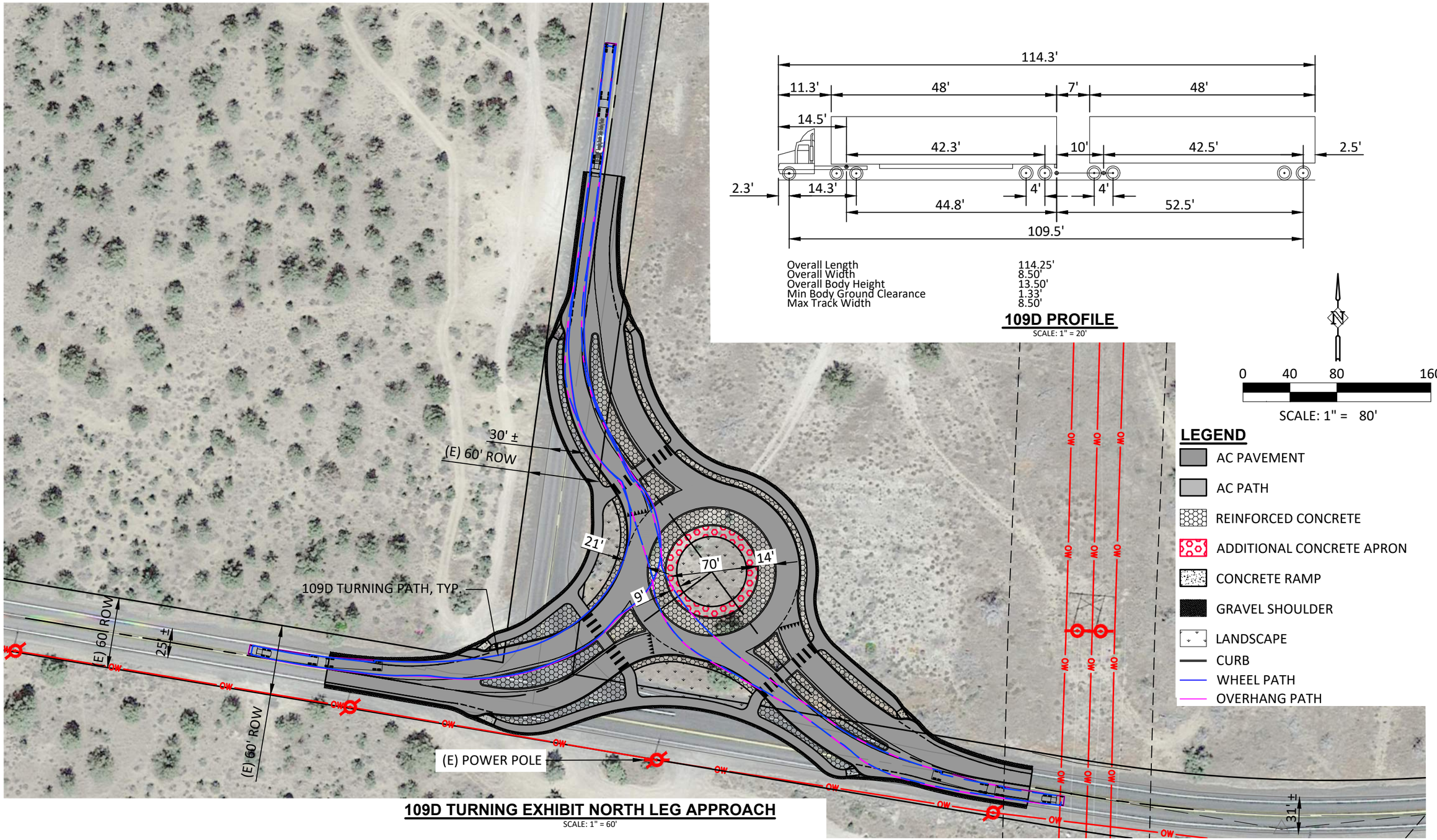

109D TURNING EXHIBIT NORTH LEG APPROACH

SCALE: 1" = 60'

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: CI
DRAWN: CI
CHECKED: NS
DATE: 08.02.2024

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NE ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

SHEET NO. EX1.2

JOB NO. DC0-02

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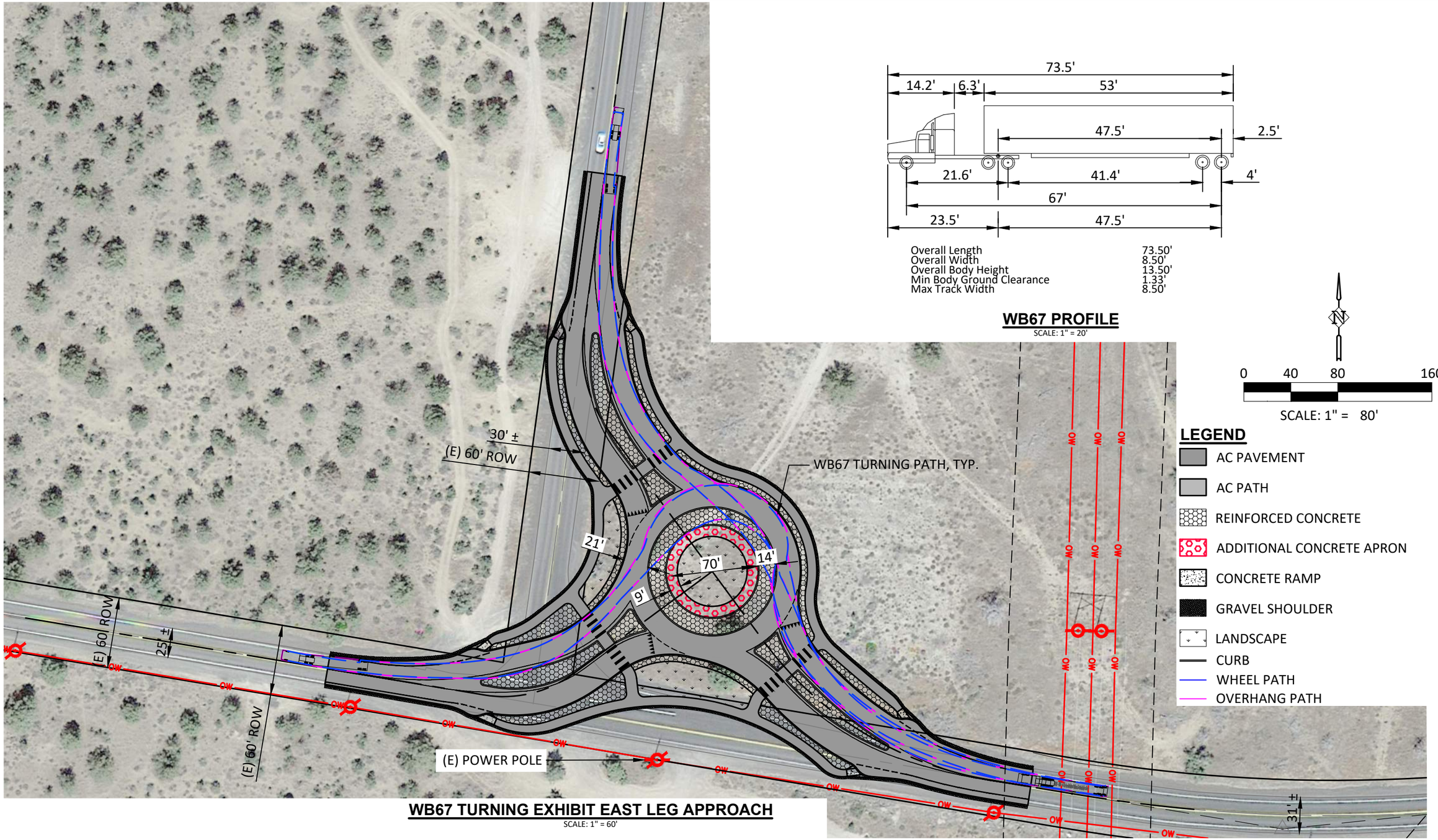

WB67 TURNING EXHIBIT EAST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DCO (Deschutes County)\DCO-04 (LBW-43rd)\DCO04-DWGS\Exhibits\Turning Path Exhibits\Opt 1 - NE Alignment 150 ICD.dwg

DESCHUTES COUNTY

DATE	NO.	DESCRIPTION

R E V I S I O N S

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DATE: 08.02.2024

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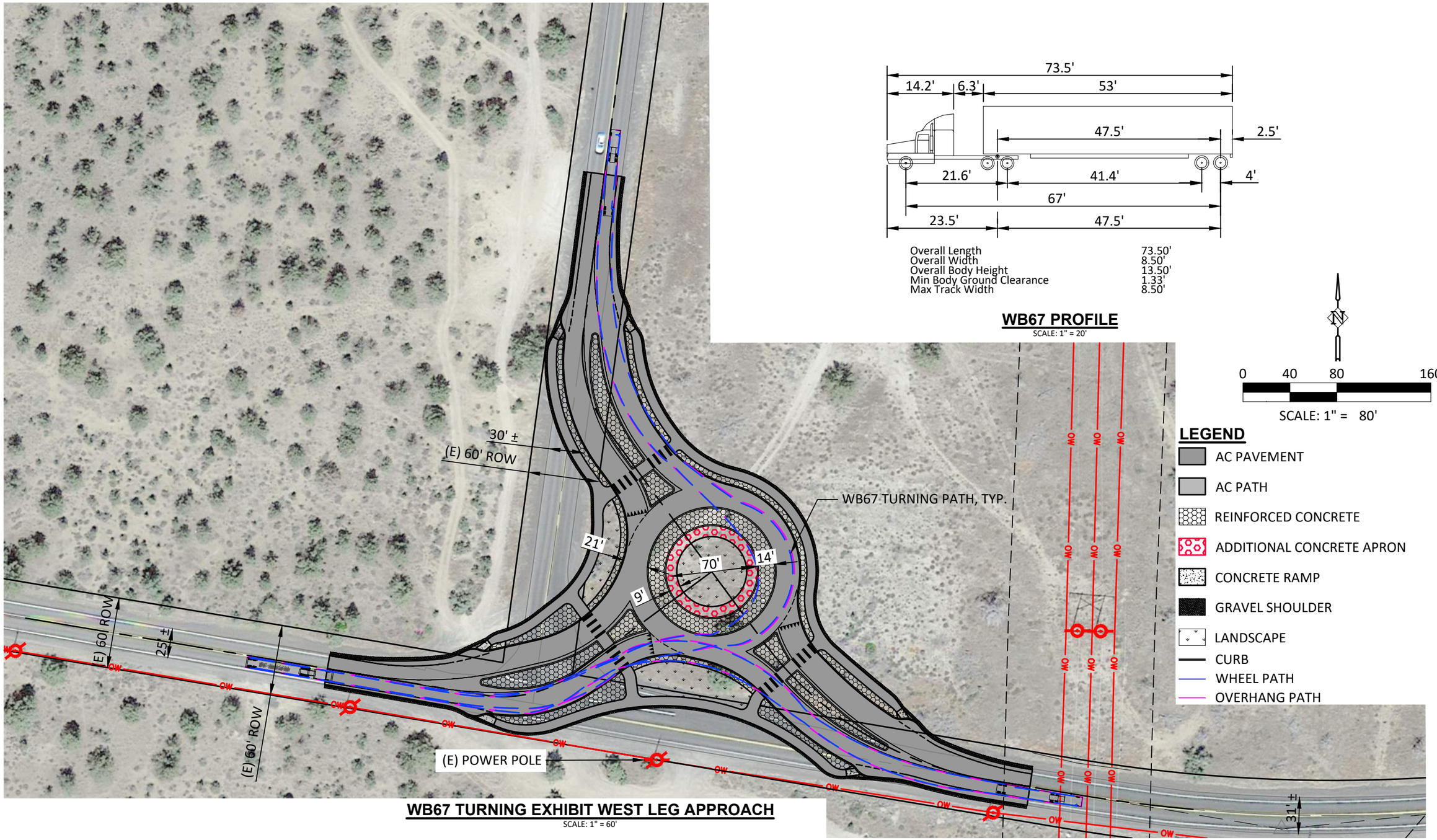
NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

SHEET NO. EX1.3

JOB NO. DC0-02



WB67 TURNING EXHIBIT WEST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 1 - NE Alignment 150 ICD.dwg

DESCHUTES COUNTY

DATE	NO.	DESCRIPTION

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NW ALIGNMENT - 140 ICD

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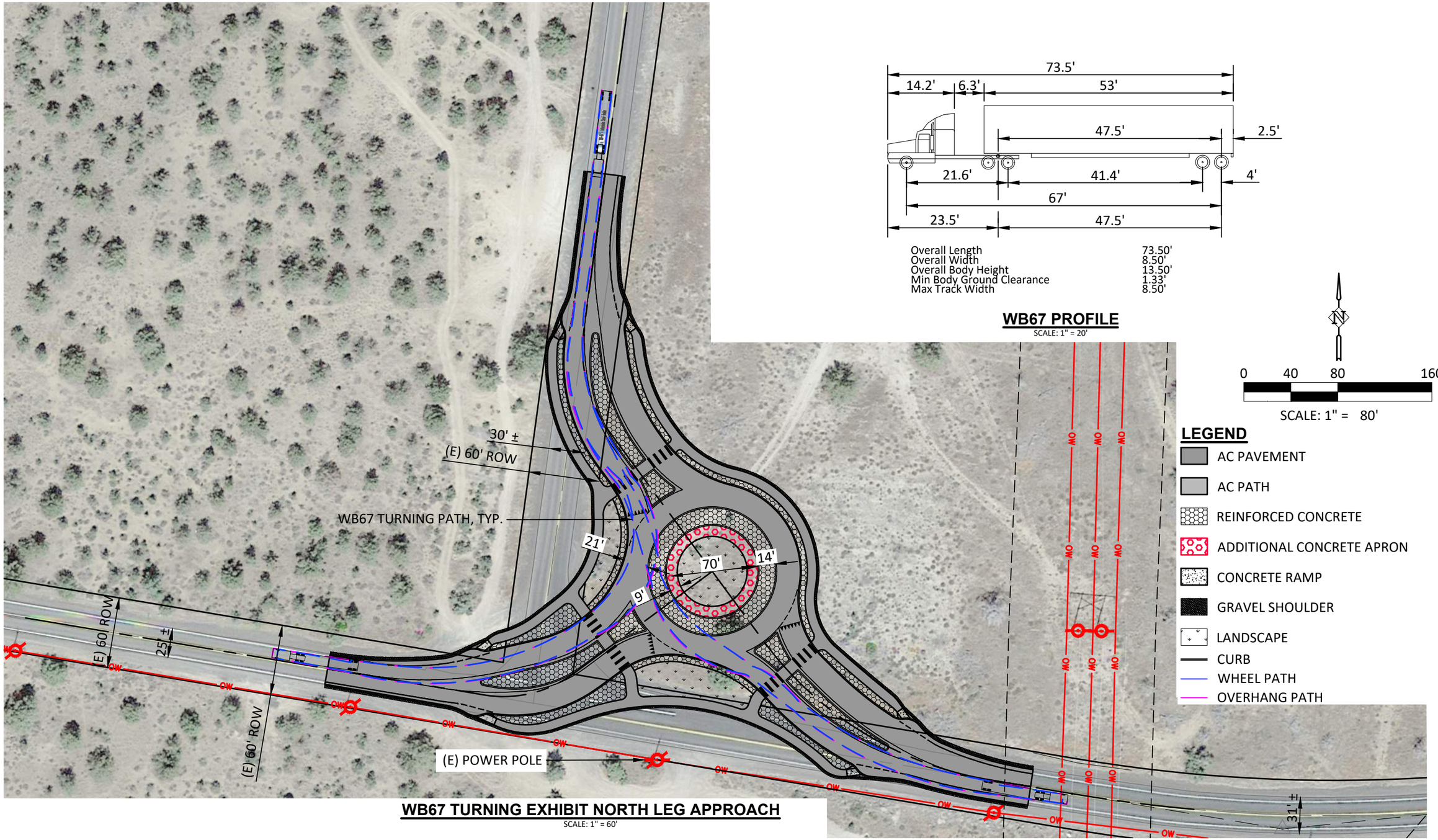
DESCHUTES COUNTY, OREGON

SHEET NO. **EX1.4**

JOB NO. DC0-02



WB67 TURNING EXHIBIT NORTH LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DCO (Deschutes County)\DCO-04 (LBW-43rd)\DCO04-DWGS\Exhibits\Turning Path Exhibits\ Opt 1 - NE Alignment 150 ICD.dwg

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

SHEET NO. EX1.5

JOB NO. DC0-02

Appendix 2b

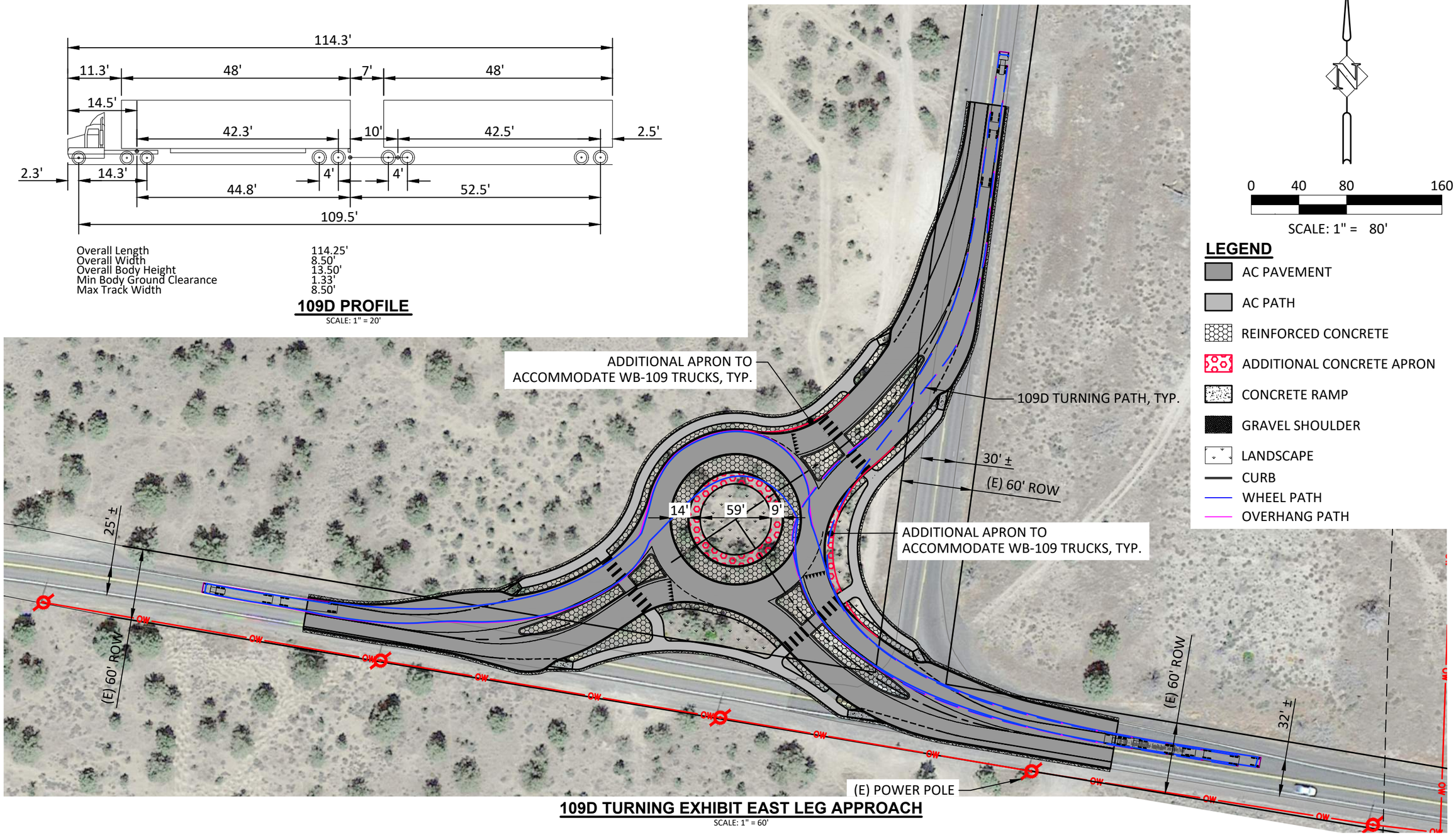
Option 2 (NW Layout)
N-W Through Direction

WB-67 and WB-109D
Truck Turning Movements

Overall Length	114.25'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

109D PROFILE

SCALE: 1" = 20'



109D TURNING EXHIBIT EAST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 2 - NW Alignment 150 ICD.dwg

DESCHUTES COUNTY

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DATE: 08.02.2024

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

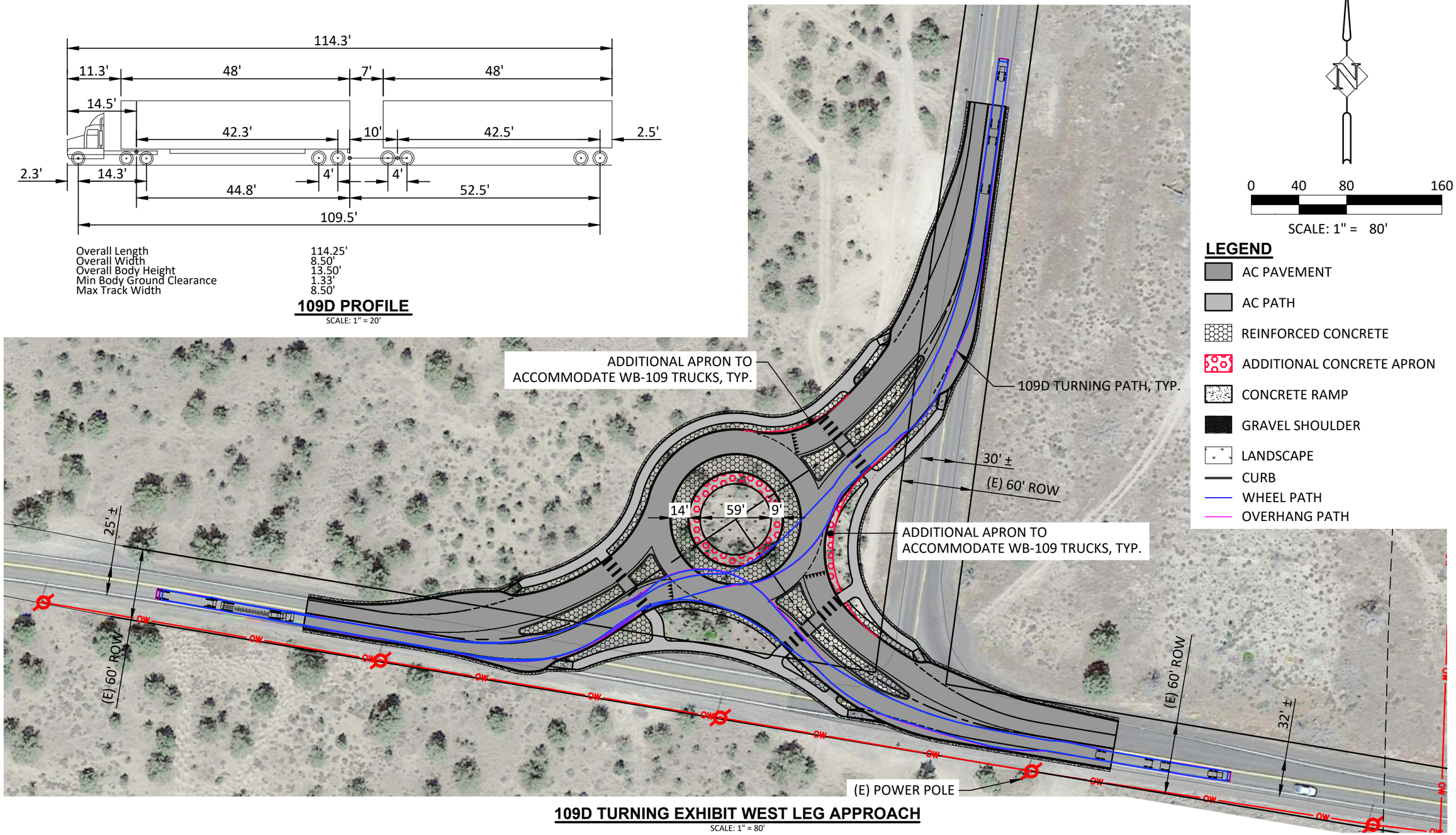
SHEET NO. **EX1.0**

JOB NO. DC0-02

Overall Length	114.25'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

109D PROFILE

SCALE: 1" = 20'



109D TURNING EXHIBIT WEST LEG APPROACH

SCALE: 1" = 80'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 2 - NW Alignment 150 ICD.dwg

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

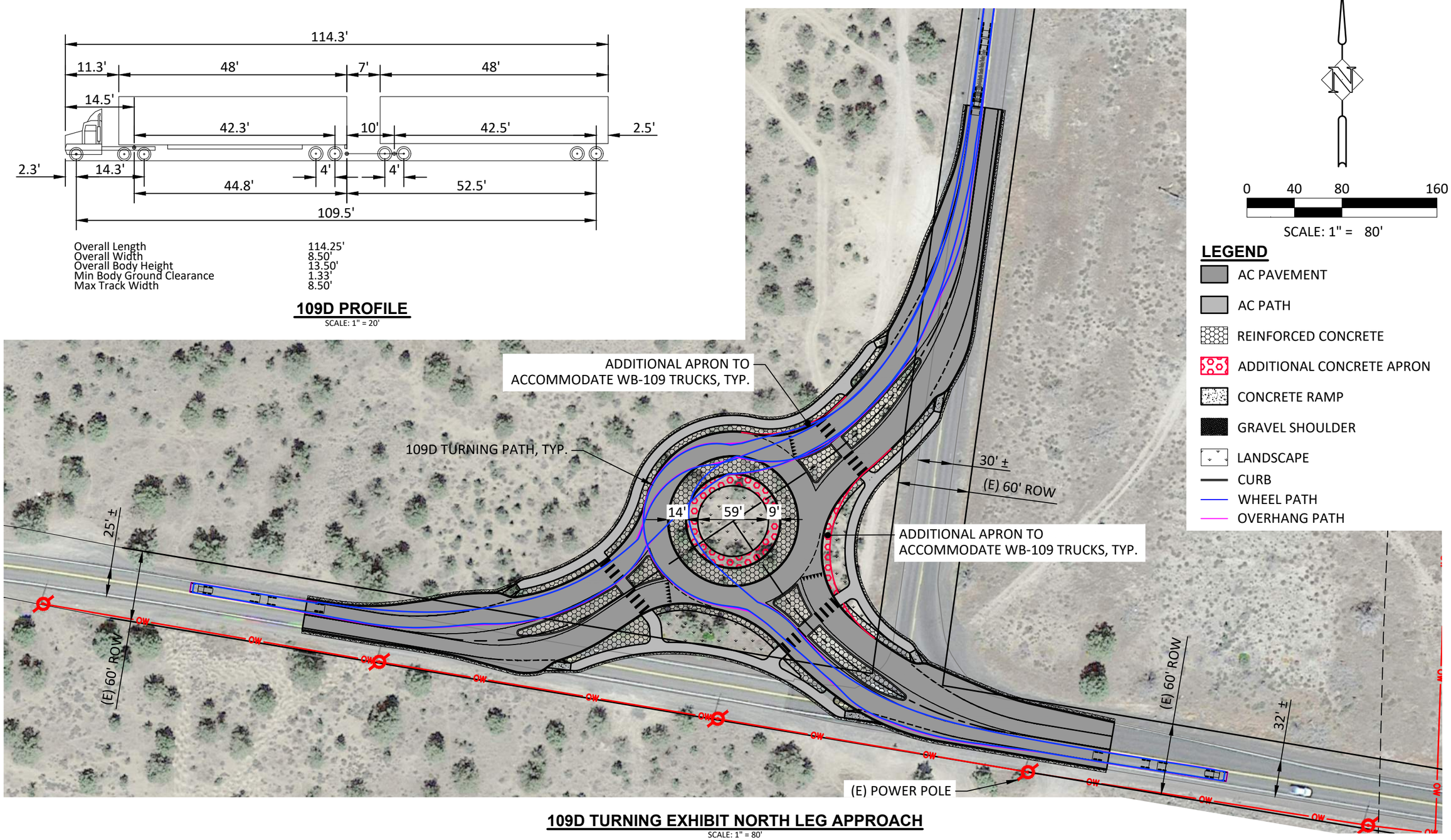
SHEET NO. **EX1.1**

JOB NO. DC0-02

Overall Length	114.25'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

109D PROFILE

SCALE: 1" = 20'



109D TURNING EXHIBIT NORTH LEG APPROACH

SCALE: 1" = 80'

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

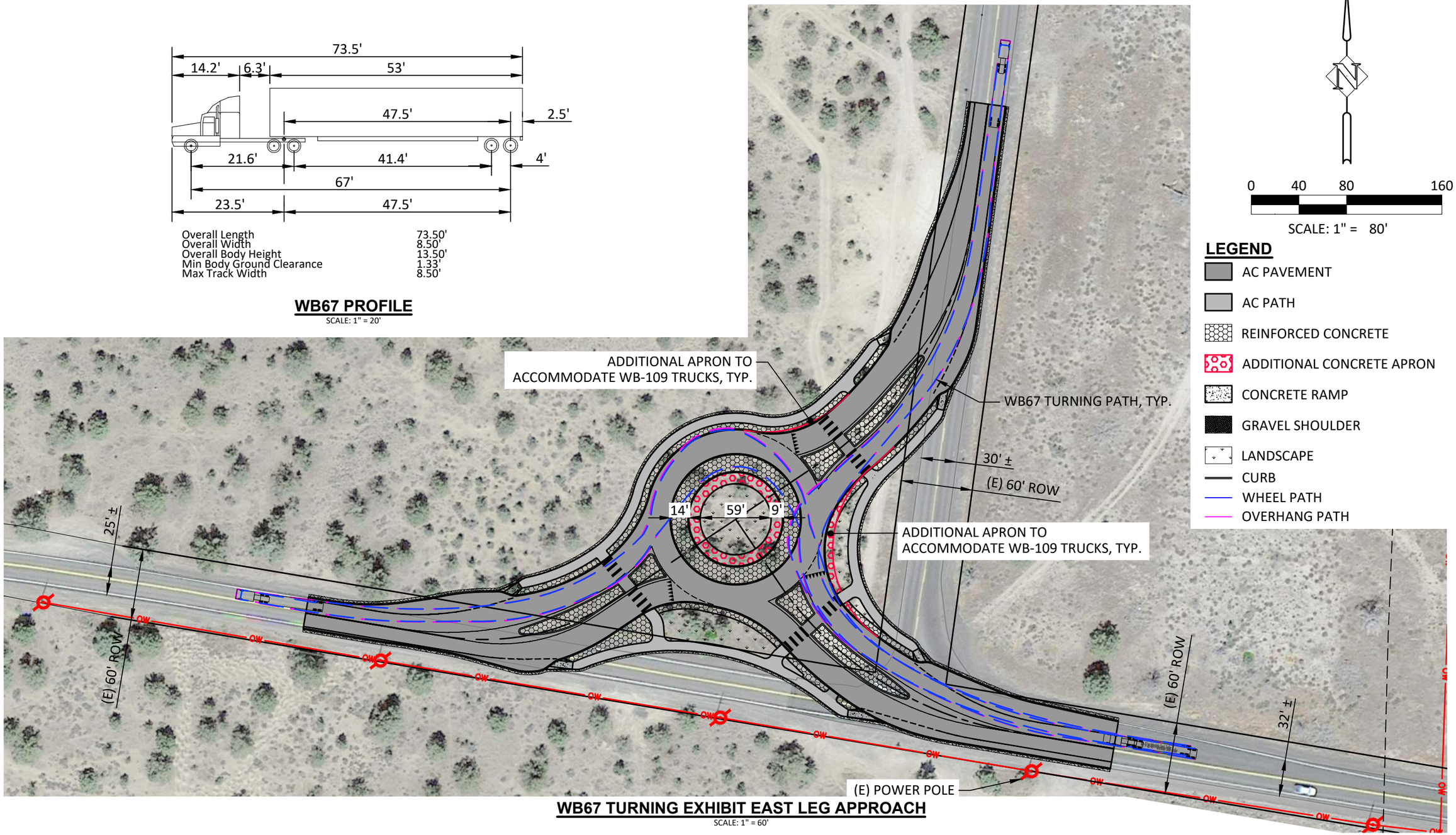
SHEET NO. **EX1.2**

JOB NO. DC0-02

Overall Length	73.50'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

WB67 PROFILE

SCALE: 1" = 20'



WB67 TURNING EXHIBIT EAST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 2 - NW Alignment 150 ICD.dwg

DESCHUTES COUNTY

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

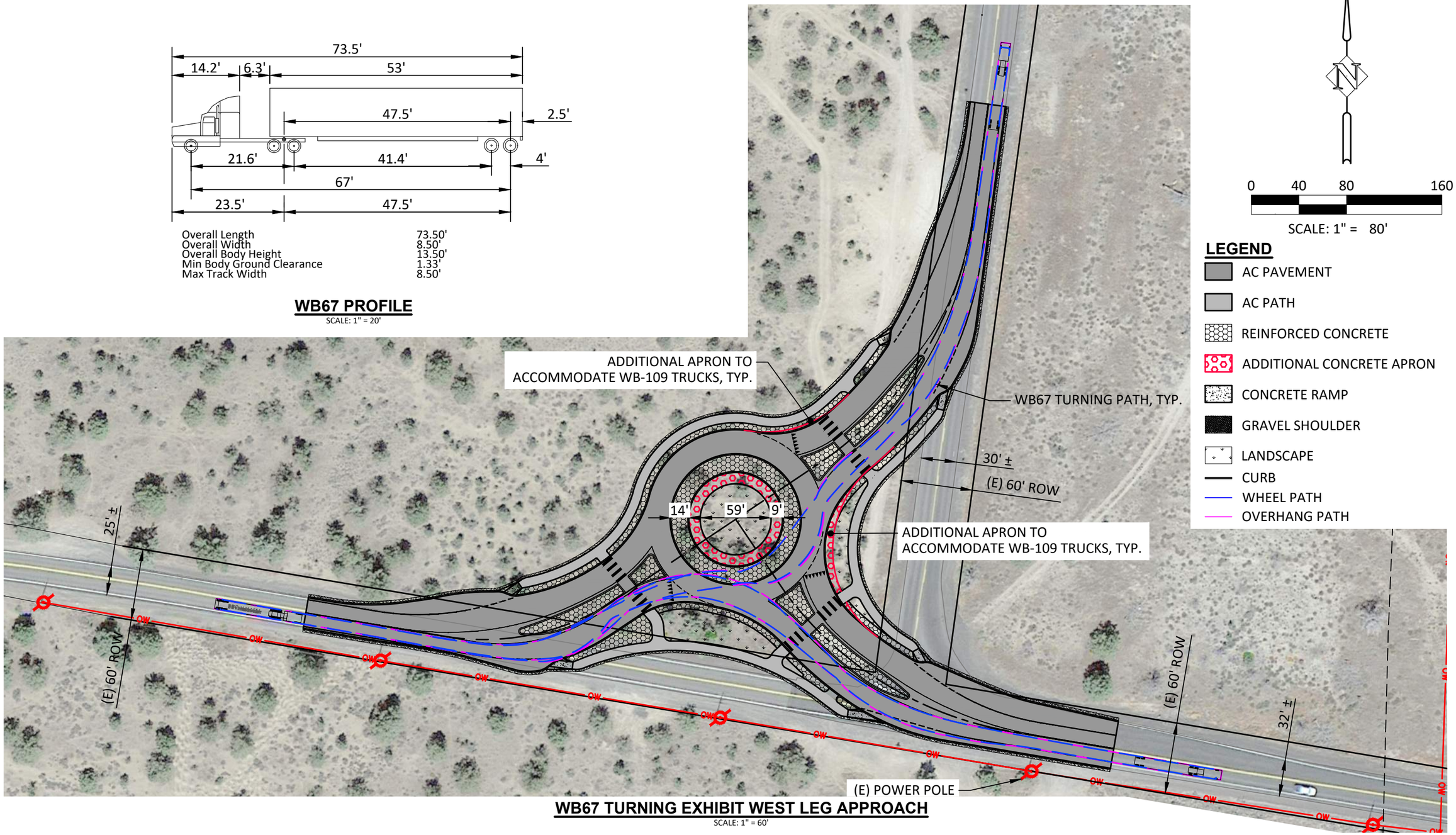
SHEET NO. **EX1.3**

JOB NO. DC0-02

Overall Length	73.50'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

WB67 PROFILE

SCALE: 1" = 20'



WB67 TURNING EXHIBIT WEST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 2 - NW Alignment 150 ICD.dwg

DESCHUTES COUNTY

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

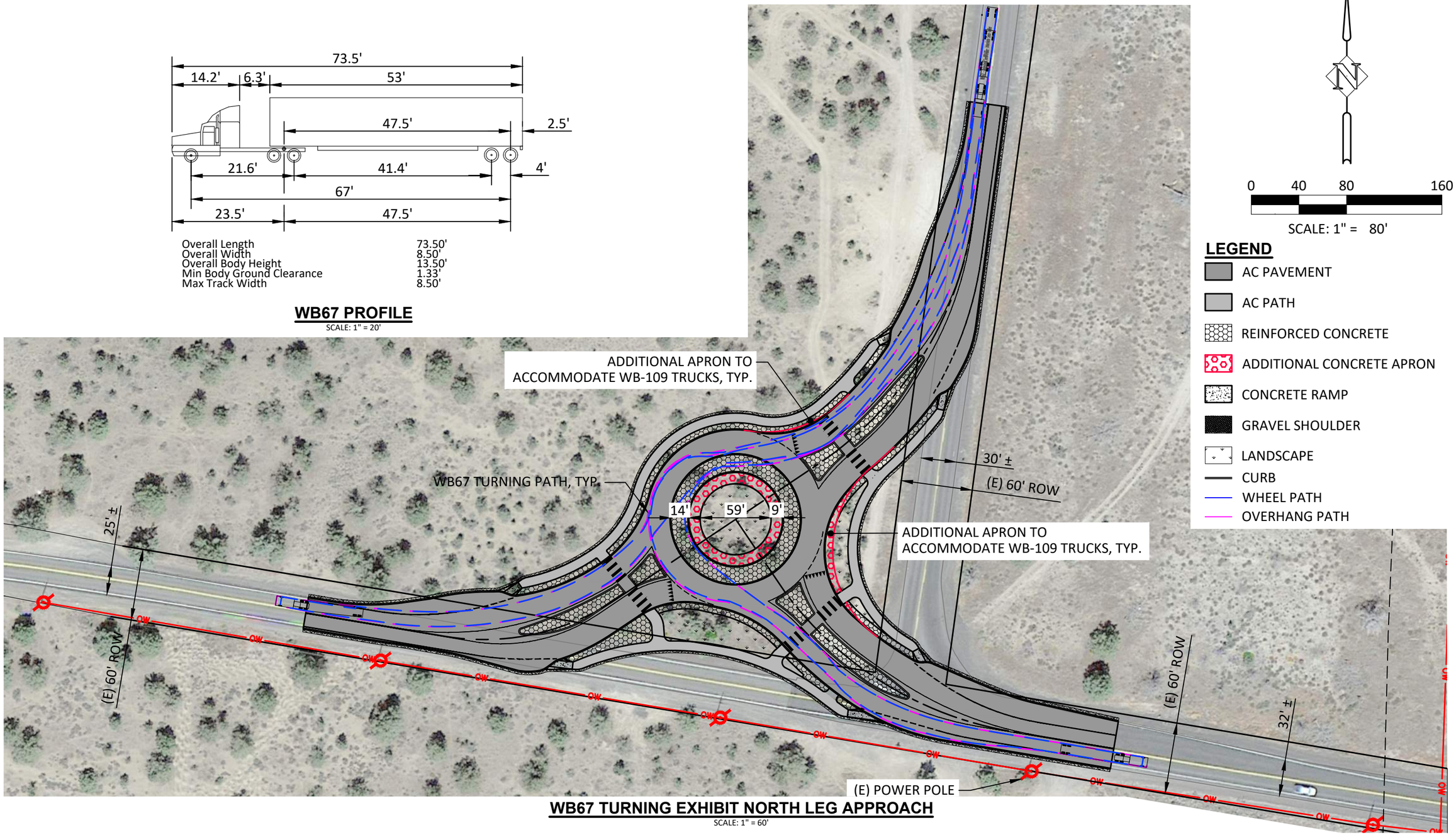
SHEET NO. **EX1.4**

JOB NO. DC0-02

Overall Length	73.50'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

WB67 PROFILE

SCALE: 1" = 20'



WB67 TURNING EXHIBIT NORTH LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DCO (Deschutes County)\DCO-04 (LBW-43rd)\DCO04-DWGS\Exhibits\Turning Path Exhibits\ Opt 2 - NW Alignment 150 ICD.dwg

DATE	NO.	DESCRIPTION

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

SHEET NO. **EX1.5**

JOB NO. DC0-02

Appendix 2c

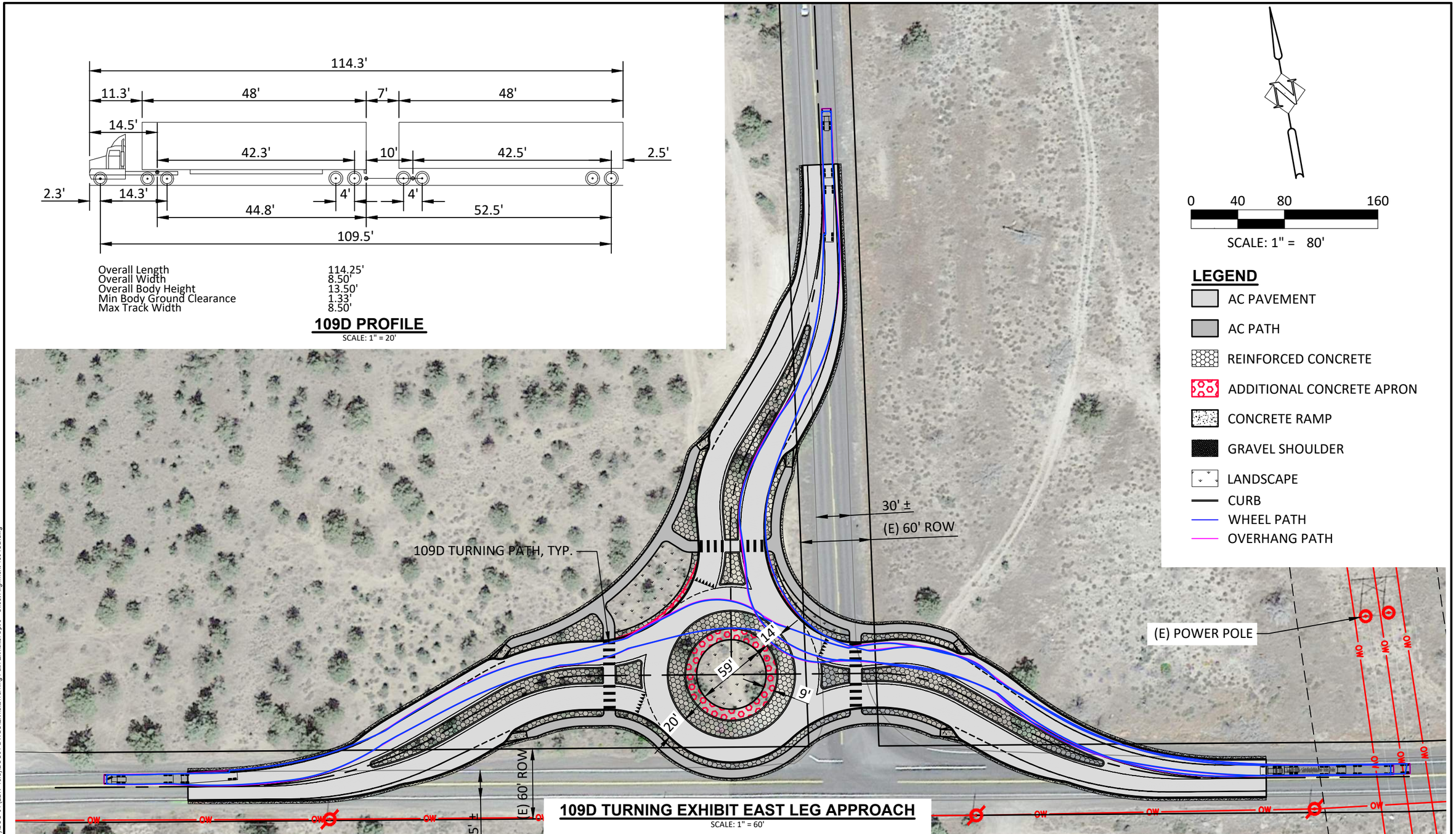
Option 3 (NW Layout)
E-W Through Direction

WB-67 and WB-109D
Truck Turning Movements

Overall Length	114.25'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

109D PROFILE

SCALE: 1" = 20'



109D TURNING EXHIBIT EAST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 3 - Offset Alignment 150 ICD.dwg

DESCHUTES COUNTY

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OFFSET ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

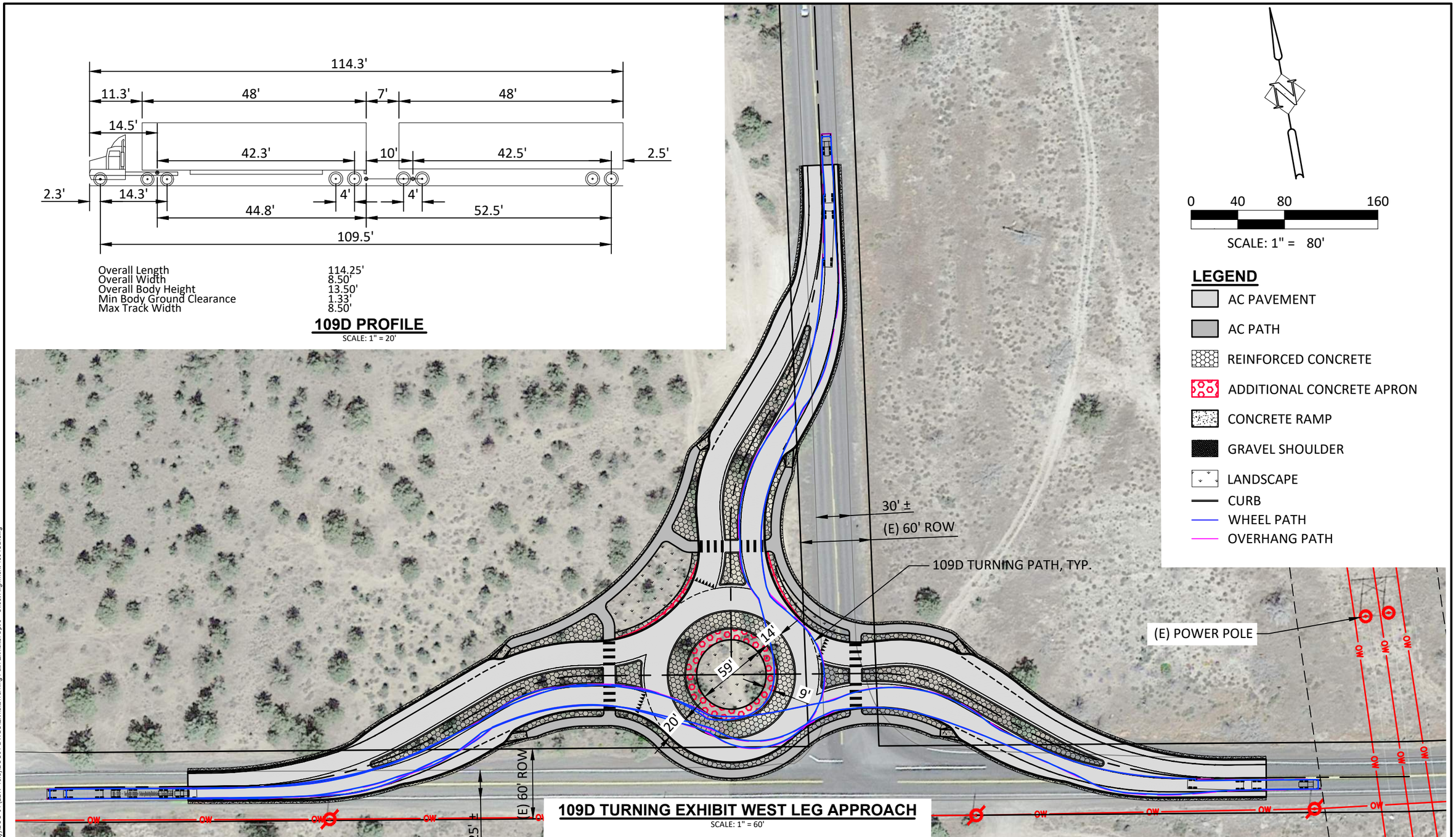
SHEET NO. **EX1.0**

JOB NO. DC0-02

Overall Length	114.25'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

109D PROFILE

SCALE: 1" = 20'



109D TURNING EXHIBIT WEST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 3 - Offset Alignment 150 ICD.dwg

DESCHUTES COUNTY

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OFFSET ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

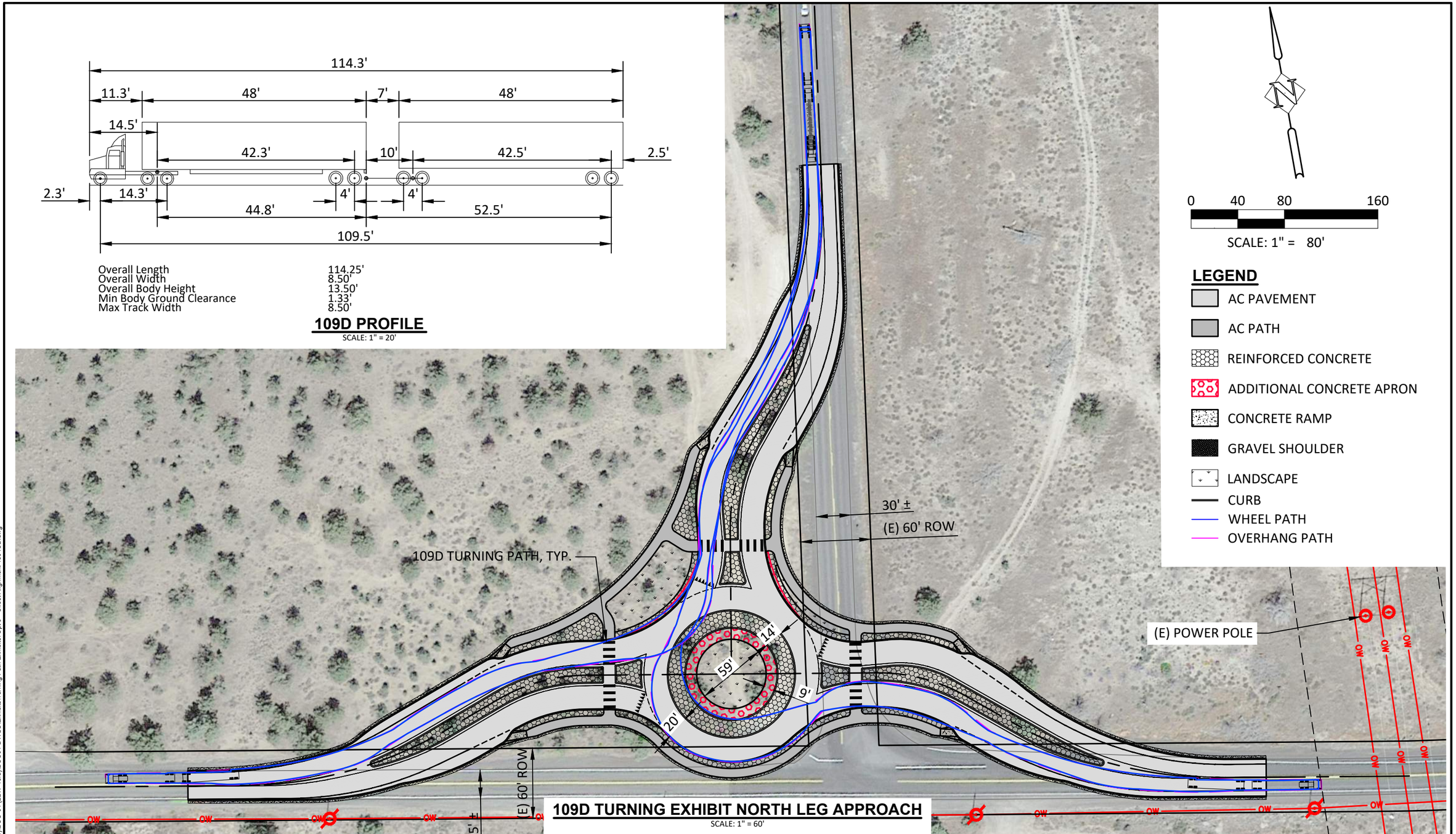
SHEET NO. **EX1.1**

JOB NO. DC0-02

Overall Length	114.25'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

109D PROFILE

SCALE: 1" = 20'



109D TURNING EXHIBIT NORTH LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 3 - Offset Alignment 150 ICD.dwg

DESCHUTES COUNTY

DATE	NO.	DESCRIPTION

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OFFSET ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

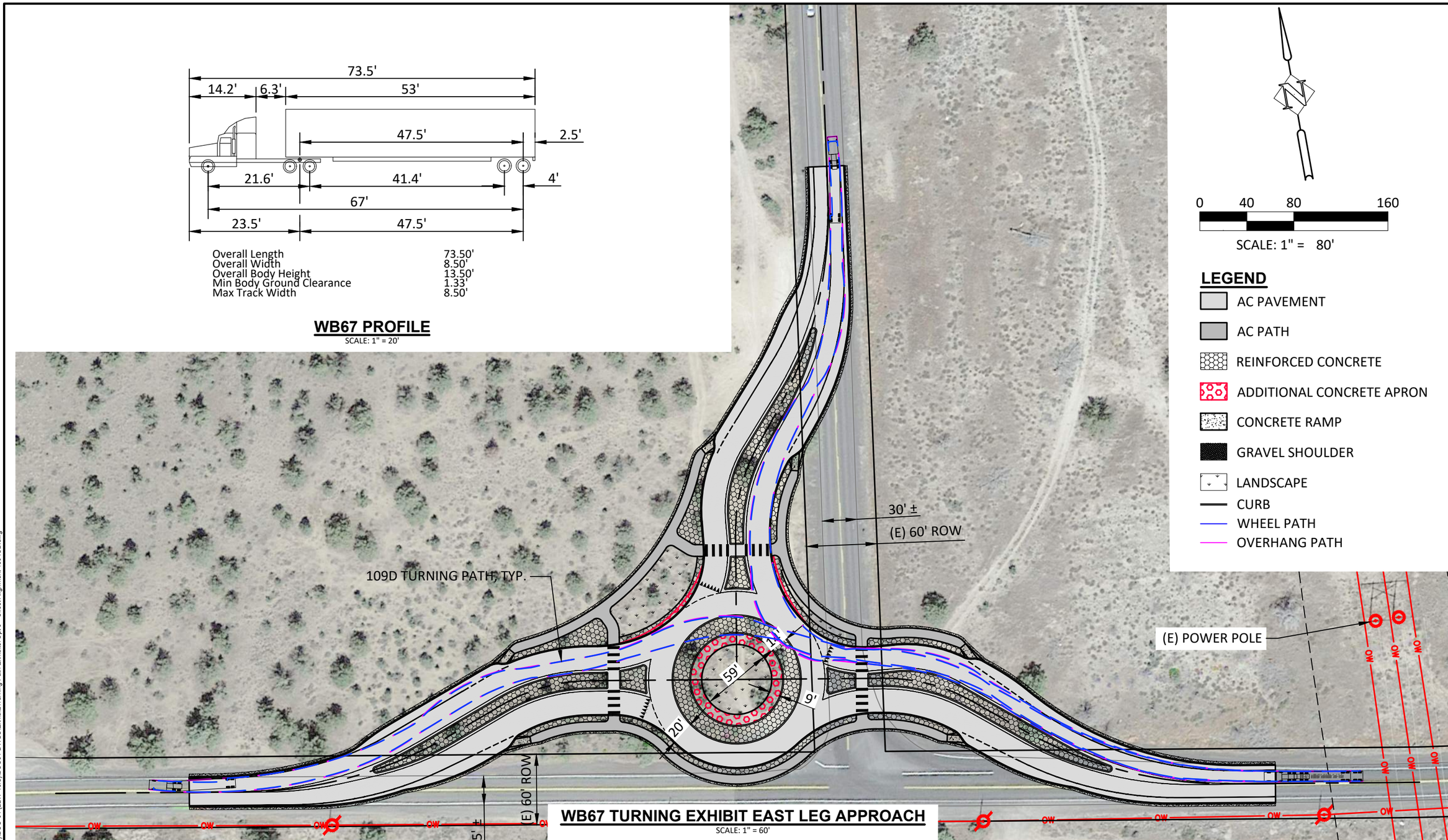
SHEET NO. **EX1.2**

JOB NO. DC0-02

Overall Length	73.50'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

WB67 PROFILE

SCALE: 1" = 20'



WB67 TURNING EXHIBIT EAST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC004-DWGS\Exhibits\Turning Path Exhibits\ Opt 3 - Offset Alignment 150 ICD.dwg

DESCHUTES COUNTY

DATE	NO.	DESCRIPTION

R E V I S I O N S

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

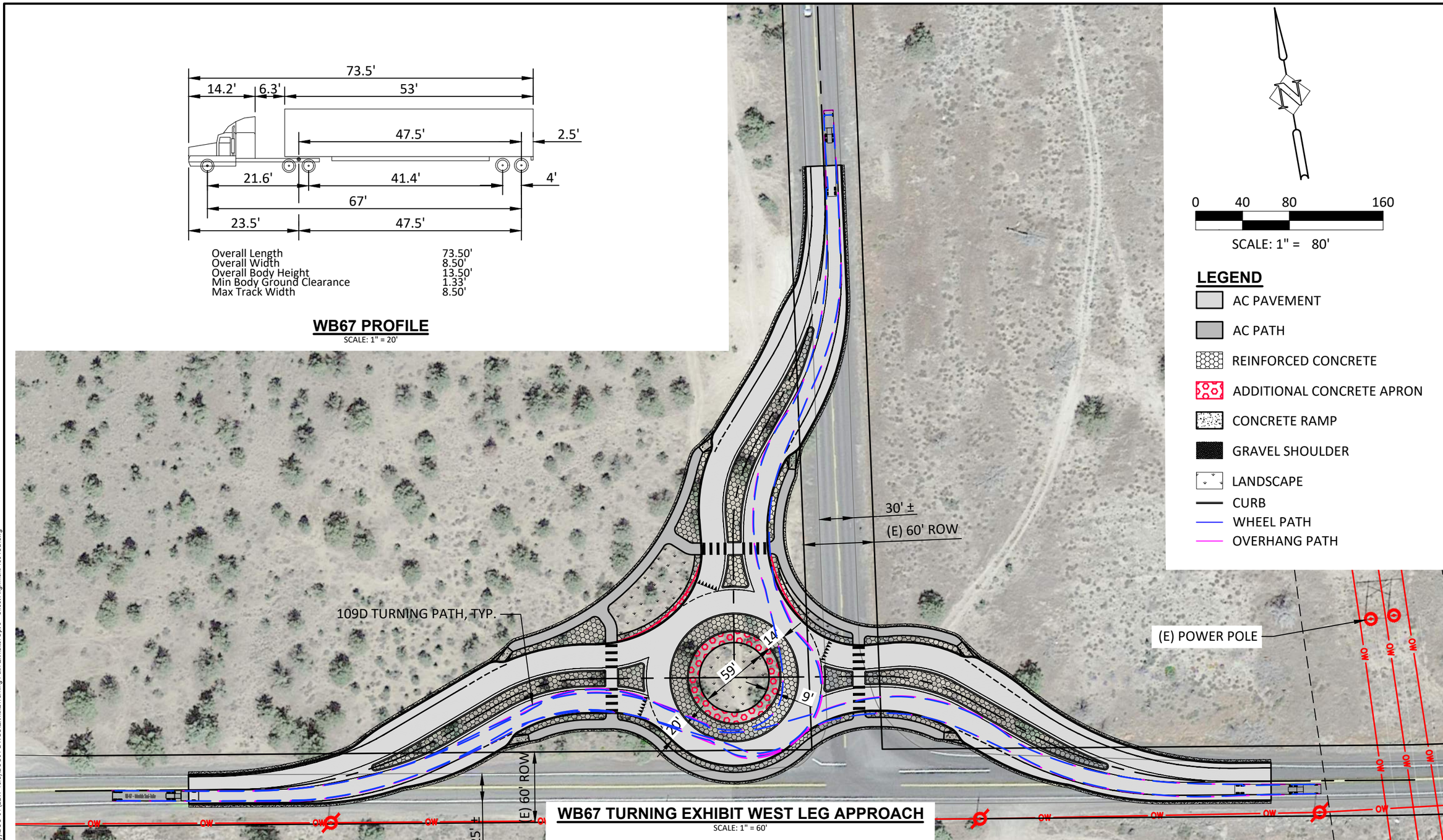
SHEET NO. **EX1.3**

JOB NO. DC0-02

Overall Length	73.50'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

WB67 PROFILE

SCALE: 1" = 20'



WB67 TURNING EXHIBIT WEST LEG APPROACH

SCALE: 1" = 60'

P:\03-Bend\DC0 (Deschutes County)\DC0-04 (LBW-43rd)\DC0-04-DWGS\Exhibits\Turning Path Exhibits\ Opt 3 - Offset Alignment 150 ICD.dwg

DESCHUTES COUNTY

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

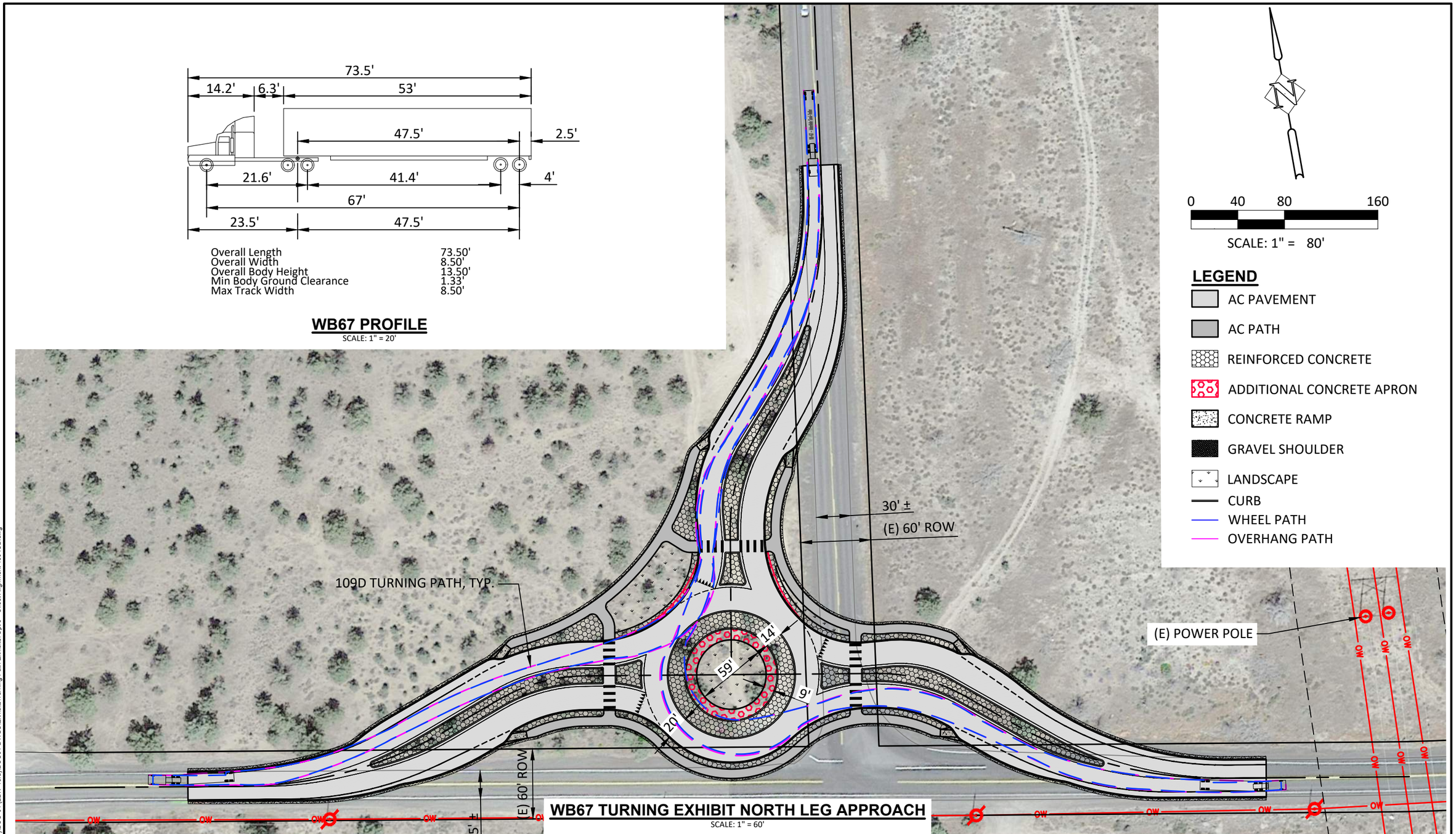
SHEET NO. **EX1.4**

JOB NO. DC0-02

Overall Length	73.50'
Overall Width	8.50'
Overall Body Height	13.50'
Min Body Ground Clearance	1.33'
Max Track Width	8.50'

WB67 PROFILE

SCALE: 1" = 20'



WB67 TURNING EXHIBIT NORTH LEG APPROACH

SCALE: 1" = 60'

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DESCHUTES COUNTY

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NW ALIGNMENT - 150 ICD

43RD / LOWER BRIDGE WAY INTERSECTION IMPROVEMENT

DESCHUTES COUNTY, OREGON

SHEET NO. **EX1.5**

JOB NO. DC0-02