Texas Department of Transportation

JUNE 2025

INNOVATIVE INTERSECTIONS DESIGN AIDS

TCP Strategies

OVERVIEW

This design aid is a supplement to the guidance provided in the PS&E Preparation Manual, October 2024; NCHRP 1043, Chapter 15.5 Construction Phasing; and, the Road Design Manual Chapter 14. It is intended to provide designers with practical considerations and best practice principles for construction phasing alternatives. This guidance applies to concrete and asphalt roundabout construction in either rural or urban settings. Challenges to construction phasing and mitigation measures for construction phasing that are common with modern roundabouts are addressed with the principles of best practice in this design aid.

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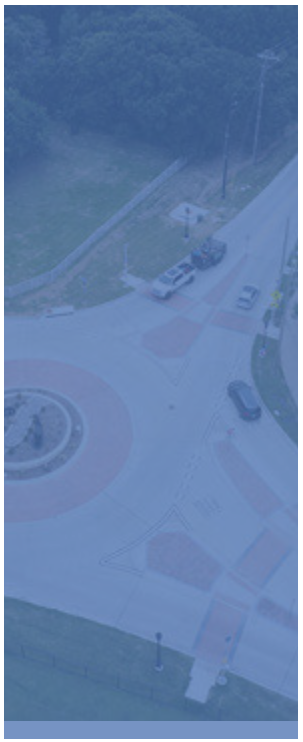

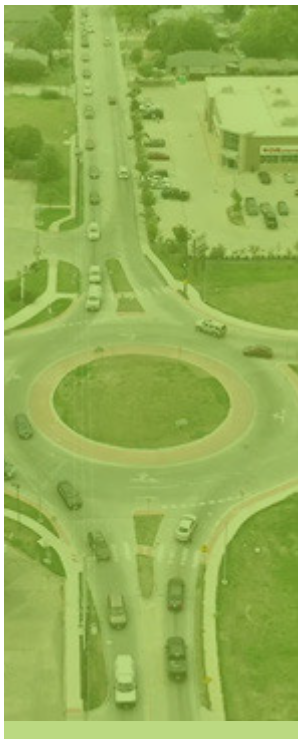

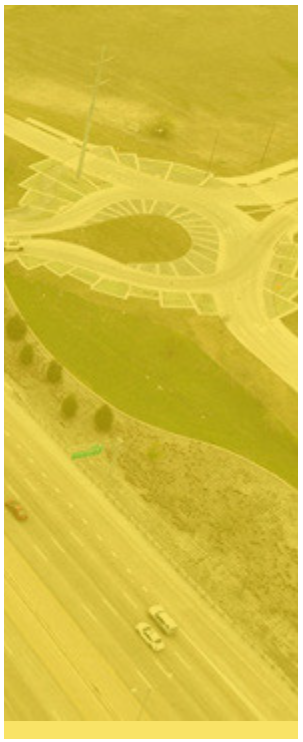

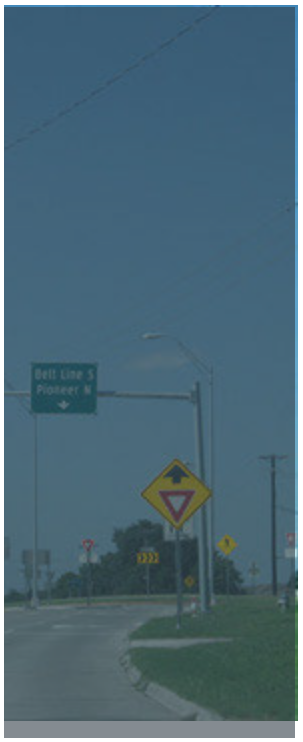

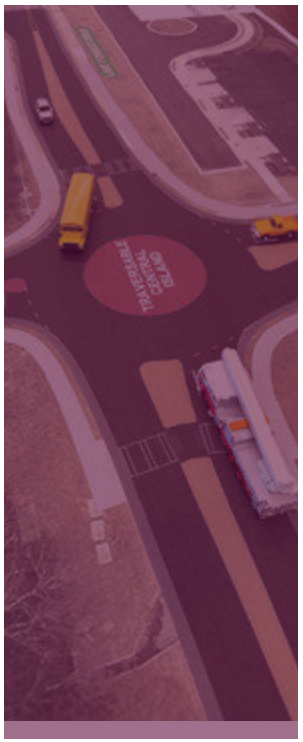

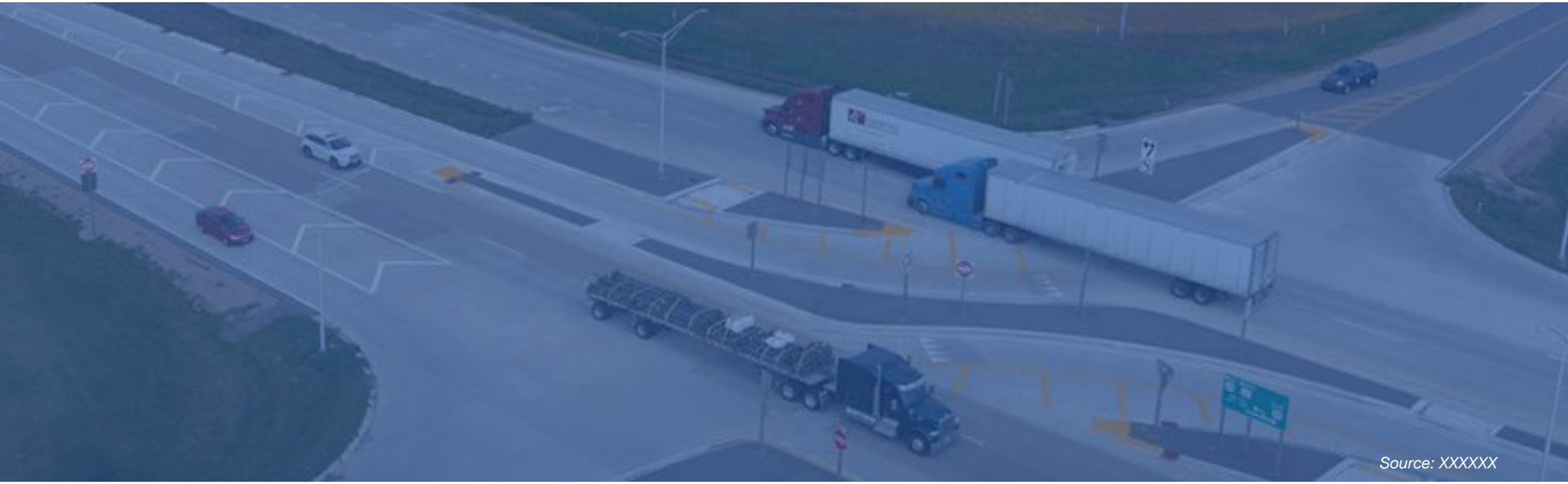
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FIGURES

Click to view figures

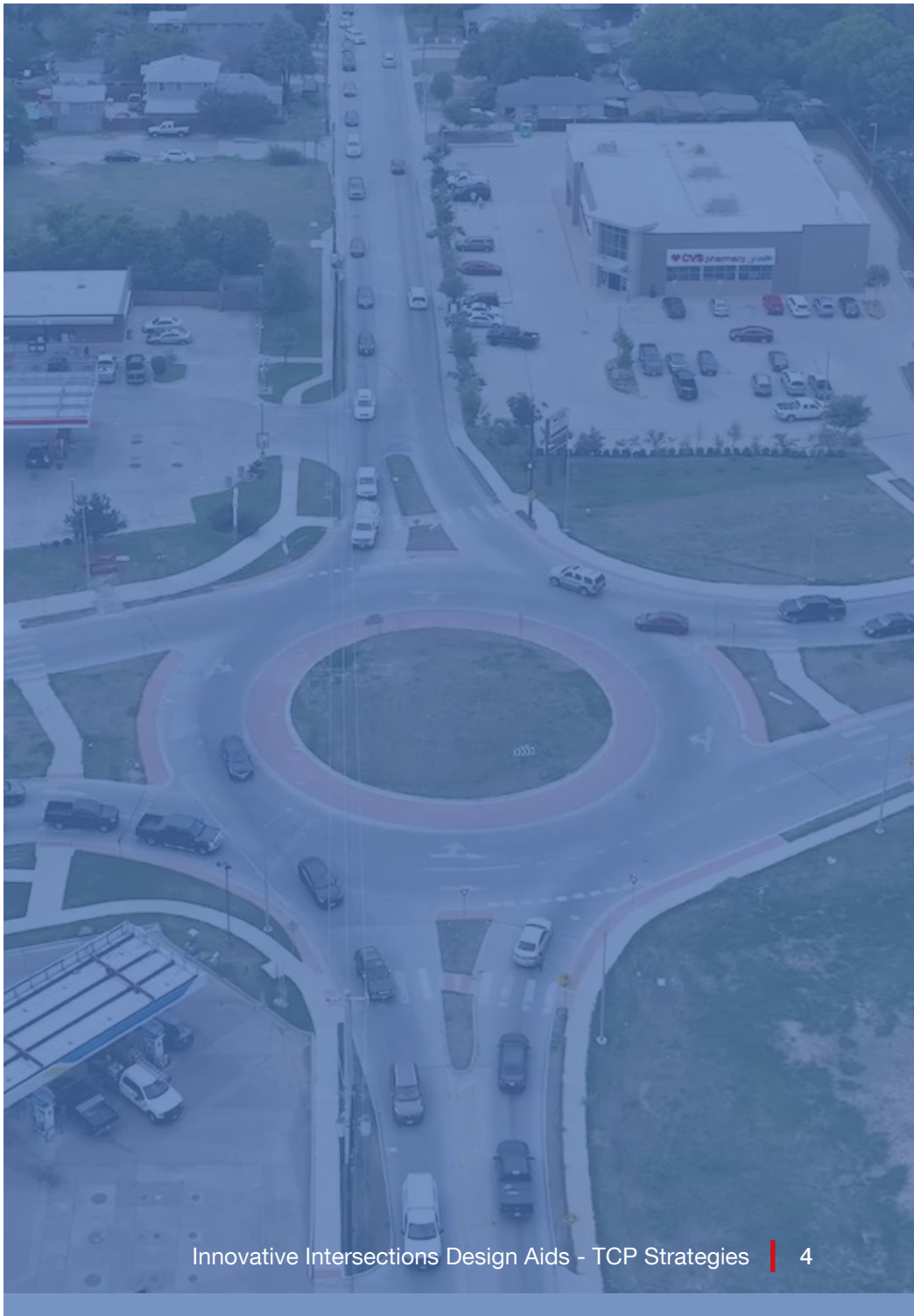
INTRODUCTION

Roundabout construction phasing, and development of traffic control plans, requires consideration early in project development, usually at the schematic design (30%) milestone. Construction cost, environmental impacts and even the question of feasibility of a roundabout can be significantly affected by construction phasing constraints.

Traffic Control Plan (TCP) sheets, appropriate for the complexity of the project, provide direction to the contractor and construction staff on the required configuration of TCP measures to move traffic through or around the construction work zone in a safe, expeditious, and clear manner. (PS&E Preparation Manual, October 2024). **The majority of construction phasing impacts and challenges, and the assessment of their impacts, can be overcome by developing a thorough construction phasing TCP schematic at the 30% design milestone.**

In general, construction of roundabouts can be staged with intersection closure, partial closure or under full traffic. Choice of pavement material, e.g., concrete versus asphalt and changes in intersection grades affect the complexity of traffic control plans (TCP) and the timing and duration of construction stages. The alternatives detailed within this design aid represent various phasing scenarios that are possible for both concrete and asphalt pavement.

Appendix A contains schematic examples and site pictures of phasing alternatives that have been successfully implemented using the alternatives/sub-alternatives outlined in this aid. **Appendix B** presents Challenges of Constructing Roundabouts and alternative mitigation measures.



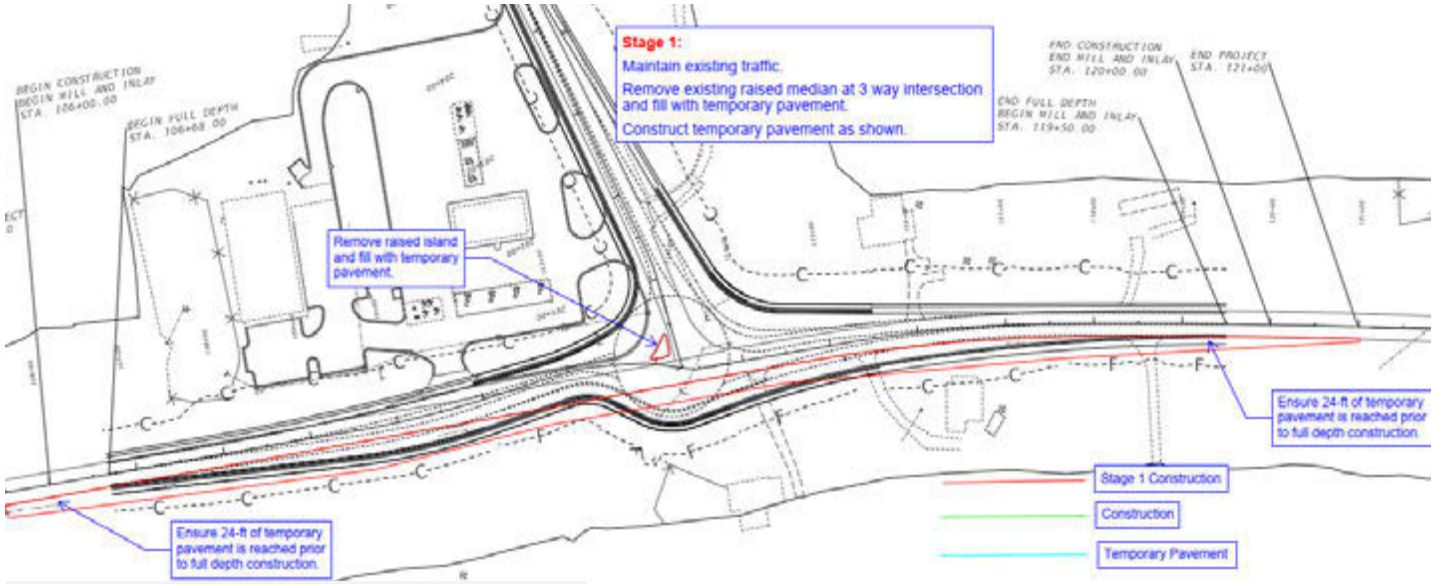
Texas Department of Transportation

BEST PRACTICE PRINCIPLES OF PHASING ROUNDABOUT CONSTRUCTION

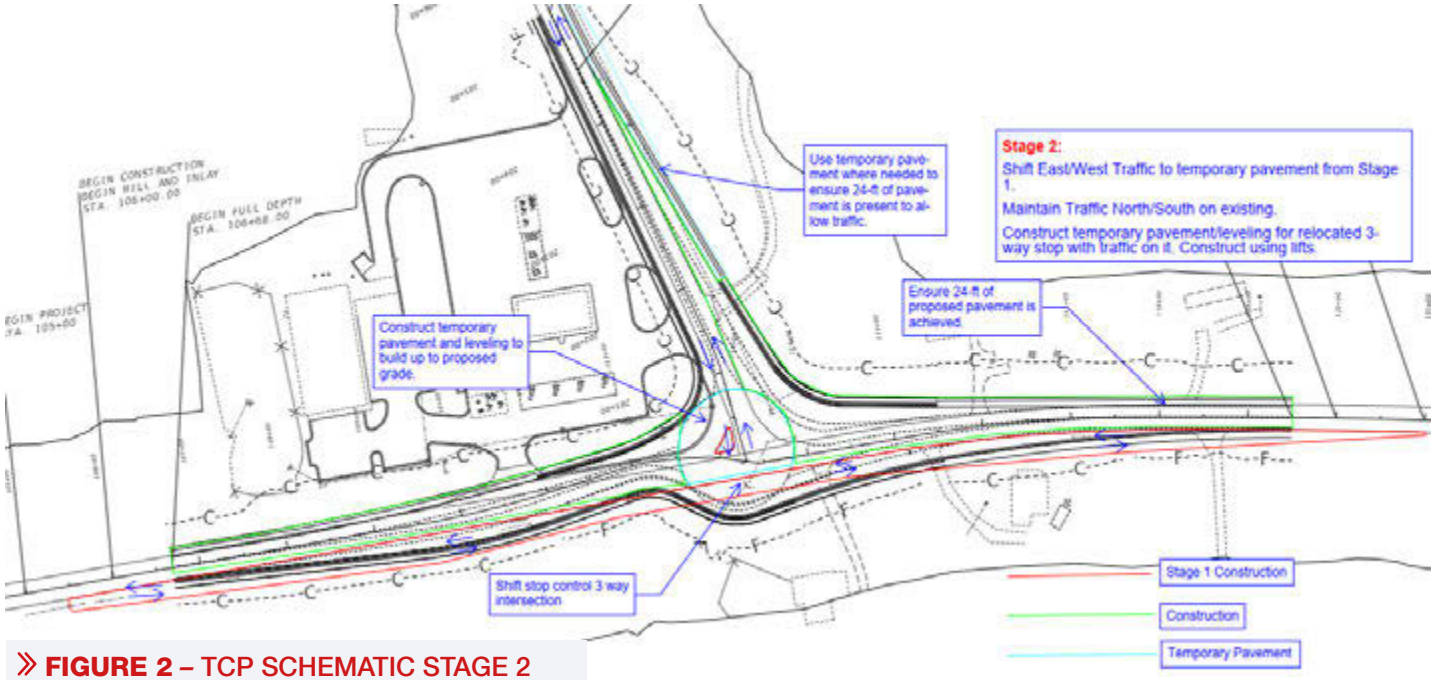
The Traffic Control Plan (TCP) schematic must illustrate, with color and shading, the phase or stages of construction, temporary traffic lanes, temporary intersection control, lane and leg closures; and if necessary, areas of pavement elevation change for temporary lanes. A TCP Narrative describes the sequence of work to be performed as shown in subsequent TCP sheets.

The figures below illustrate an example of a draft (work in progress) of a TCP schematic with a brief narrative of construction phases. This documentation forms the basis of discussions with stakeholders and the subsequent detailed development of TCP sheets. The value of a TCP schematic cannot be overemphasized.

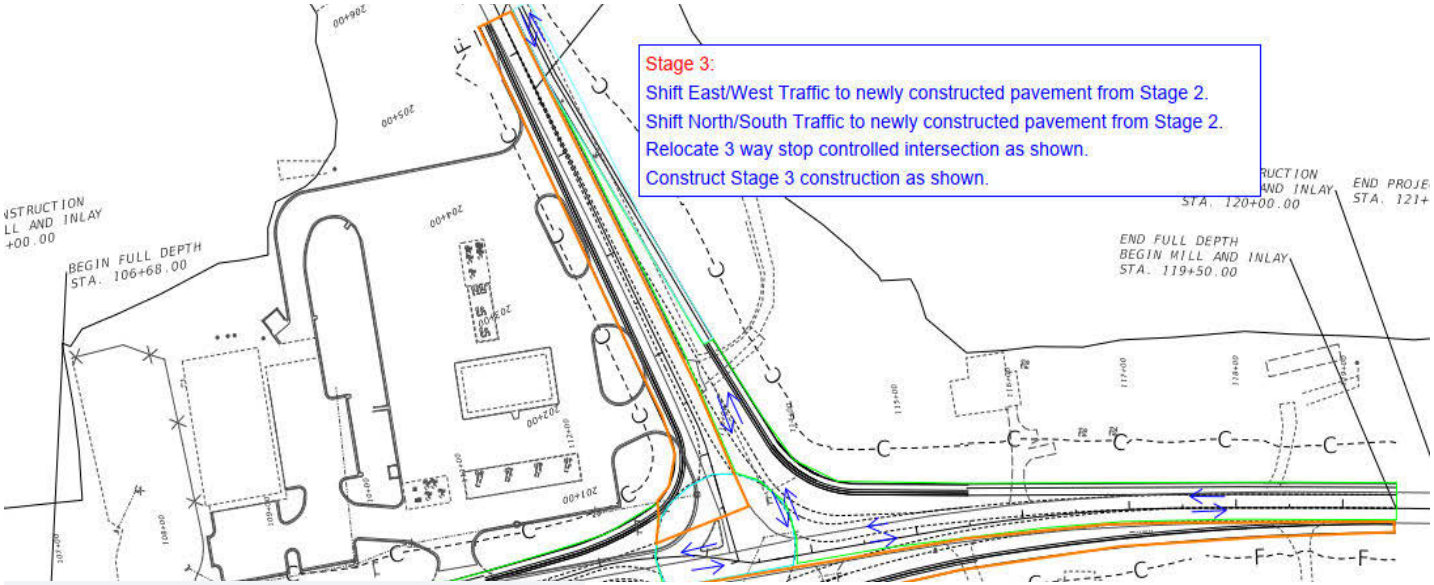
This initial TCP exploration and documentation is essential at 30% design, before preliminary design, as it sets out road closures, possible detours, and critical space requirements for temporary lanes. Construction phasing feasibility can affect property requirements, environmental encroachment, business access, construction cost, and duration. Efficient construction phasing minimizes cost, and traffic disruption and promotes safety to both workers and traffic. In many cases, multiple stages are required to safely maintain existing traffic movements during construction of a roundabout.



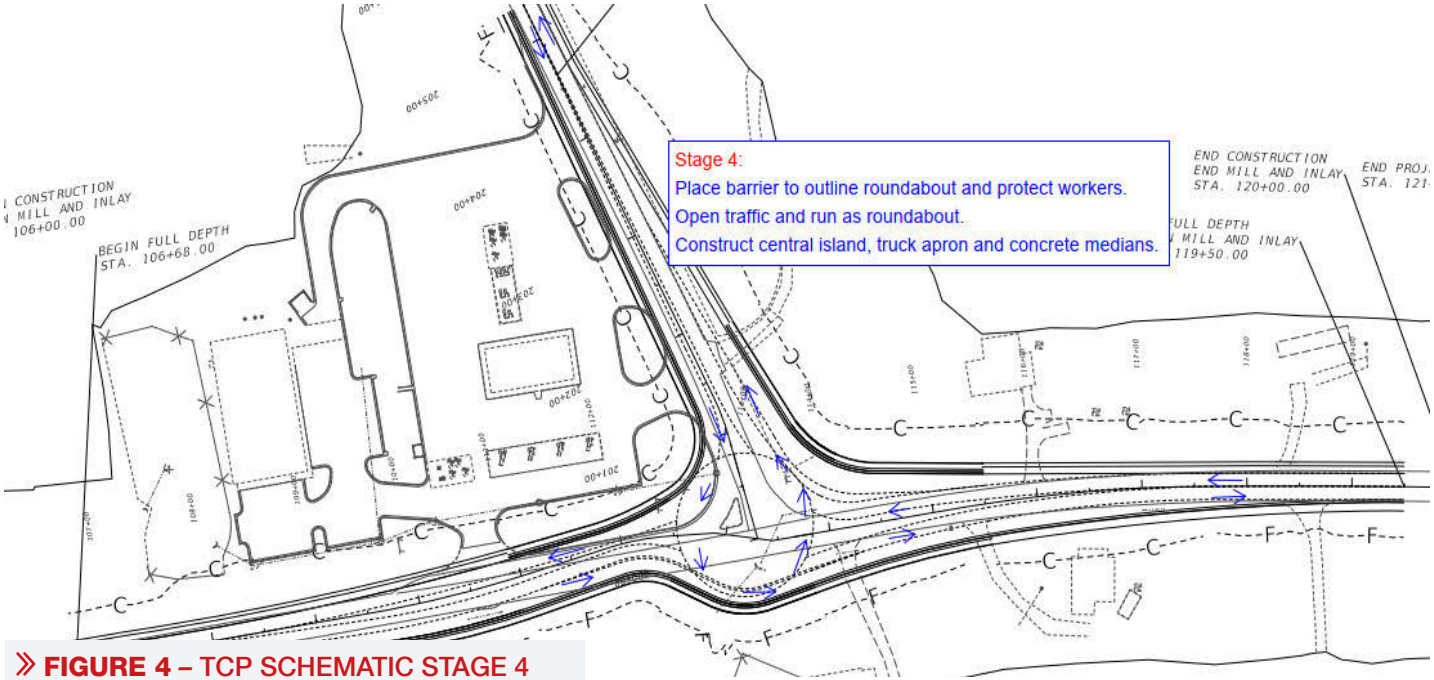
» **FIGURE 1** – TCP SCHEMATIC STAGE 1



» **FIGURE 2** – TCP SCHEMATIC STAGE 2



» **FIGURE 3** – TCP SCHEMATIC STAGE 3



» **FIGURE 4** – TCP SCHEMATIC STAGE 4

If feasible, consider closure of the intersection and use of a detour(s). Below is a list of best practice principles to apply to all roundabout construction phasing and traffic management:

- Develop a TCP Narrative that describes the sequence of work to be performed as shown in subsequent TCP sheets.
- The TCP sheets show locations of work zone pavement markings, barriers, and channelizing devices on typical section sheets, as well as lane widths, buffer widths, and construction zone widths.
- Before the 60% Design, all utility points of conflict need to be established on a Conflict Layout plan. NOPCs need to be sent, and a utility kick-off meeting needs to be held. The Conflict Layout must identify utility conflicts associated with each phase of construction.
- At 90%, if it becomes clear that a certain utility will not be straightforward before prior to letting, then a construction management plan (CMP) is required. This plan outlines where an existing utility inhibits each phase of roadway construction and clarifies when said utility is scheduled to be relocated. Typically, several months of buffer is required to get a plan approved.
- Prioritize achieving circulating traffic, i.e., introducing traffic to roundabout traffic operations, as soon as possible.
  - Roundabout traffic operations reduce speeds, improve capacity, and improve safety for crossing movements and workers present in the intersection. (If needed ,use cones/barrels during construction to create a temporary roundabout.)
- Minimize the number of stages to avoid extending construction durations and increasing costs.
- Minimize the changes to traffic control at the intersection.
  - Avoid switching from yield to stop control and back again.
  - Avoid operating traffic in the contra-flow direction on the roundabout; this minimizes the possibility of driver confusion.
- At least two (2) weeks before opening the roundabout, implement the standard priority rules of yielding at entry with traffic flowing counterclockwise.
- Before opening, install necessary signing including but not limited to:
  - Lane designation signs for multilane roundabouts
  - Wayfinding (D and M series signs)
- Place changeable message boards on each approach for a reasonable duration during the construction phase, if temporary control is proposed, and when opening the roundabout. The changeable message should alternate from “New Control” and “Yield Ahead.” Advise changeable message boards remain in place for up to six weeks after opening.
  - Message boards should be placed, especially on approaches that were previously uncontrolled or free-flowing.
- Concrete pavement requires special consideration of joint placement. Desirable jointing patterns improve roundabout efficiency and safety. Phasing should match desirable jointing patterns, and additional stages may be required.
- Check each phase of construction with the design vehicle and check vehicle routing to ensure the swept path of a vehicle is accommodated. This verification is important when routing opposing traffic in directly adjacent lanes and horizontal curves are used, or traffic is directed within the circulatory roadway of the roundabout with one direction contra-flowing. An articulated vehicle will require significant width within the horizontal curves that should be incorporated into the lane widths of the construction phasing design.

PHASING ALTERNATIVES AND TRAFFIC CONTROL STRATEGIES

In general, construction of roundabouts can be staged with intersection closure, partial closure or, under full traffic. Choice of pavement material, e.g., concrete versus asphalt, and changes in intersection grades affect the complexity of traffic control plans (TCP) and the timing and duration of construction stages. The alternatives detailed within this design aid represent various phasing scenarios that possible for concrete and asphalt pavement.

Appendix A contains schematic examples and site pictures of phasing alternatives that have been successfully implemented using the alternatives/sub-alternatives outlined in this aid. It is recommended to consider the alternatives in the order presented because they are generally listed in ascending order of increasing cost and complexity.

1.1 Long-Term Closure with a Traffic Detour

1.2 Short-Term closure

1.2.1 Night Closure(s)

1.2.2 Weekend Closure(s)

1.2.3 Partial Lane Closure (Utilize a Flagger/Temporary Signal to maintain traffic)

1.2.4 Multiple Week Closure with a Detour

1.3 Partial Detour (close the Minor Crossroad or One Leg)

1.4 Construction of a Roundabout Off Alignment

1.5 Construction of the Roundabout Under Traffic

1.5.1. Quadrants or Piece-work

1.5.2. Undivided Two-Lane Road

1.5.3. Divided Four-Lane Road

1.5.4. Outer Detour

1.1 Long-Term Closure with a Traffic Detour

When there is an acceptable detour route, closing the intersecting roads to traffic and allowing the contractor the full work zone to construct the roundabout results in the safest, most efficient, cost-effective construction process. A detour plan is required and subject to consultation with the District Traffic Engineer (who may discuss it with local officials). A best practice to determine detour feasibility is to determine the additional travel time associated with the proposed detour. A general range of increased travel time for a rural detour is between 5 and 20 minutes. Urban detours can range between 15 minutes to 30 minutes in additional travel time. The project owner and/or District Engineer has the final approval of the proposed detour. Properties with driveways within the closure limits will still need access during the construction. A portion of the widening can be completed prior to the closure/detour of the intersection (see 1.2.3 Stage 1 Figure for widening example).

Additional consideration should be given along routes that are intermittently or significantly used by oversized and overweight permitted vehicles. Coordination between the Area Office may uncover a high frequency of permitted vehicles that could create significant issues transporting larger loads elsewhere without significant delay.

1.2 Short-Term Closure

Short-term closures can range from a night or a weekend to multiple weeks or even single-lane closures. A portion of the widening would typically be completed prior to the closure/detour of the intersection (see **1.2.3 Stage 1 Figure** for widening example).

1.2.1 NIGHT CLOSURE(S)

Night closures (evening to morning OR after PM peak to before AM peak) are preferred to long-term closures, as formalized detour plans are not needed. Night closures can be covered under TxDOT District - specific general notes and are subject to District review. Signing and lighting requirements are specified in the TxDOT Barricade and Construction Standards (BC (1) thru (12)).

1.2.2 WEEKEND CLOSURE(S)

Weekend closures (Friday evening to Monday morning) are preferred to long-term closures because formalized detour plans are not needed. Weekend closures can be covered under TxDOT District - specific general notes and are subject to District review.

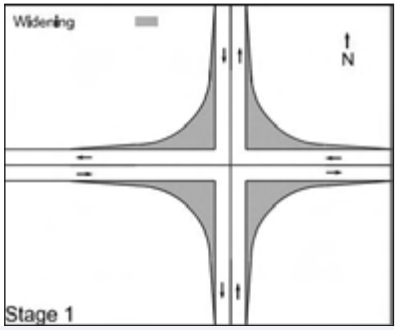
A typical construction activity completed during a weekend closure is pouring the roundabout's truck apron.

1.2.3 PARTIAL LANE CLOSURE (UTILIZE A FLAGGER/TEMPORARY SIGNAL TO MAINTAIN TRAFFIC)

Reducing the number of traffic lanes at the intersection is a short-term alternative that can allow for pavement construction, which will help improve safety and traffic movements in the following stages. By utilizing flaggers or temporary signals, traffic can safely maneuver through the intersection while the pavement is being placed. See Appendix A for phasing examples.

- This alternative is especially effective when the existing road can be milled and filled to the proposed grades. Mill and fill operations can be completed quickly and allow the intersection to resume full functionality without ever being fully closed to traffic.
  - Mill and fill operations only apply when the proposed grade is in fill scenario. When the proposed grade is in cut, a full-depth replacement is necessary.
- The same principles can be applied to concrete intersections, but the closure duration is much longer due to the placement and cure time of the concrete.

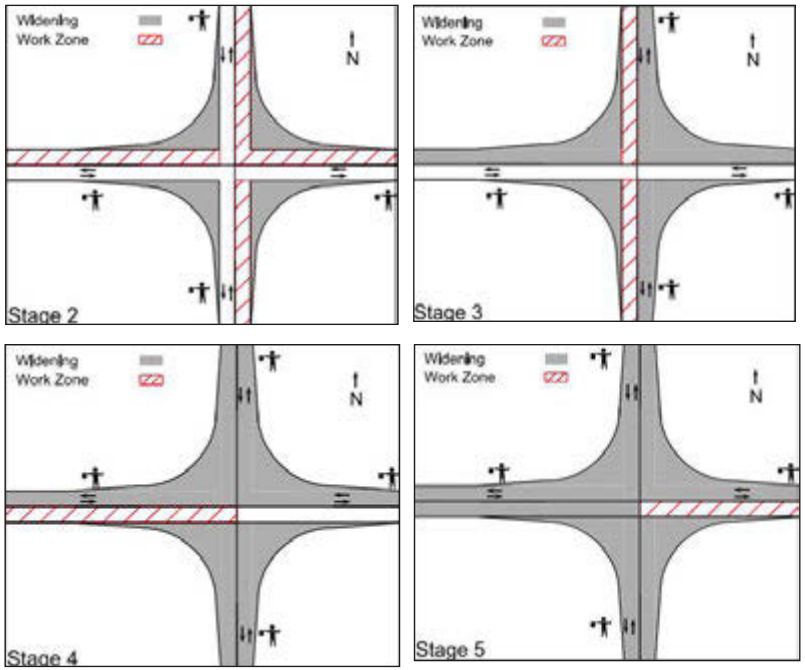
Excess asphalt is present on the center island for both concrete and asphalt conditions, which will be removed when the final median is placed. This excess pavement allows traffic to traverse the intersection safely until the circulating traffic pattern is implemented. When the central island is utilized to channel traffic through the intersection, it is commonly referred to as a “Pave Thru” alternative.



» **FIGURE 5** – 1.2.3 STAGE 1

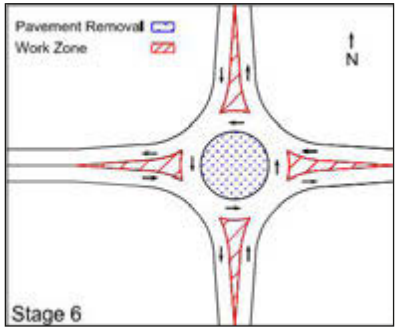
Stage 1

- Intersection to remain open under existing traffic conditions.
- Construct pavement widening, and outer concrete curb and gutter along the existing roadway, where feasible.
- Advertise lane closure notice to the public 14 calendar days in advance.
- Place signing during non-peak hour traffic and in advance of lane closure.



Stages 2-5

- Reduce traffic to one lane in each direction through the intersection, utilizing flaggers/traffic signal to channel traffic through the intersection.
- During the lane reduction, construct as much of the intersection as possible. When feasible mill existing pavement and replace the driving surface to tie into proposed grades.
- Shift traffic through the various stages as pavement is set.

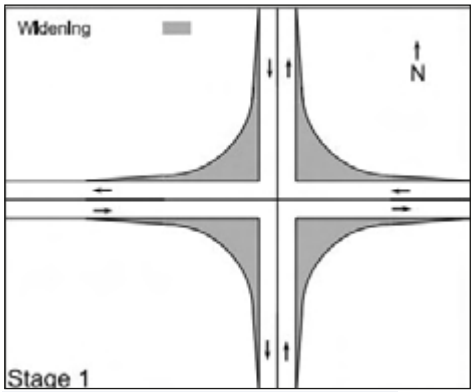


Stage 6

- Open roundabout intersection to traffic.
- Construct the remaining splitter islands, while maintaining enough separation between workers and traffic.
- Pave remaining surface course of asphalt as needed.

1.2.4 Multiple Week Closure with Detour

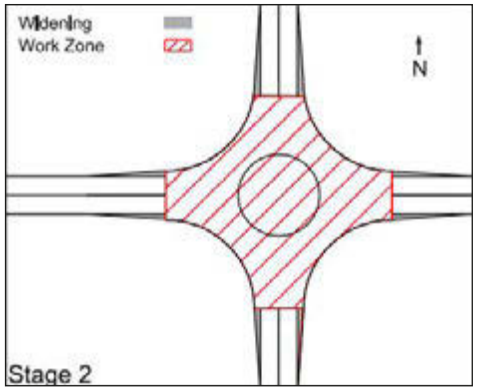
Multiple-week closures are not preferred to night or weekend closures because this alternative requires a formalized detour plan. However, this is an option when weekend closures are insufficient and long-term closures are not feasible. This alternative is practical when placing concrete pavement, as the intersection will have to be shut down during the placement and curing of concrete pavement.



» **FIGURE 6** – 1.2.4 STAGE 1

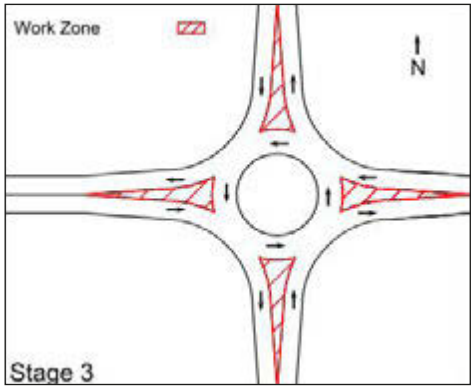
Stage 1

- Intersection to remain open under existing traffic conditions.
- Construct pavement widening, and outer concrete curb and gutter along the existing roadway, where feasible.
- Advertise detour notice to the public 14 calendar days in advance of intersection closure.
- Place detour signing during non-peak hour traffic and in advance of roadway closure.



Stages 2

- Close the intersection to traffic, rerouting traffic via the proposed detour.
- Maintain access for local property owners within construction limits.
- During the closure, construct as much of the intersection as possible.
- During closure prioritize these primary construction items central island, concrete truck apron, concrete islands, temporary/final striping, and surface coarse of asphalt, where feasible.

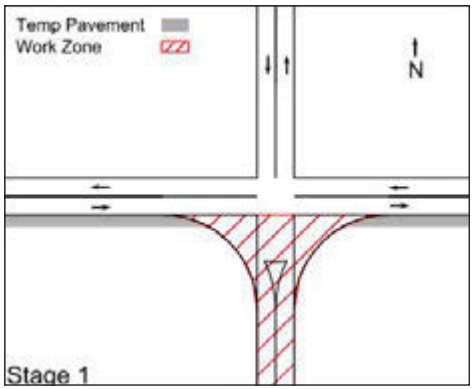


Stages 3

- Open roundabout intersection to traffic.
- Construct the remaining splitter islands, while maintaining enough separation between workers and traffic.
- Pave remaining surface course of asphalt as needed.

1.3 Partial Detour (Close the Crossroad or One Leg)

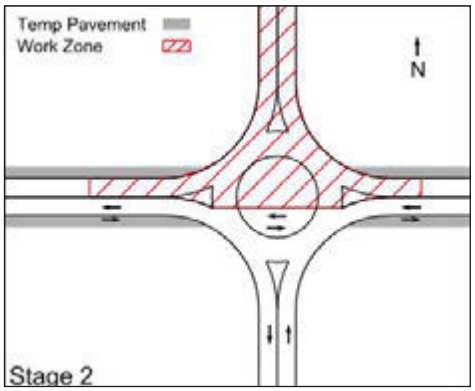
This alternative can be implemented when it is feasible to close and detour the minor route, but the main road must remain open. In the example below, the north and south segments are the minor routes.



» **FIGURE 7** – 1.3 STAGE 1

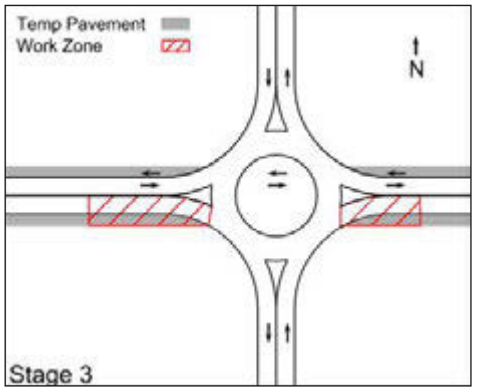
Stage 1

- Advertise detour notice to the public 14 calendar days in advance of intersection closure.
- Place detour signing during non-peak hour traffic and in advance of roadway closure.
- Shift or close and detour traffic on south leg.
- Construct temporary widening along the south side of the mainline to accommodate future traffic switches.
- Complete full construction of the south leg.
- Construct as much as possible of the roundabout quadrants and circulatory roadway.



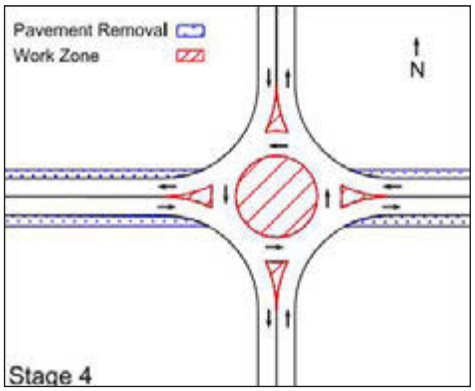
Stage 2

- Shift mainline traffic onto stage 1 constructed/temporary widening and open the south leg to traffic.
- Close and detour traffic from the north leg.
- Complete full construction of north leg.
- Construct as much as possible of the roundabout quadrants and circulatory roadway.
- Construct westbound mainline approaches.
- Construct temporary pavement for traffic switches.



Stage 3

- Shift mainline traffic onto new westbound lanes using temporary pavement in the islands.
- Open the north leg to traffic.
- Complete construction of eastbound mainline approaches.

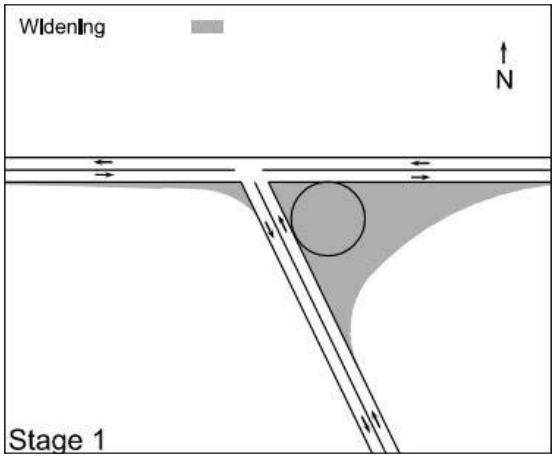


Stage 4

- Complete construction of remaining central island and splitter islands, while maintaining enough separation between workers and traffic.
- Remove pavement under the landscaping area and all temporary pavement. Construct outside curb and gutter after central island is completed.
- Pave remaining surface course of asphalt.

1.4 Construction of a Roundabout Off Alignment

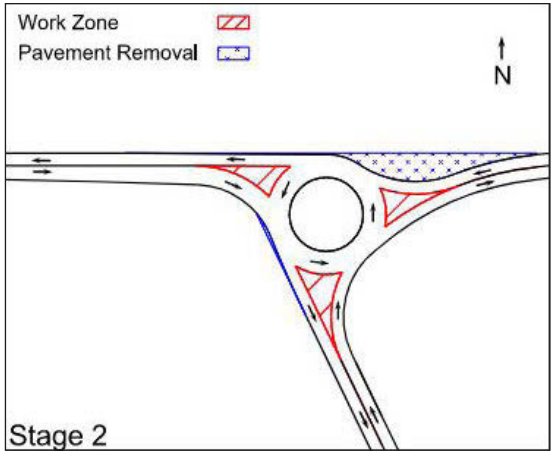
This alternative involves constructing a roundabout with the circle shifted off the existing intersection. Because fewer stages are necessary, it can significantly save phasing/construction costs. This is an especially viable alternative at T-intersections.



» **FIGURE 8** – 1.4 STAGE 1

Stage 1

- Construct all truck aprons and pavement outside of existing pavement limits.



Stage 2

- Shift traffic to roundabout control.
- Construct the remaining splitter islands, curb and gutter, etc. while maintaining enough separation between workers and traffic.
- Remove excess pavement.

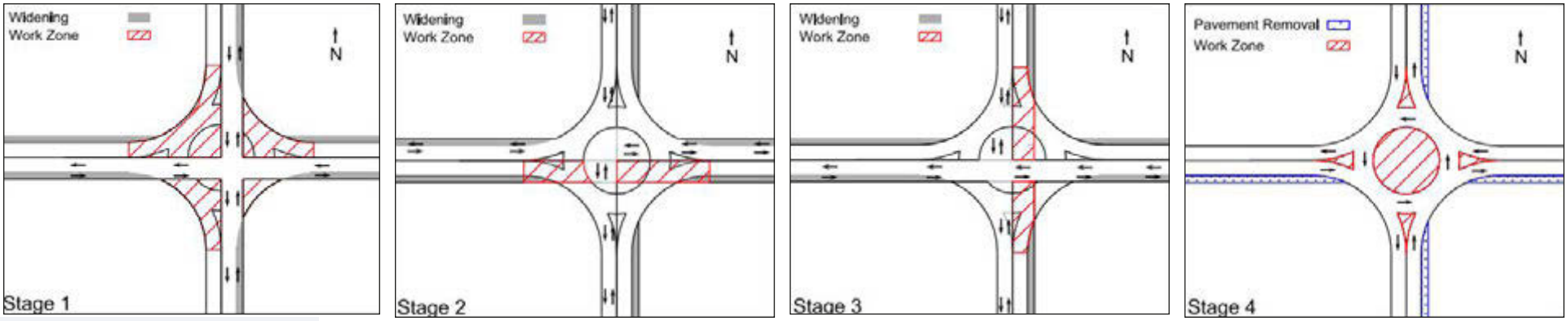
1.5 Construction of the Roundabout Under Traffic

Generally, there are two sub-alternatives to consider when phasing roundabout construction while maintaining traffic through the intersection:

- Quadrants or Piece-work – Constructing quadrants of the intersection and shifting traffic within the work zone using a combination of existing/temporary pavement and proposed/temporary pavement to maintain traffic through the intersection.
- 'Outer Detour' – Partial closure of the intersection via a detour around the work zone area while the central island area and circulatory are constructed, followed by the phase construction of each leg of the roundabout. This sub-alternative introduces a circular traffic flow pattern during construction and can provide uninterrupted inner traffic circle construction operation. However, this method is limited to areas with larger rights-of-way that can offer the necessary footprint for the temporary outer detour pavement and the larger work zone areas.

1.5.1. QUADRANTS OR PIECE-WORK – UNDIVIDED TWO-LANE ROADWAY

This alternative is applicable for two-lane undivided intersections that do not have a feasible detour route available.



» **FIGURE 9** – 1.5.1 STAGE 1

Stage 1

- Shift traffic onto temporary/ existing pavement and construct as much of proposed roadway as possible.
- Temporary leveling will likely be needed on existing lanes through the intersection to keep a smooth transition.

Stage 2 & 3

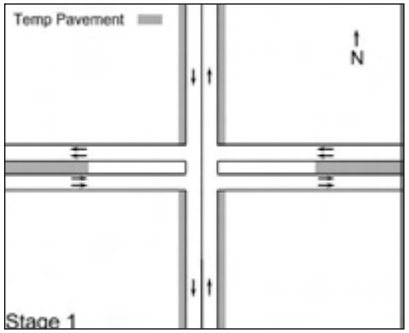
- Construct the remaining proposed pavement.
- Consider adding leveling to roadway as needed to avoid drainage issues.
- Use the shoulder for a traffic lane or temporary pavement as needed to complete the roundabout construction.

Stage 4

- Construct the remaining central island and splitter islands, quadrants, and the circulatory roadway.
- Traffic is on the newly constructed pavement.
- Remove all temporary pavement and construct outside curb and gutter after central island is completed.

1.5.2. QUADRANTS OR PIECE-WORK – DIVIDED FOUR-LANE ROADWAY

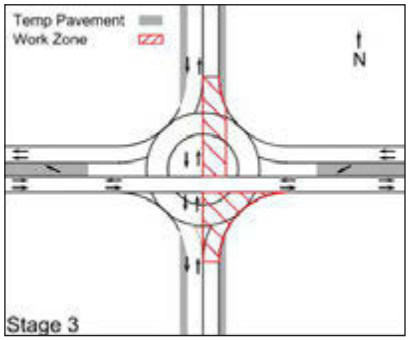
This alternative is applicable at an intersection of a four-lane divided and two-lane road that does not have a feasible detour route available.

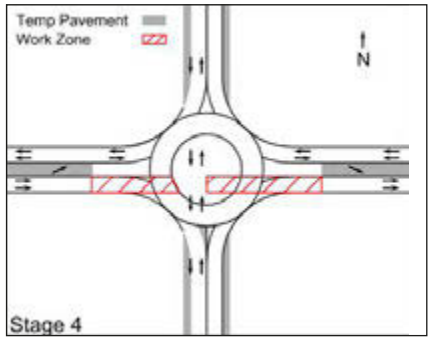


» **FIGURE 10** – 1.5.2 STAGE 1

Stage 1

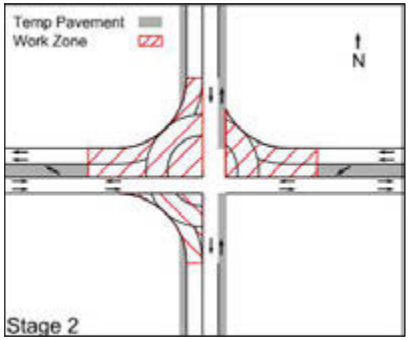
- Construct temporary pavement along one side of the two-lane road and between the median on the four-lane road.





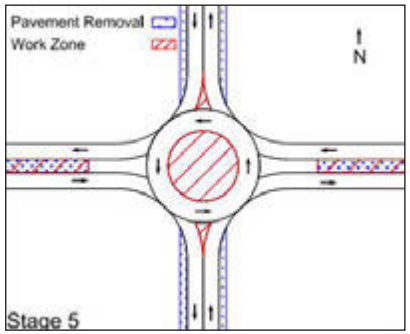
Stage 3 & 4

- Construct the remaining proposed pavement.
- Use the temporary pavement as needed to complete the roundabout construction.



Stage 2

- Shift traffic onto temporary/ existing pavement and construct as much of proposed roadway as possible.
- Restrict traffic to one lane in each direction through the intersection.
- Construct any additional temporary pavement needed for traffic switches.

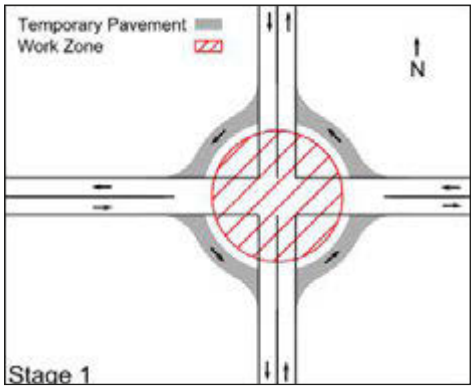


Stage 5

- Construct the remaining central island and splitter islands.
- Traffic is on the newly constructed pavement.
- After the central island is complete, remove all temporary pavement and construct outside curb and gutter.

1.5.3. OUTER DETOUR

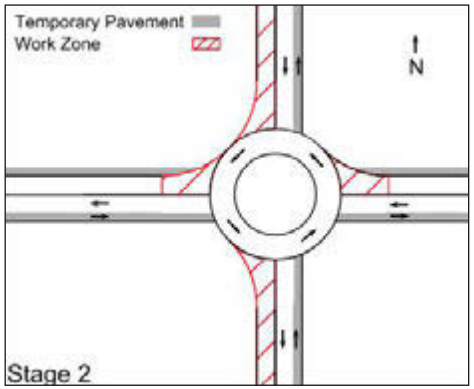
This alternative is applicable at an intersection with sufficient right-of-way to construct an outer detour around the work zone.



» **FIGURE 11** – 1.5.3 STAGE 1

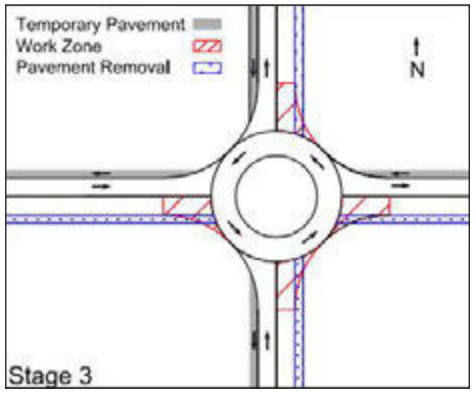
Stage 1

- Construct temporary pavement at each quadrant of the intersection around the proposed Inscribed Circle Diameter (ICD).
- Traffic uses temporary pavement while the central island and circulating lanes are constructed.
- Intersection functions with all-way stop control during this phase.



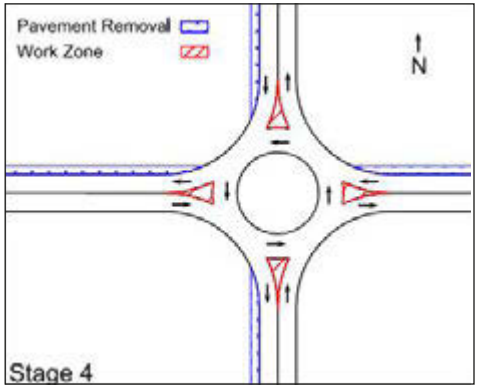
Stage 3

- Construct additional temporary pavement and shift traffic onto temporary/proposed pavement.
- Remove the excess temporary pavement from Stage 2.
- Construct the remaining proposed pavement.



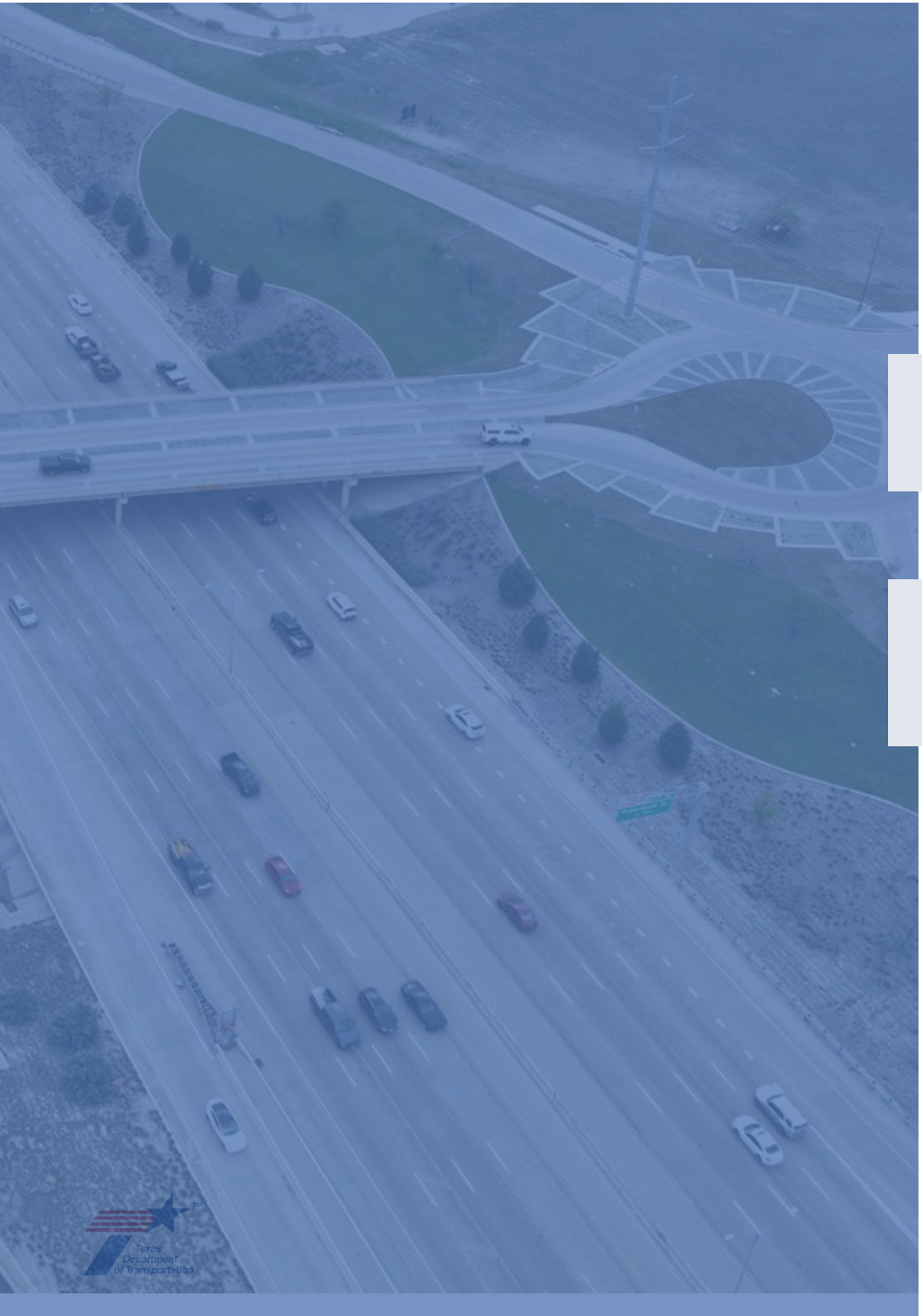
Stage 2

- Construct additional temporary pavement along each quadrant.
- Traffic is shifted onto the existing/temporary pavement for the approach and departures at the intersection.
- The central island and circulatory are fully functional and traffic utilizes the counter-clockwise circulating movement.
- Construct as much of the remaining quadrants as possible.



Stage 4

- Remove all temporary pavement.
- Construct the remaining splitter islands and outside curb and gutter.



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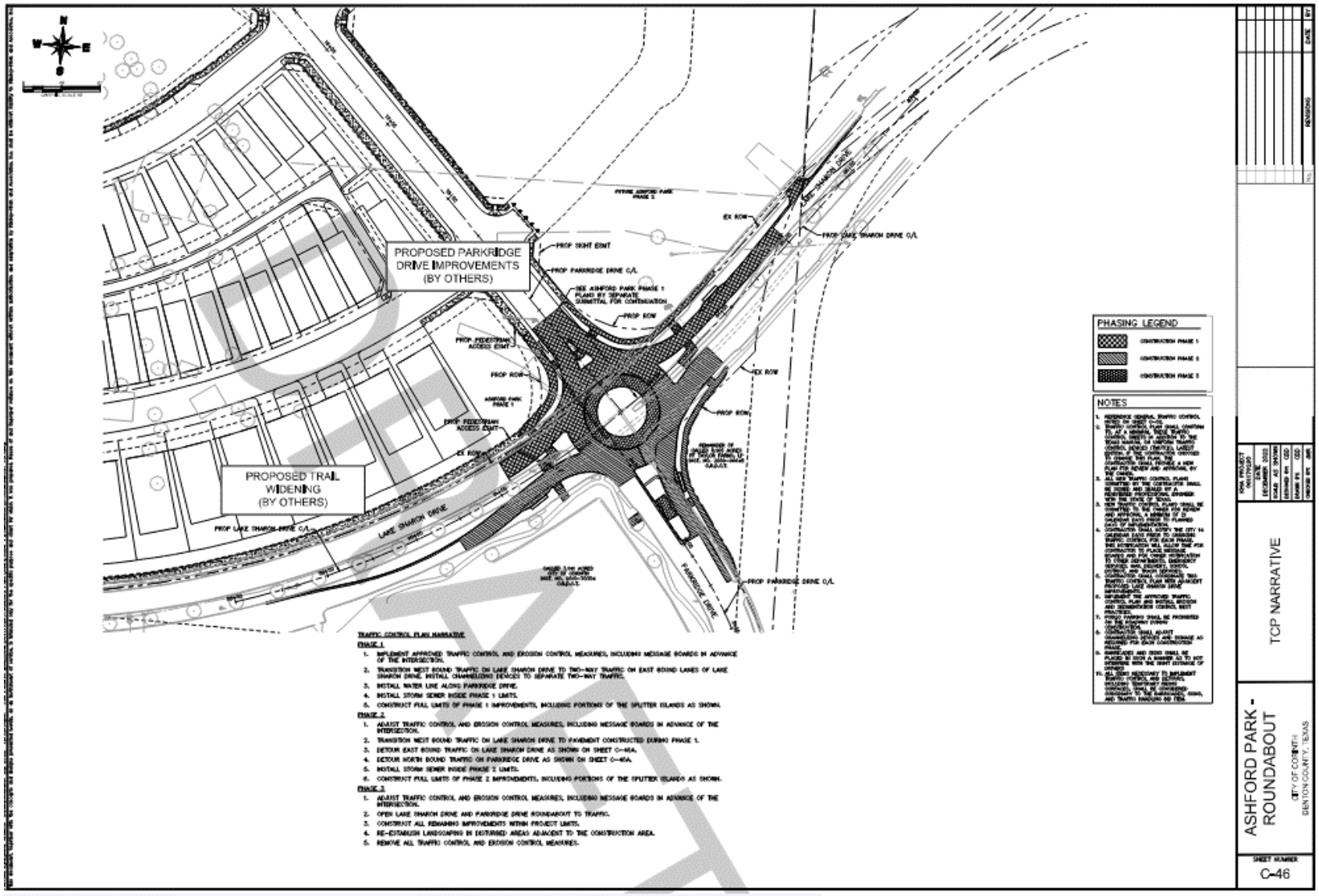
1 Roundabout Design Guide. Georgia Department of Transportation. Revision 2.3, 2023.

2 Temporary Traffic Control for Building and Maintaining Single and Multi-Lane Roundabouts. American Traffic Safety Services Association, 2012.

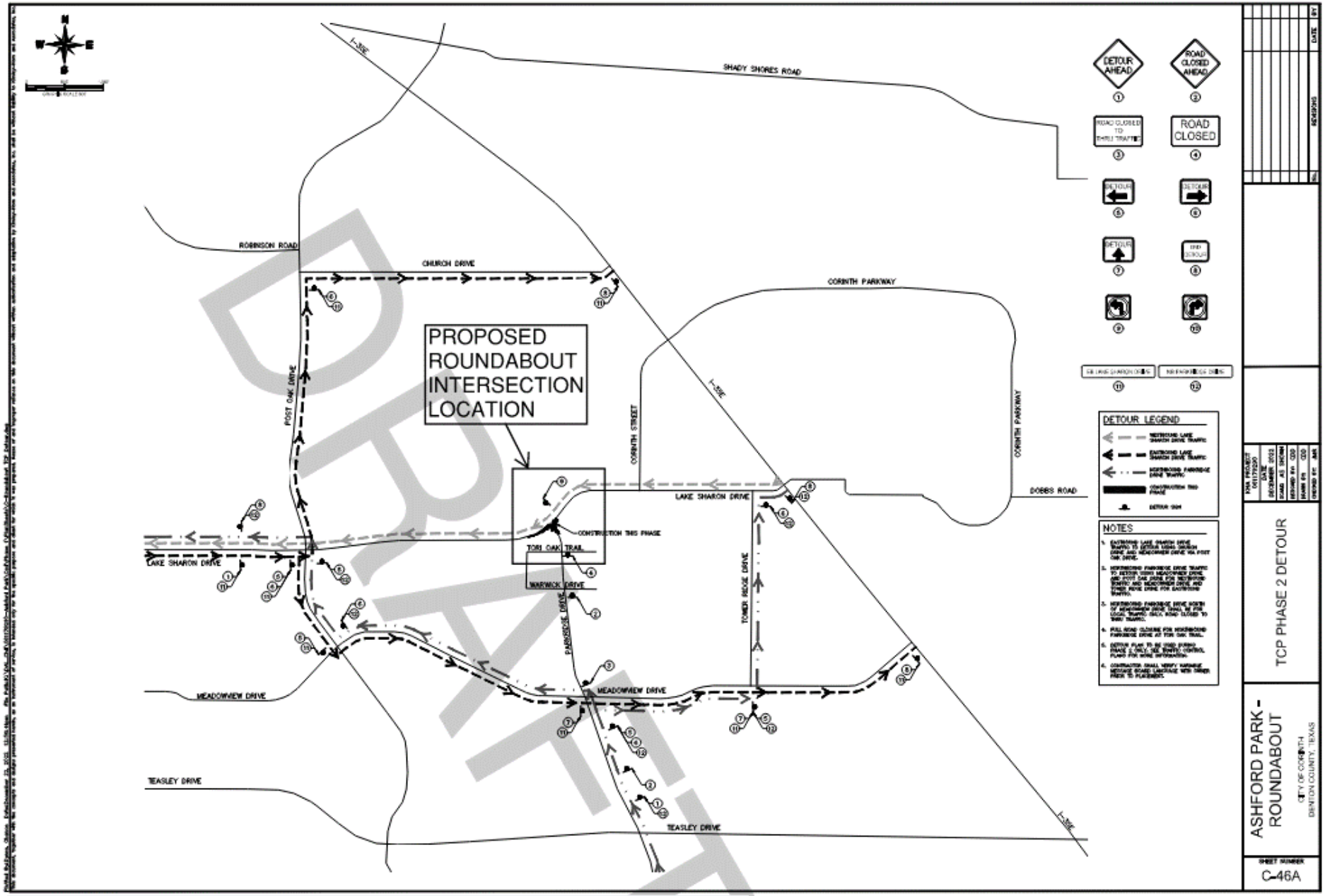
APPENDIX A – VARIOUS ALTERNATIVE PHASING EXAMPLES

Example 1 – Phasing Plans: Partial Detour and Closure in Corinth, TX

The project was located in Corinth, TX at the intersection of Parkridge Drive and Lake Sharon Drive. This example illustrates a phasing narrative for a partial detour of one of the intersecting roadways (Parkridge Drive) and the proposed detour plan.



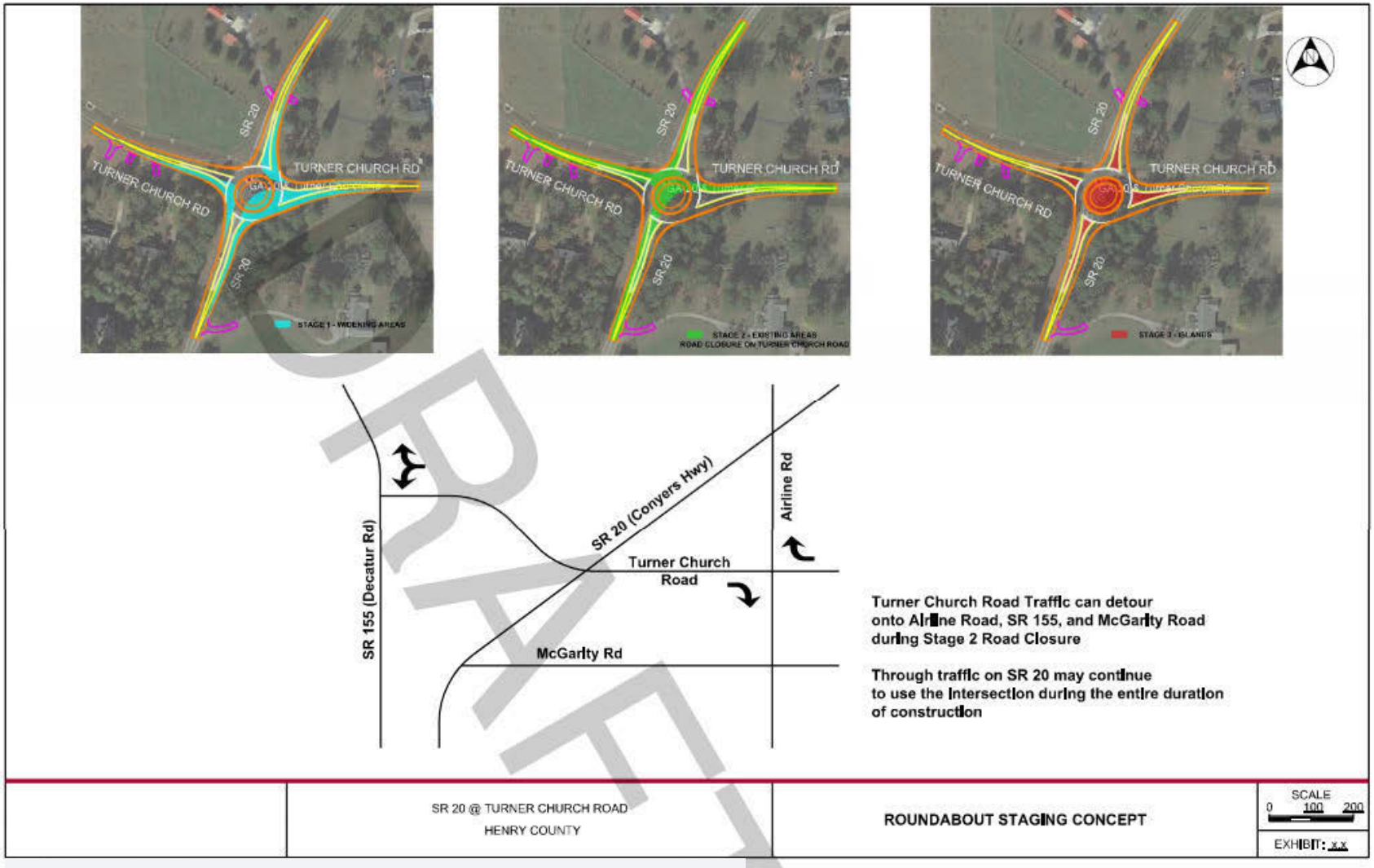
» **EXAMPLE 1** – PARTIAL DETOUR OF ONE OF THE INTERSECTING ROADWAYS



» **EXAMPLE 1** – PARTIAL DETOUR OF ONE OF THE INTERSECTING ROADWAYS

Example 2 – Phasing Concept: Off Alignment and Partial Closure in Henry County, GA

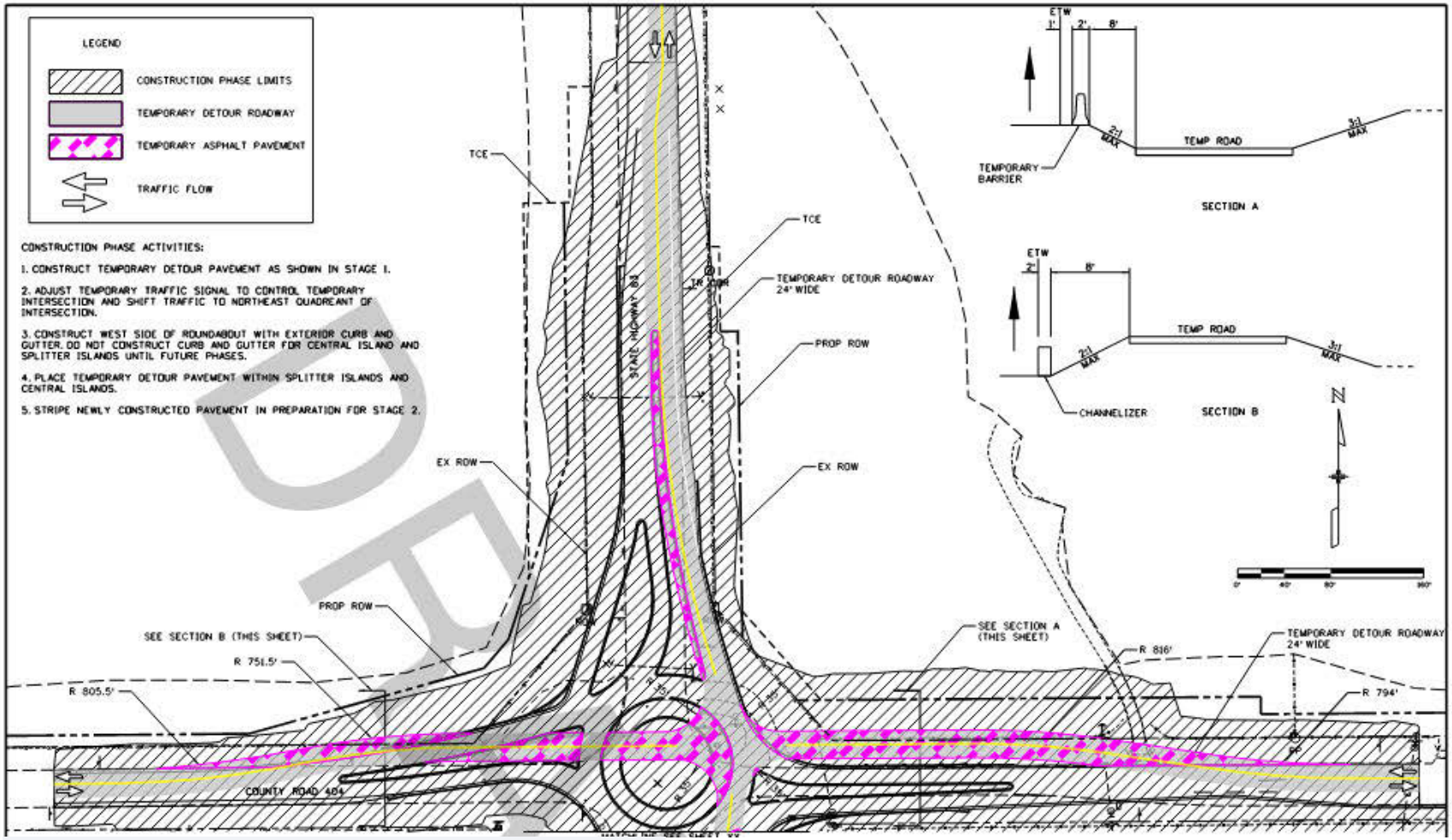
This example contains phasing concepts for SR 20 and Turner Church Road in Henry County, GA and is an example of both “Off Alignment” and a “Partial Closure” phasing. Stage 1 utilizes some of the principles outlined in an “Off Alignment” scenario, by constructing a large portion of the proposed pavement outside of the existing limits. Stage 2 introduces a “Partial Detour” where Turner Church Road has a feasible detour route and allows for traffic to be detour during this phase. SR 20 traffic can remain open during the entire duration of the project.



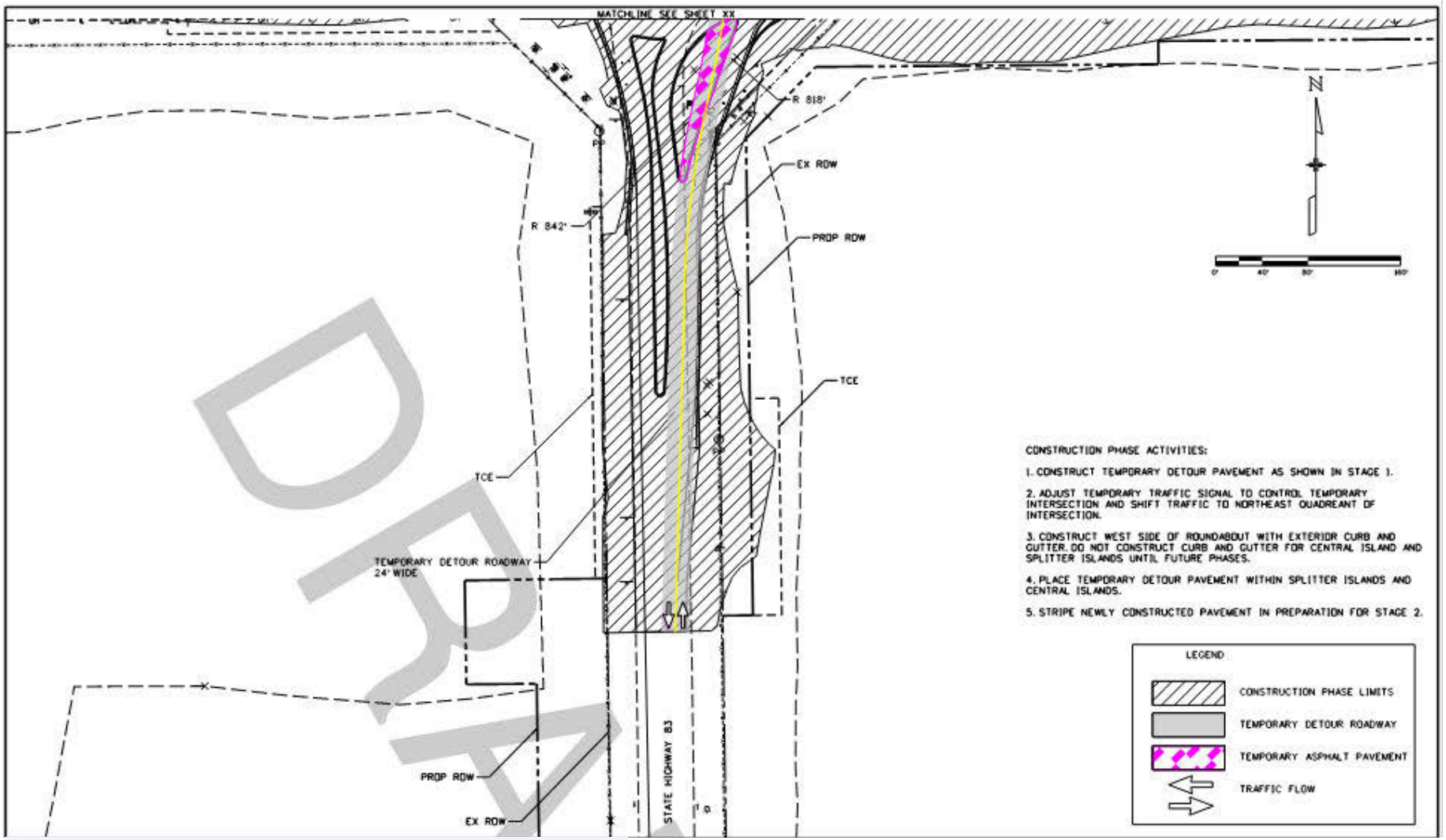
» **EXAMPLE 2** – OFF-ALIGNMENT AND PARTIAL CLOSURE PHASING

Example 3 – 'Piece of the Work' Rural Undivided 2-Lane Phasing near Woodmoor, CO

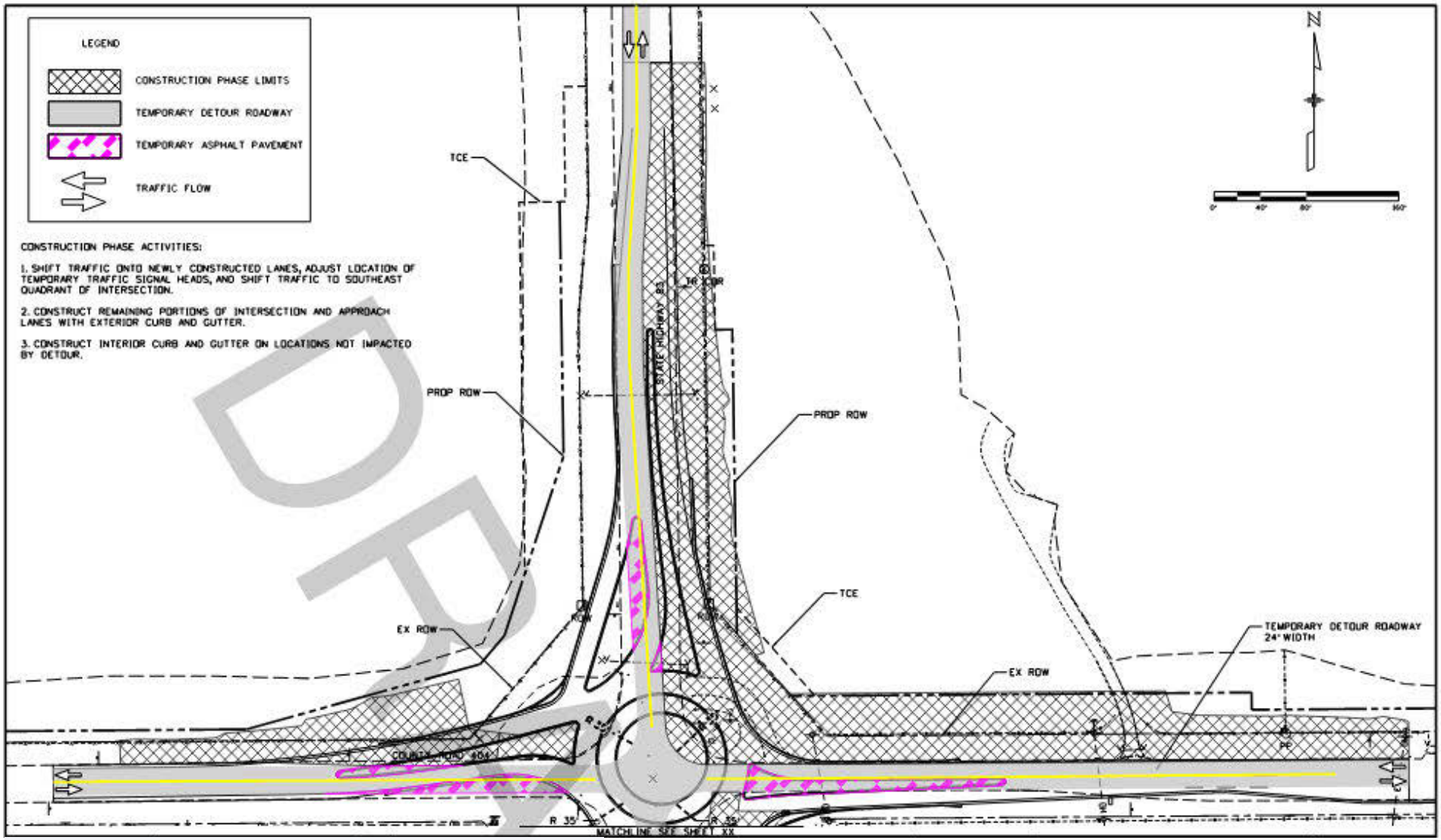
This example is located at the intersection of CR 404 and SH 83 in Woodmoor, CO. 2 lanes of traffic were maintained throughout each the proposed stages. Temporary pavement was used to shift traffic away from the central island and allowed for more proposed pavement to be constructed in Stage 1. Stage 2 traffic was shifted to the previously constructed pavement and a temporary signal was used to control traffic while the remaining proposed pavement was placed. The central island was utilized with the "Pave Thru" concept to allow traffic to traverse the intersection in each stage.



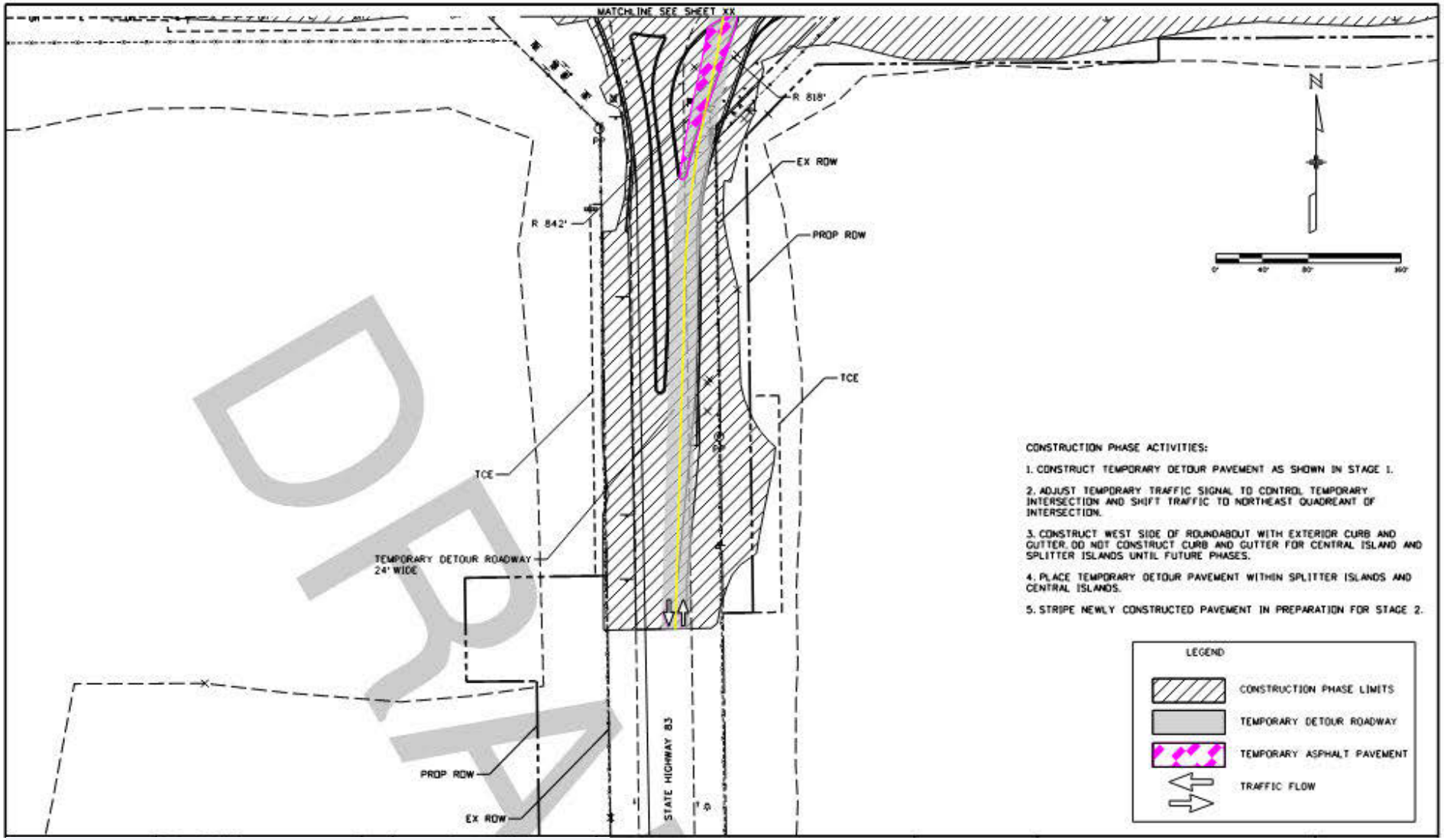
» **EXAMPLE 3** – PICE-WORK PHASING CONCEPT LAYOUT



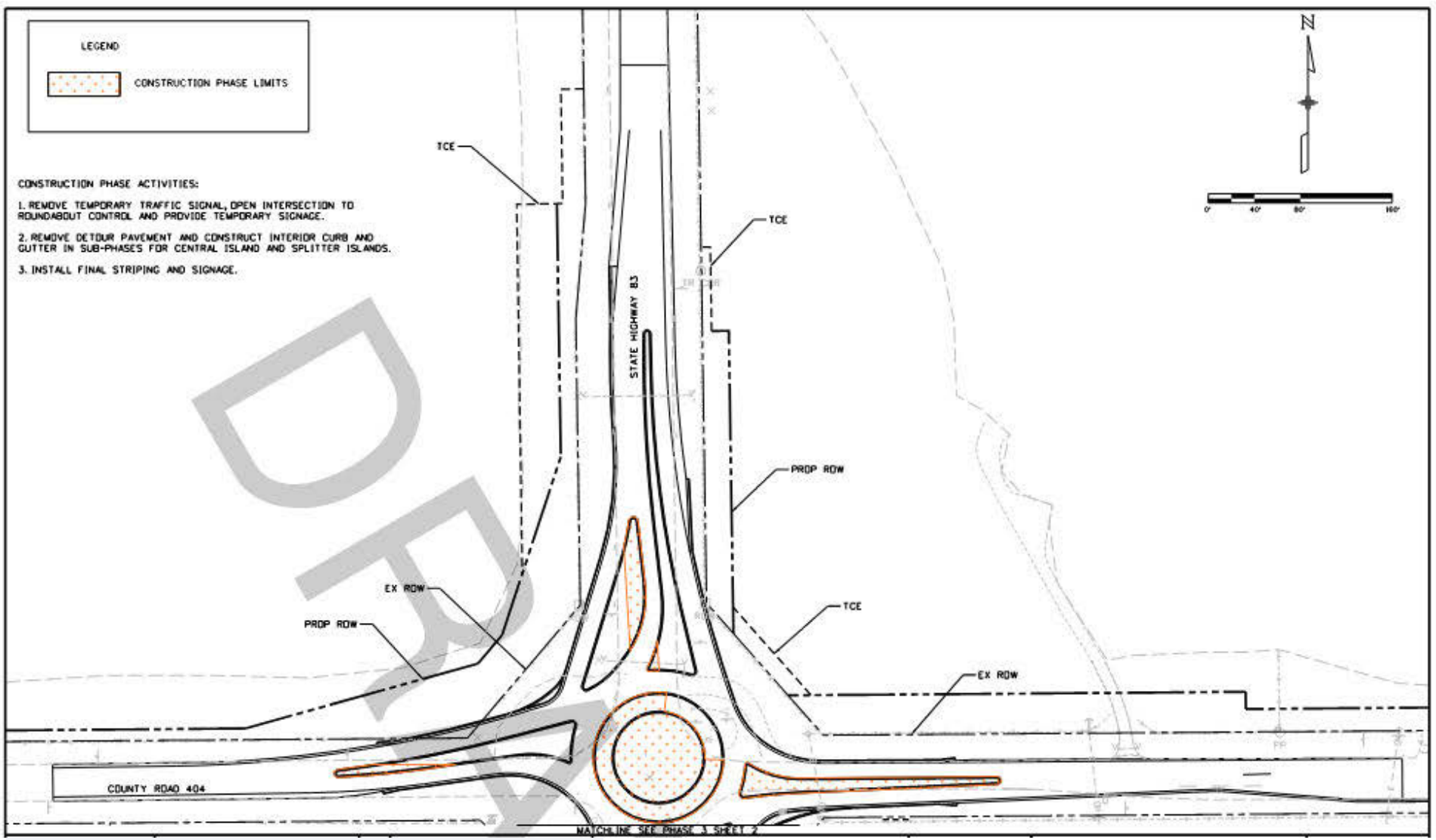
» **EXAMPLE 3** – PIECE-WORK PHASING CONCEPT LAYOUT



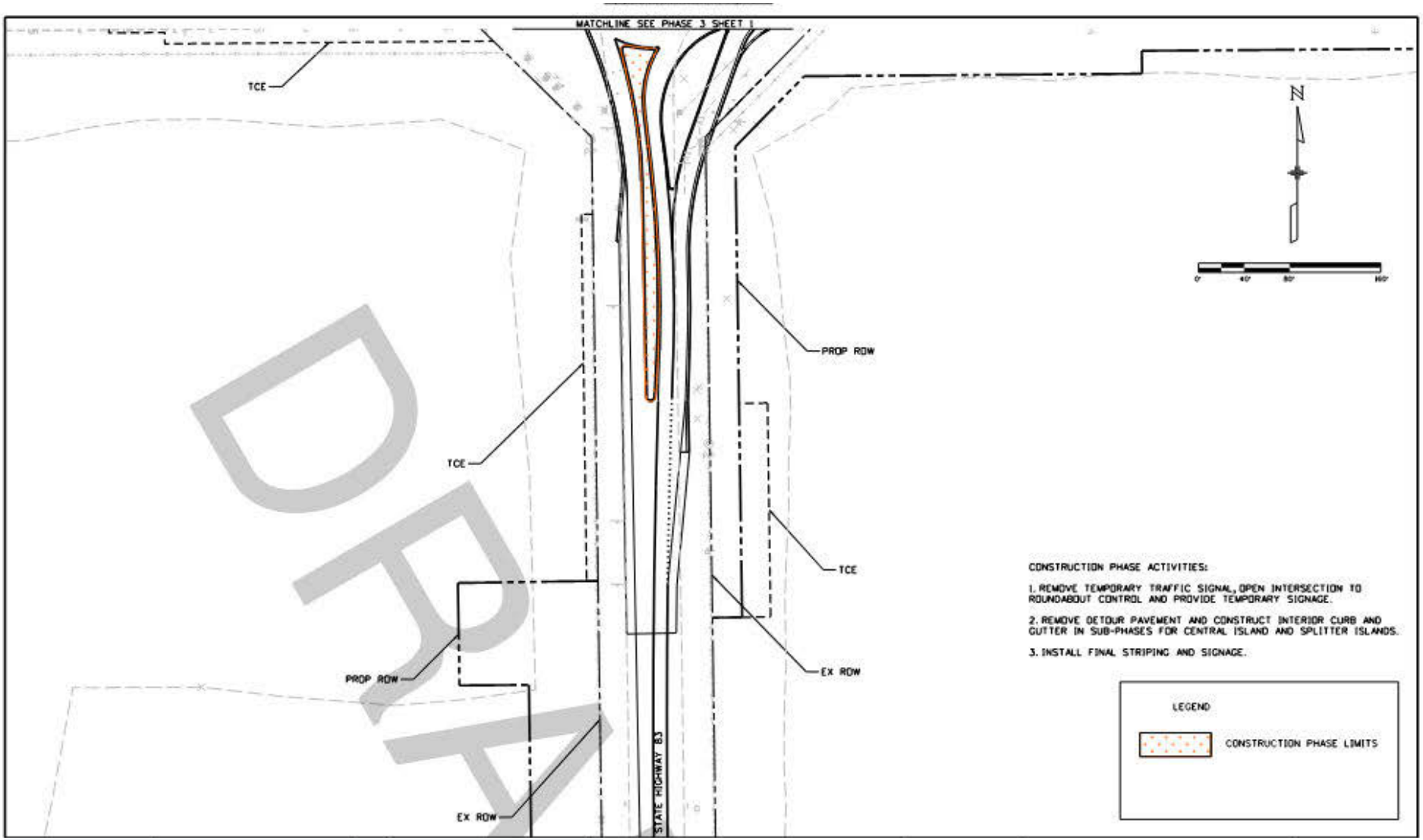
» **EXAMPLE 3** – PIECE-WORK PHASING CONCEPT LAYOUT



» **EXAMPLE 3** – PIECE-WORK PHASING CONCEPT LAYOUT



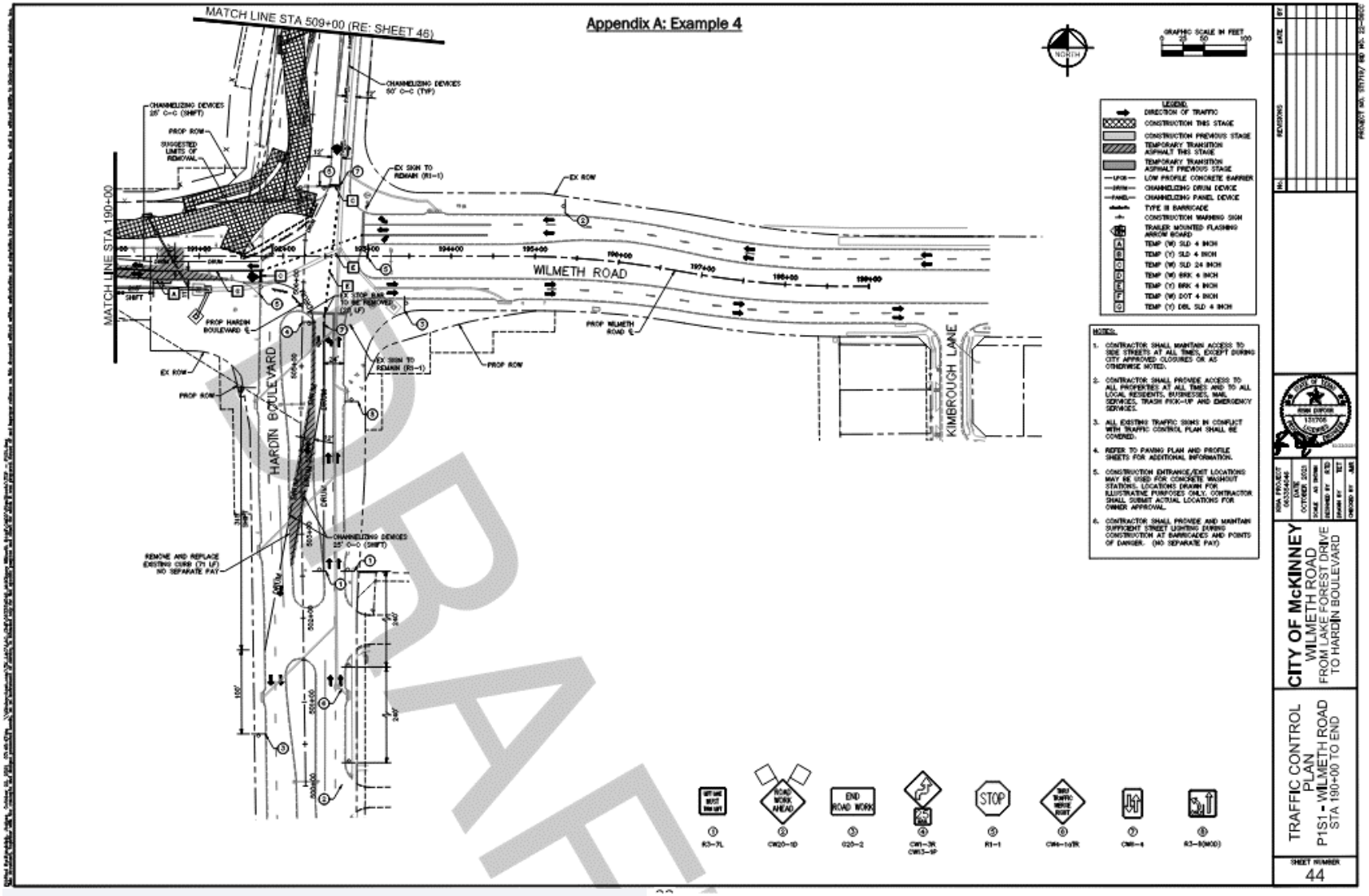
» **EXAMPLE 3** – PIECE-WORK PHASING CONCEPT LAYOUT



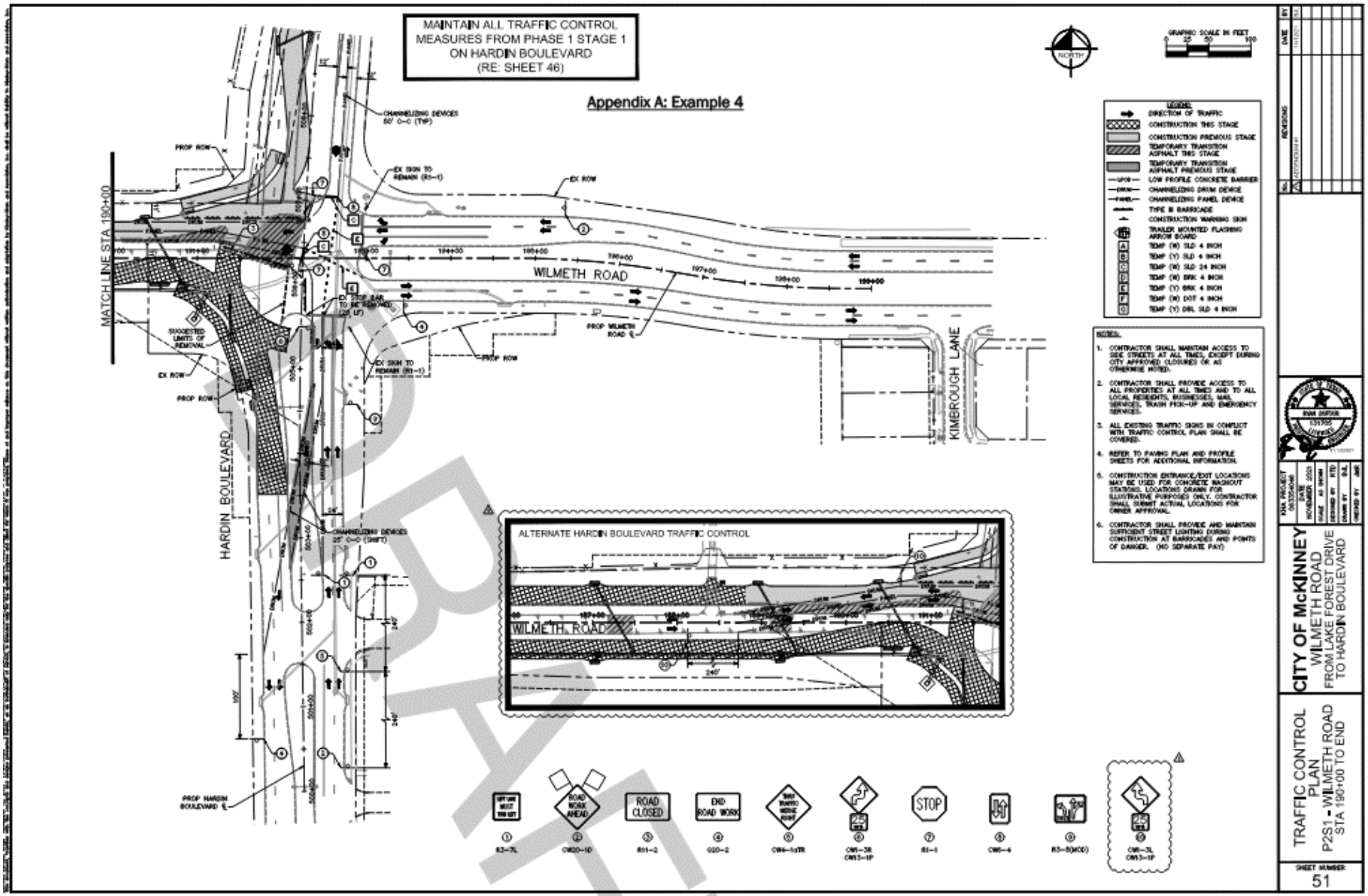
» **EXAMPLE 3** – PIECE-WORK PHASING CONCEPT LAYOUT

Example 4 – Piece-work Urban 4-Lane Divided Phasing in McKinney, TX

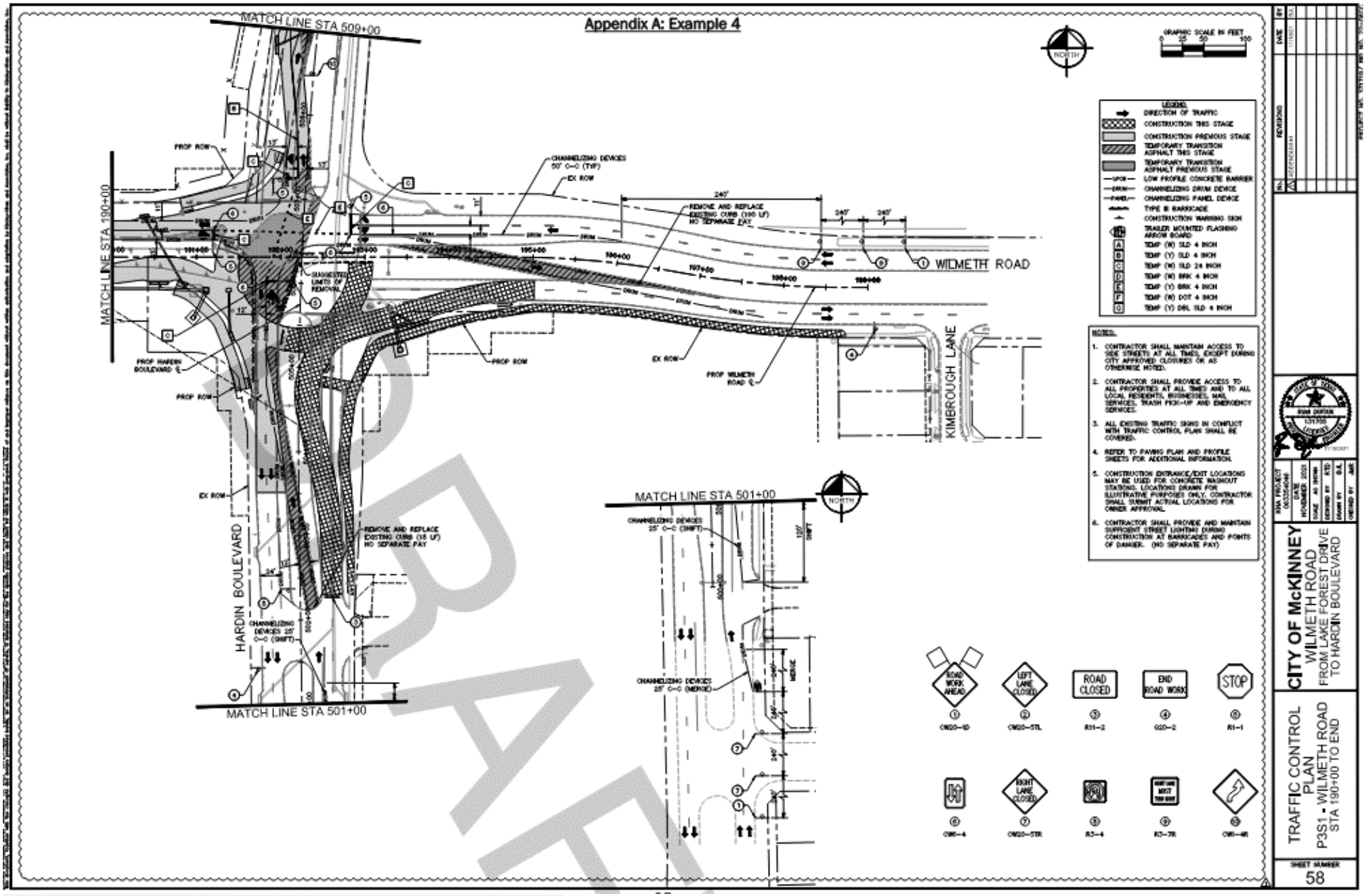
This example is located in McKinney, TX at the intersection of Hardin Boulevard and Wilmeth Road. Both intersecting roads were 4-lane divided and a reduction to 1 lane in each direction was utilized to keep the intersection functional during the construction. This example did not require the use of flaggers because 2 lanes of traffic were able to traverse through the existing intersection. The “Pave Thru” concept was applied to allow traffic to navigate the intersection through the central island during each phase.



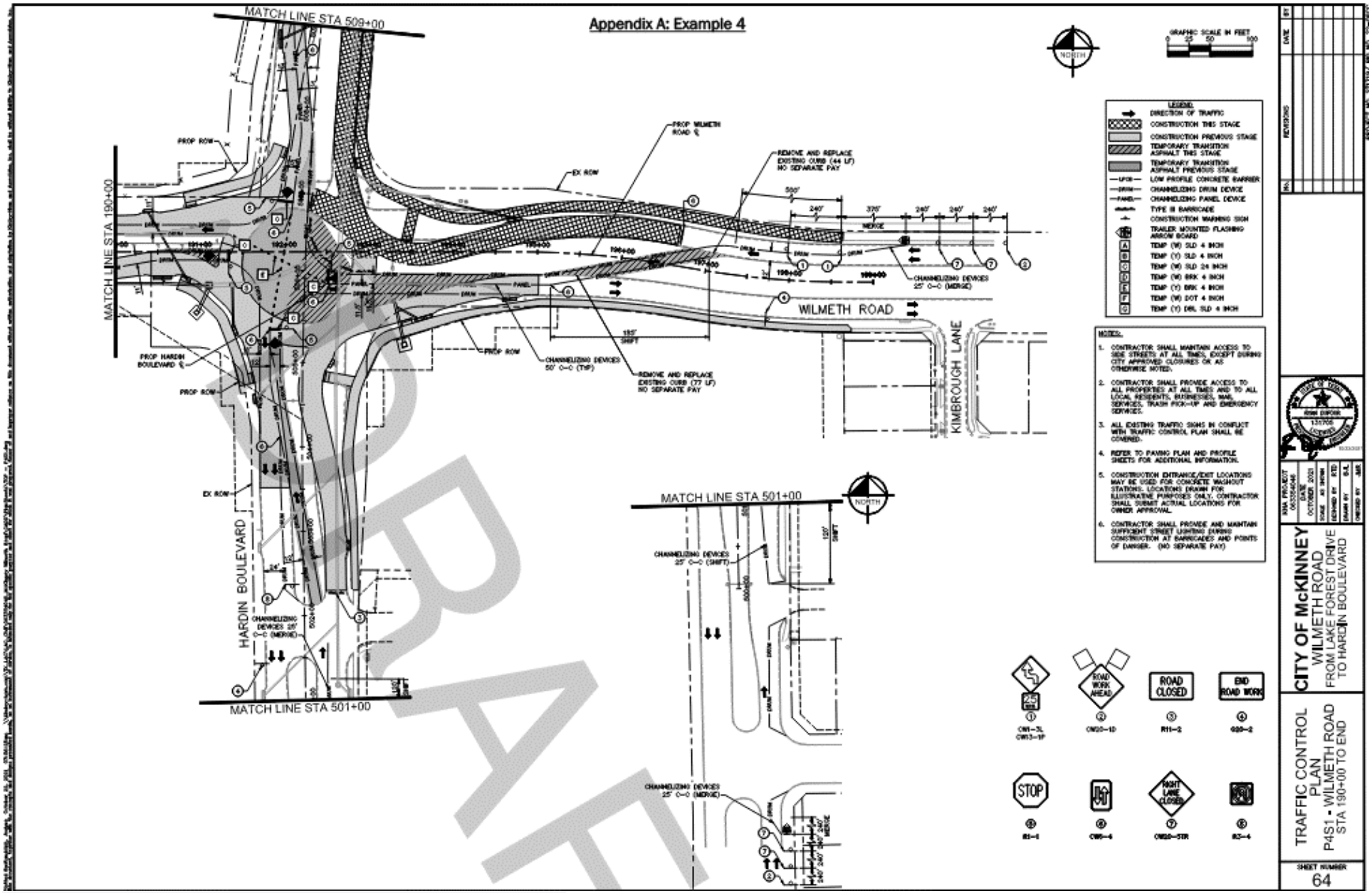
» **EXAMPLE 4** – PIECE-WORK WITH PAVE-THRU CONCEPT



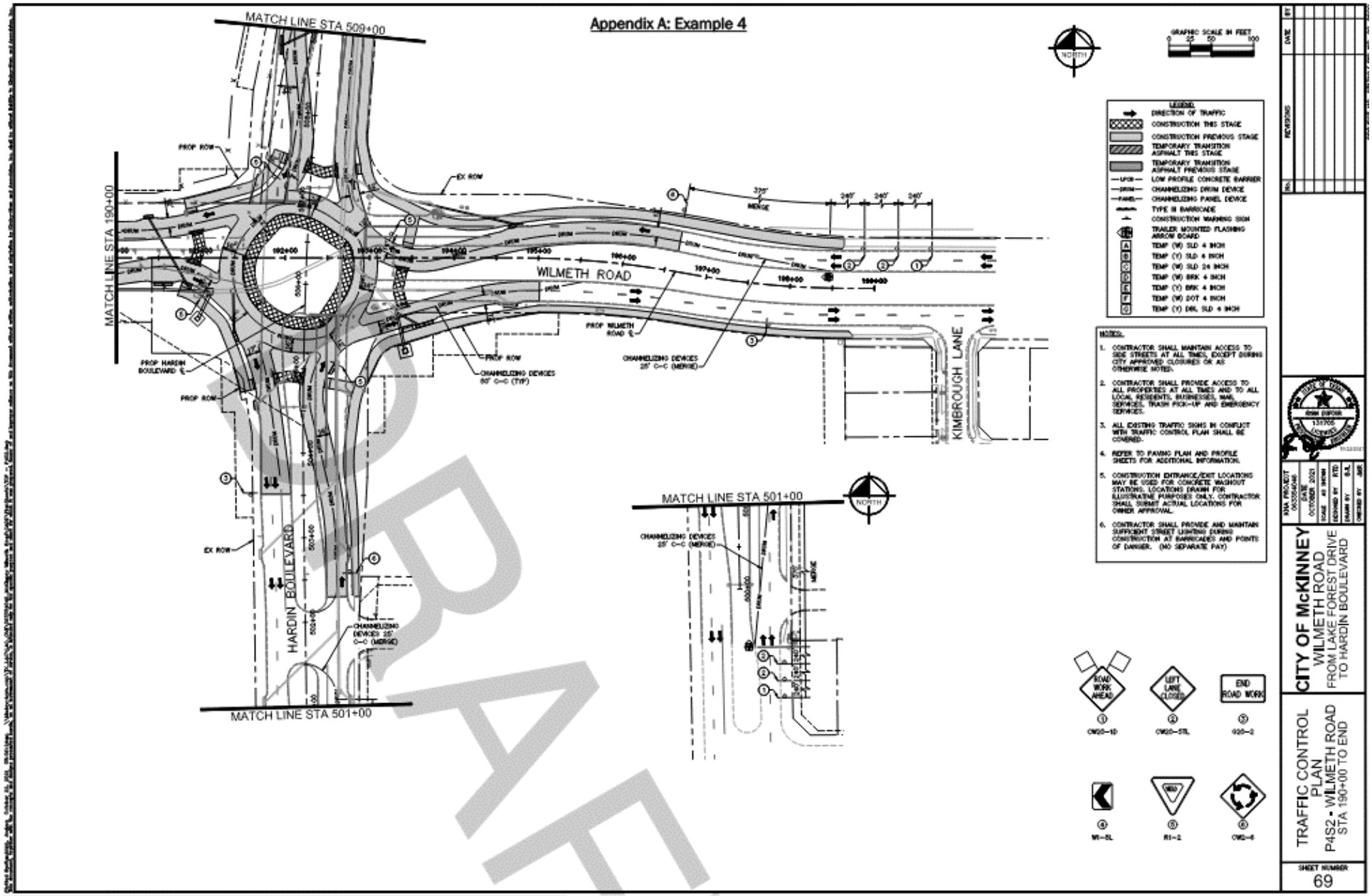
» **EXAMPLE 4** – PIECE-WORK WITH PAVE-THRU CONCEPT



» **EXAMPLE 4** – PIECE-WORK WITH PAVE-THRU CONCEPT



» **EXAMPLE 4** – PIECE-WORK WITH PAVE-THRU CONCEPT

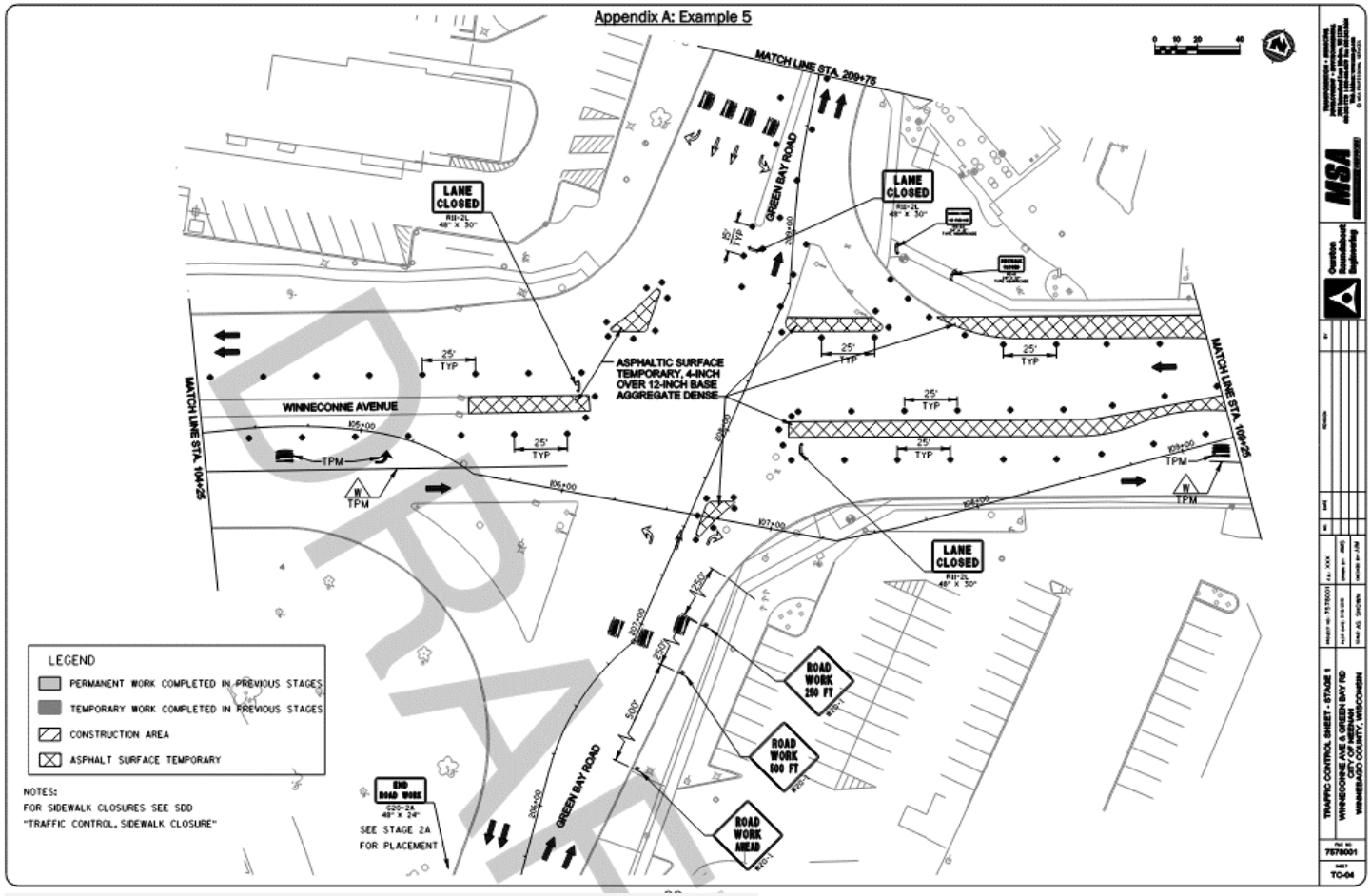


» **EXAMPLE 4** – PIECE-WORK WITH PAVE-THRU CONCEPT

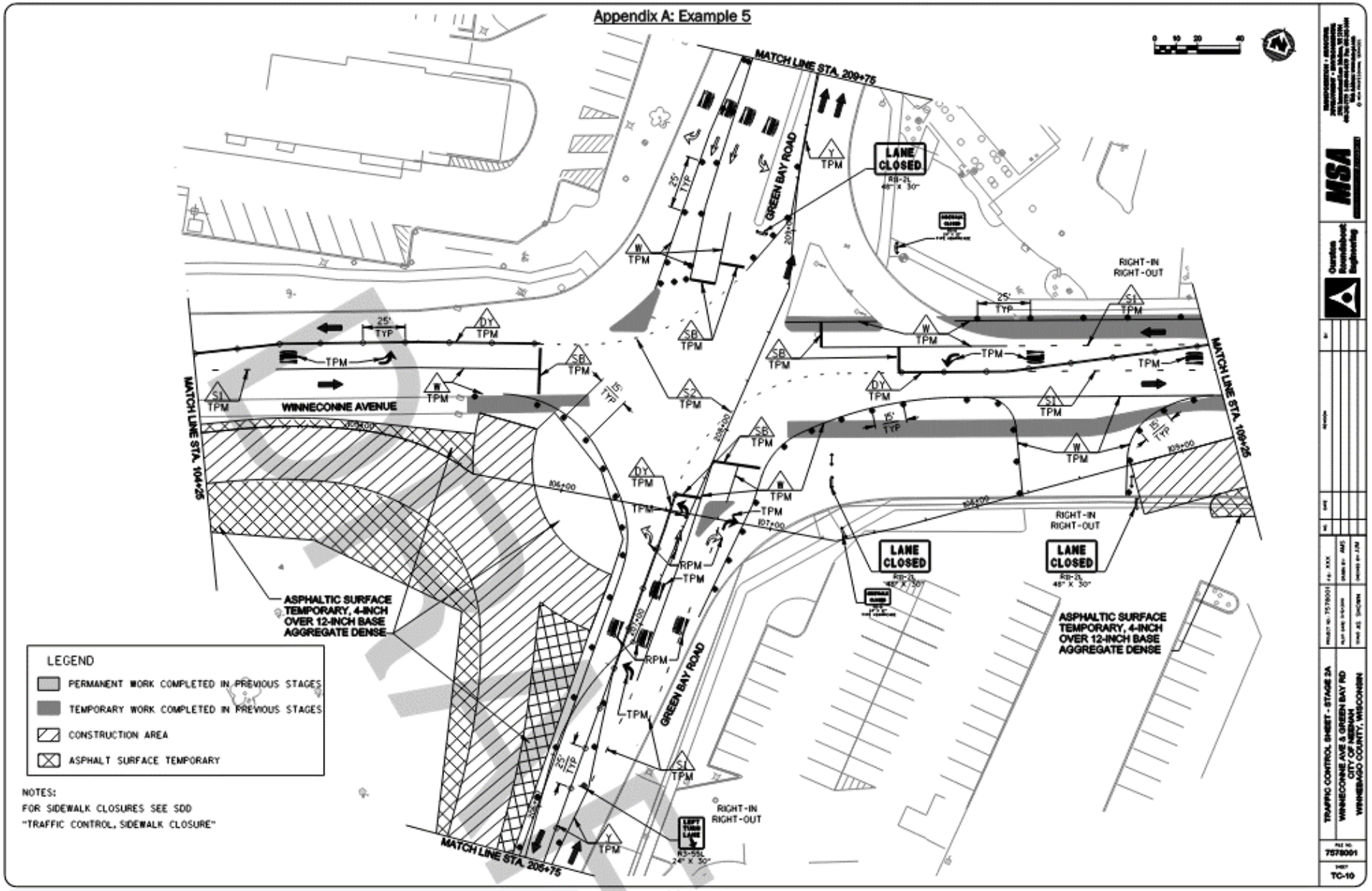
Example 5 – Piece-work Multilane Roundabout with Multilane Approaches in Neenah, WI

This example contains detailed plans illustrating a lane reduction at the intersection of S Green Bay Road and Winnconne Ave. The phasing detailed below followed the general principals outlined in this aid and were detailed to account for the concrete pavement jointing pattern. At least two lanes of traffic were maintained throughout the construction and no flaggers were necessary during this construction. Temporary signals were placed to help control traffic through each stage of construction. "Pave Thru" concepts where applied and central island was utilized throughout each phase by constructing temporary asphalt that allowed traffic to traverse through the intersection as necessary in each phase. This pavement is removed prior to placement of the final central island.

Following the plans content example sheets are pictures during the construction of the project. It should be noted that during the construction phase the TCP plans were modified, and a partial closure was implemented, as seen in the site pictures. This decision was made after conversations with the property/business owner concluded that it would be least impactful overall to shut down this leg of the intersection to expedite the construction.

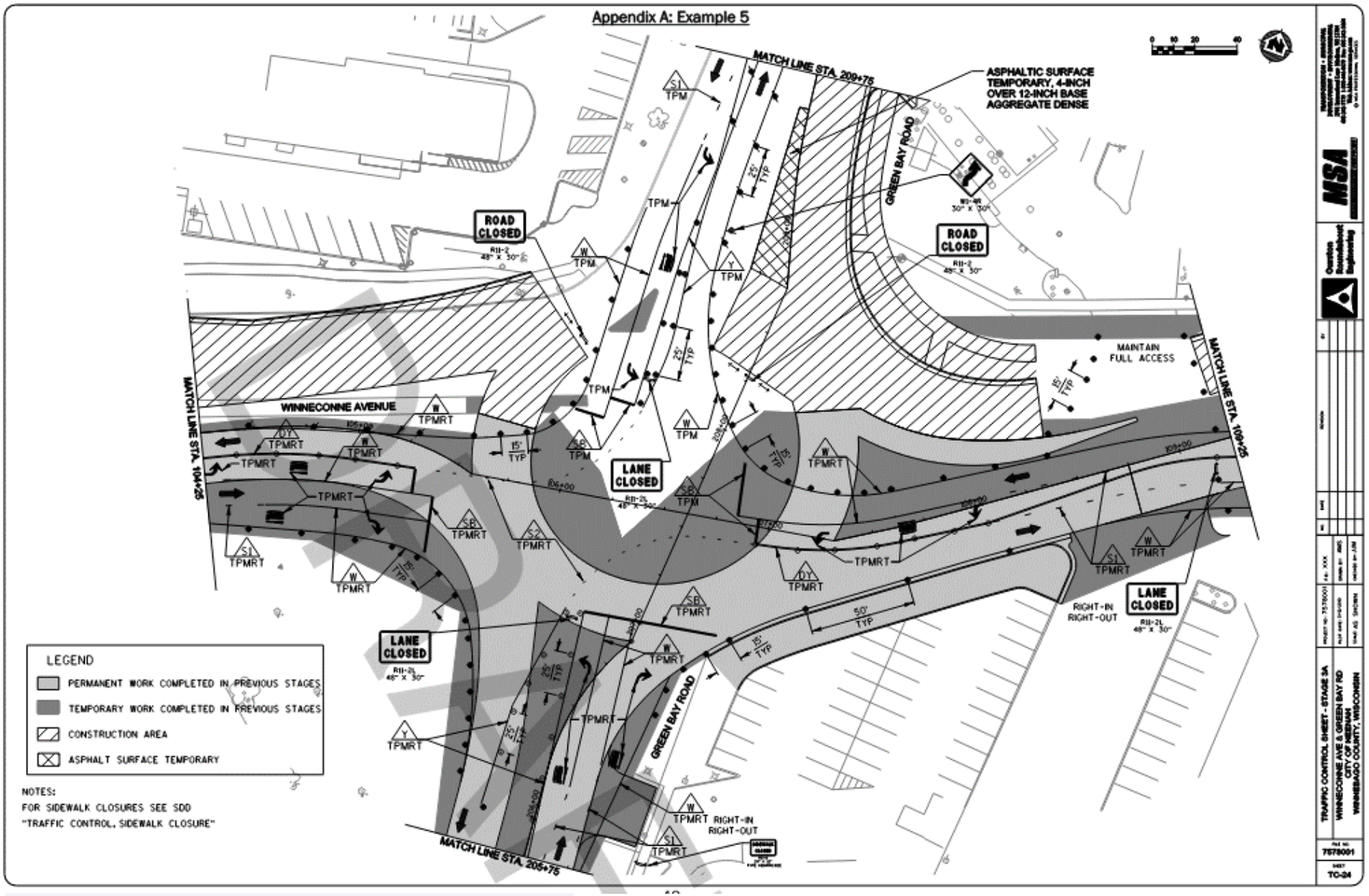


» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT

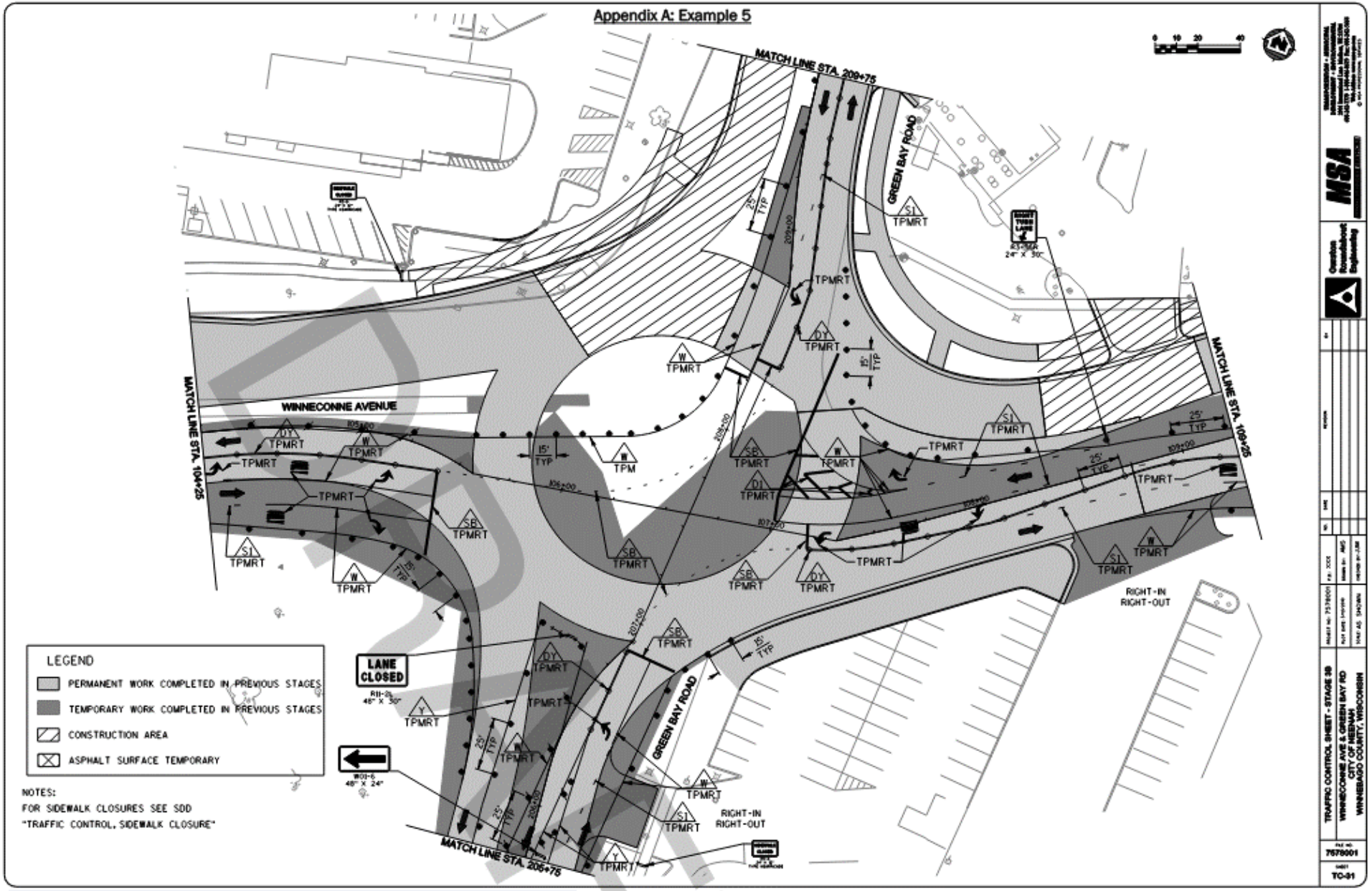


» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT

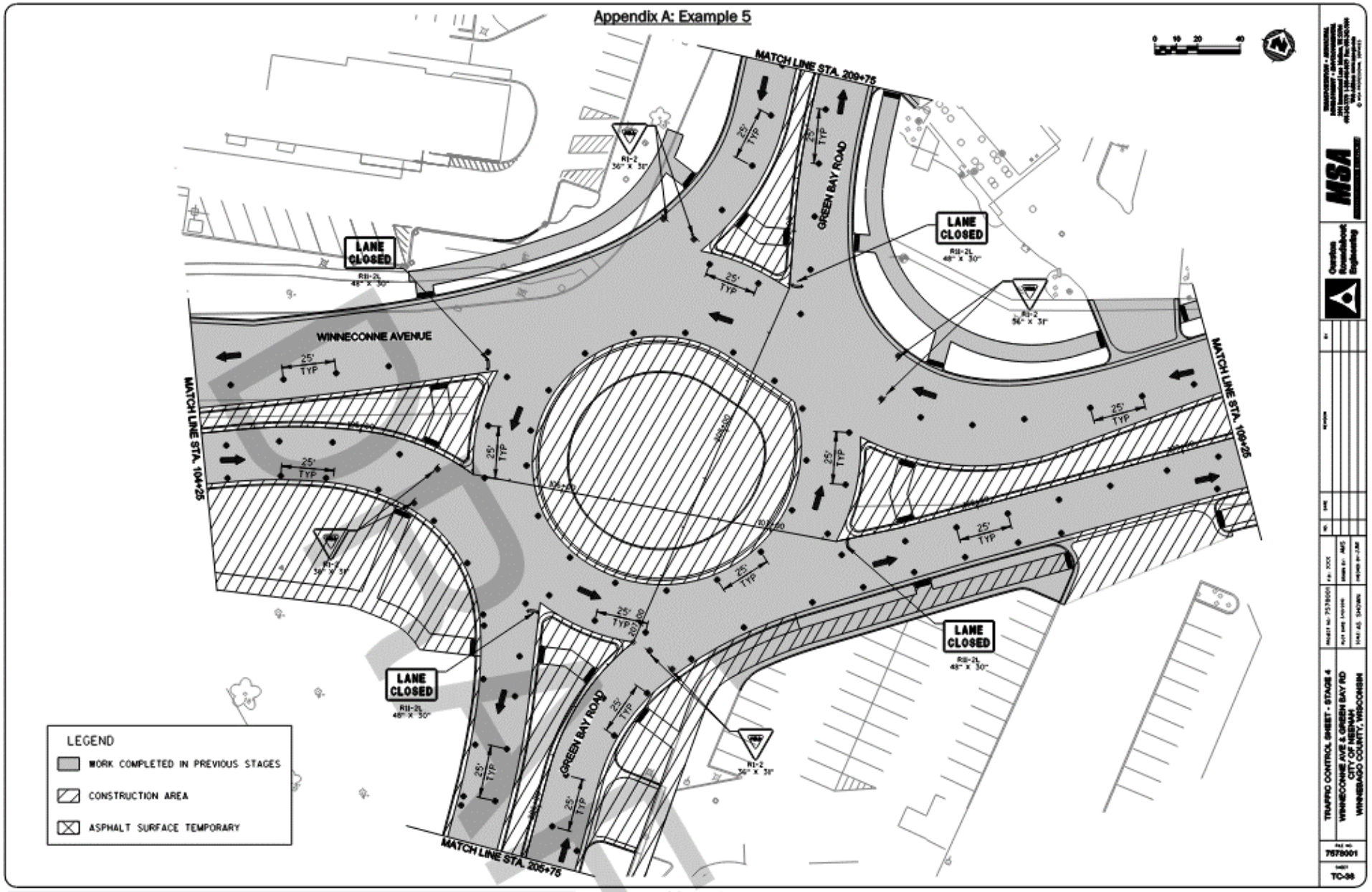
» EXAMPLE 5 – PIECE-WORK WITH PAVE-THRU CONCEPT



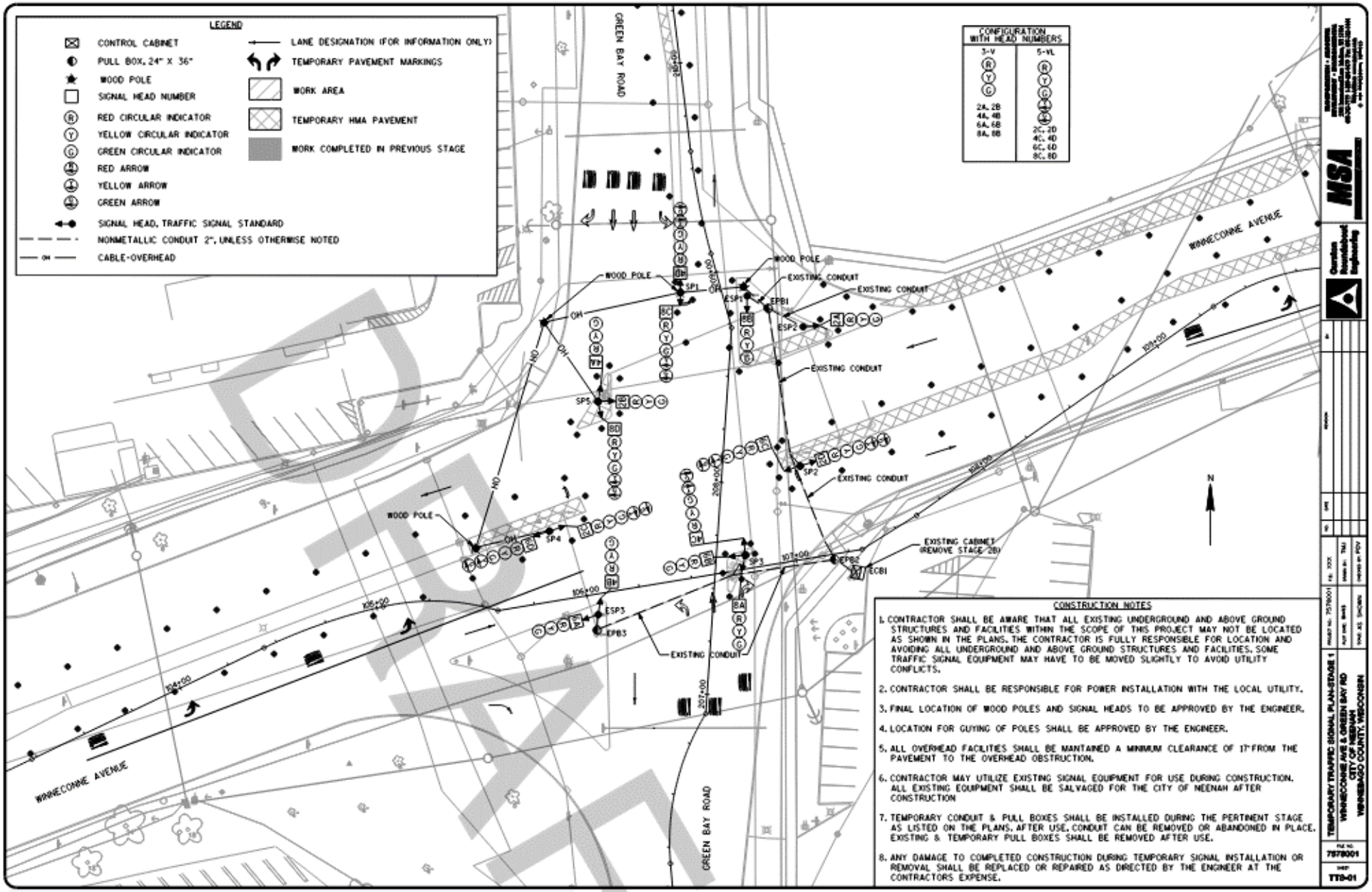
» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT



» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT



» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT



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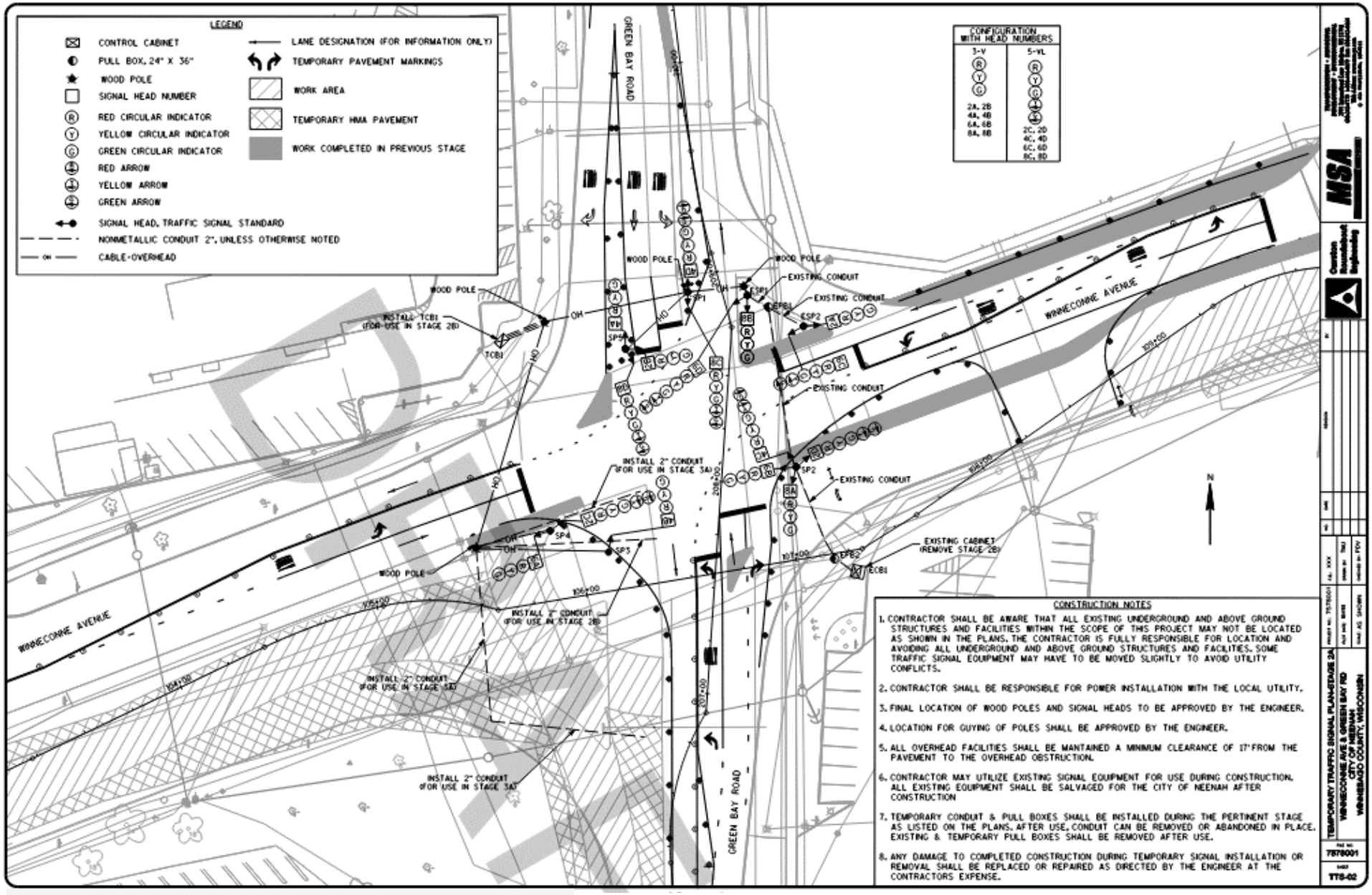

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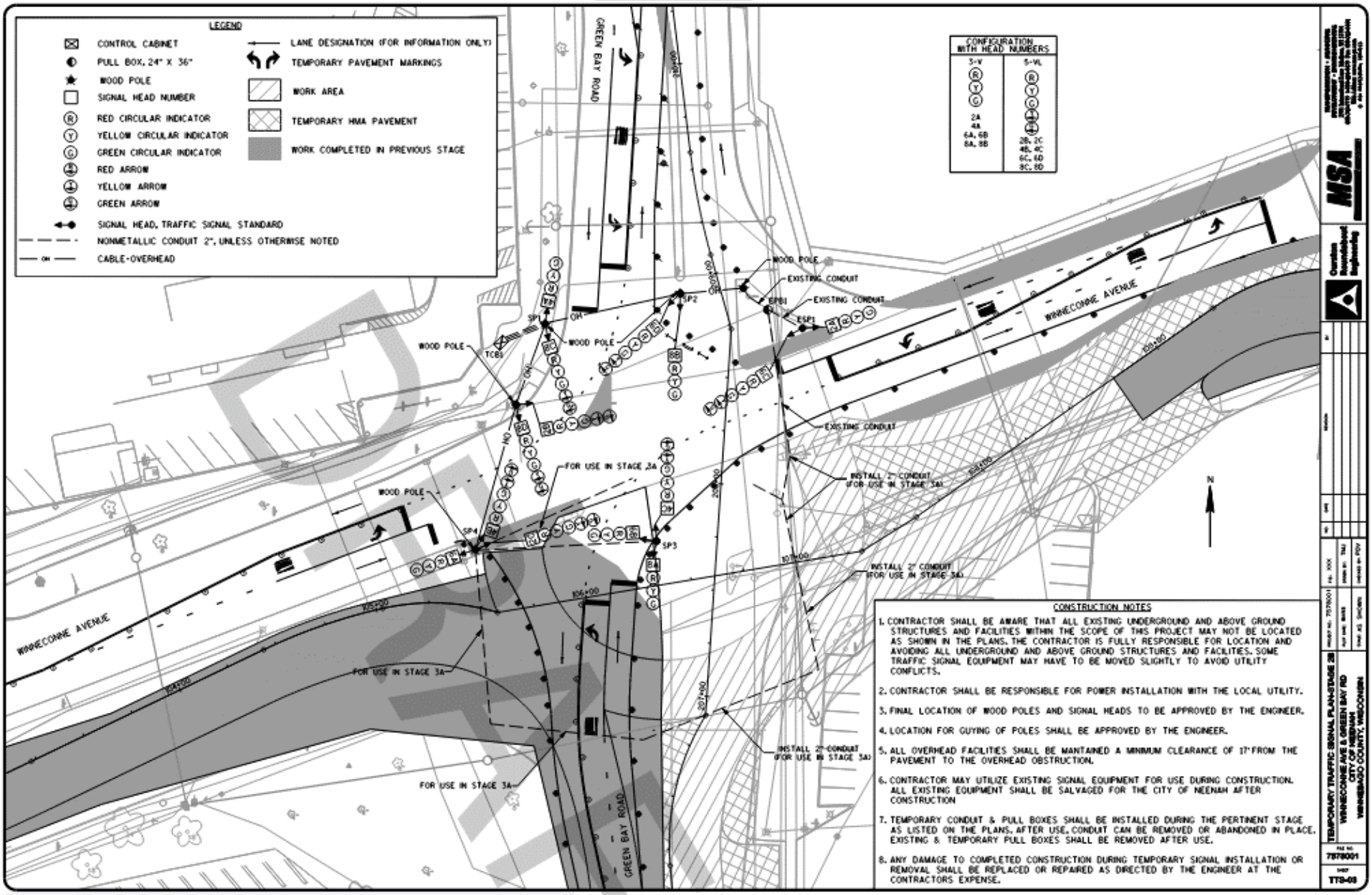
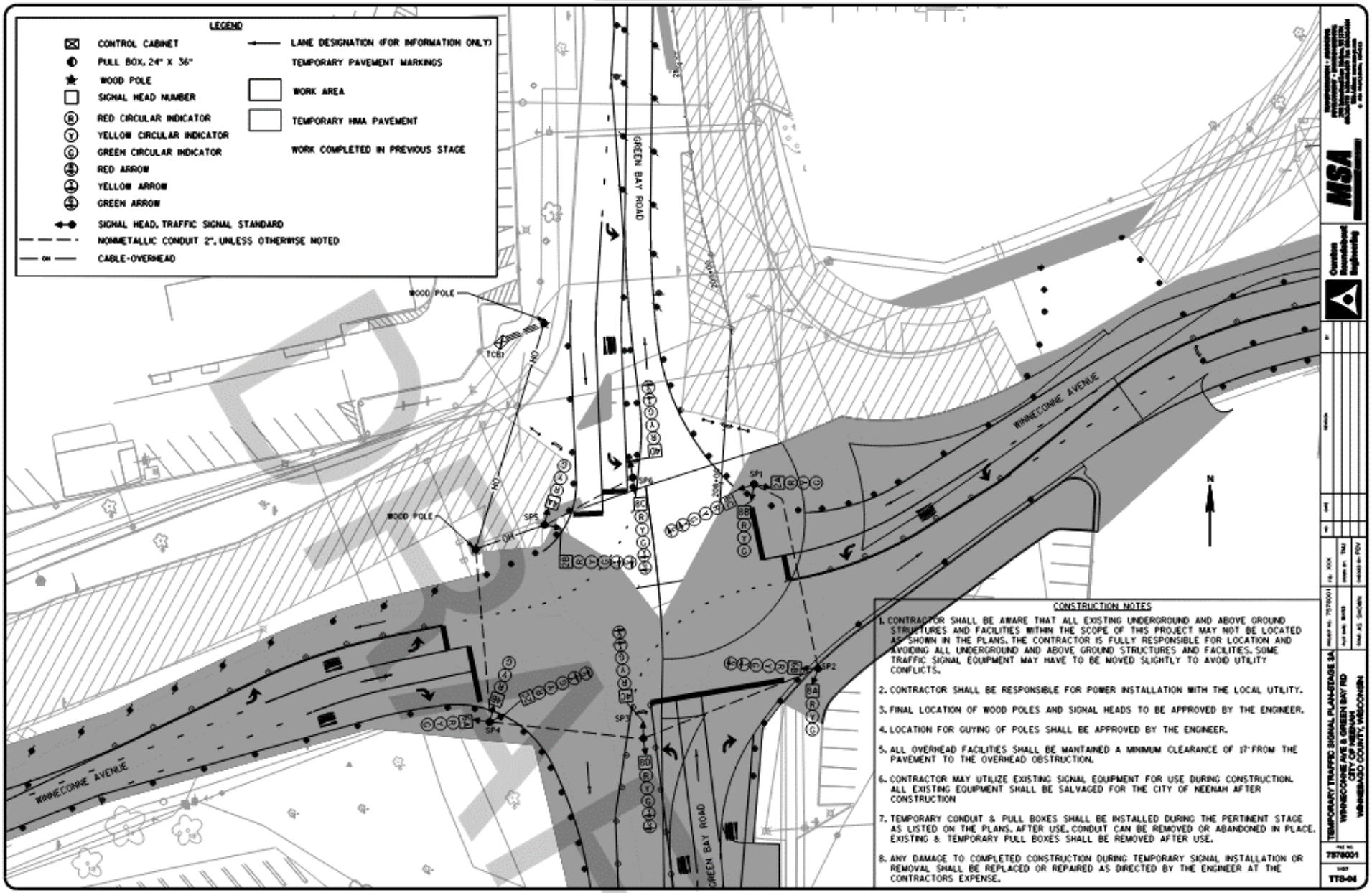


» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT



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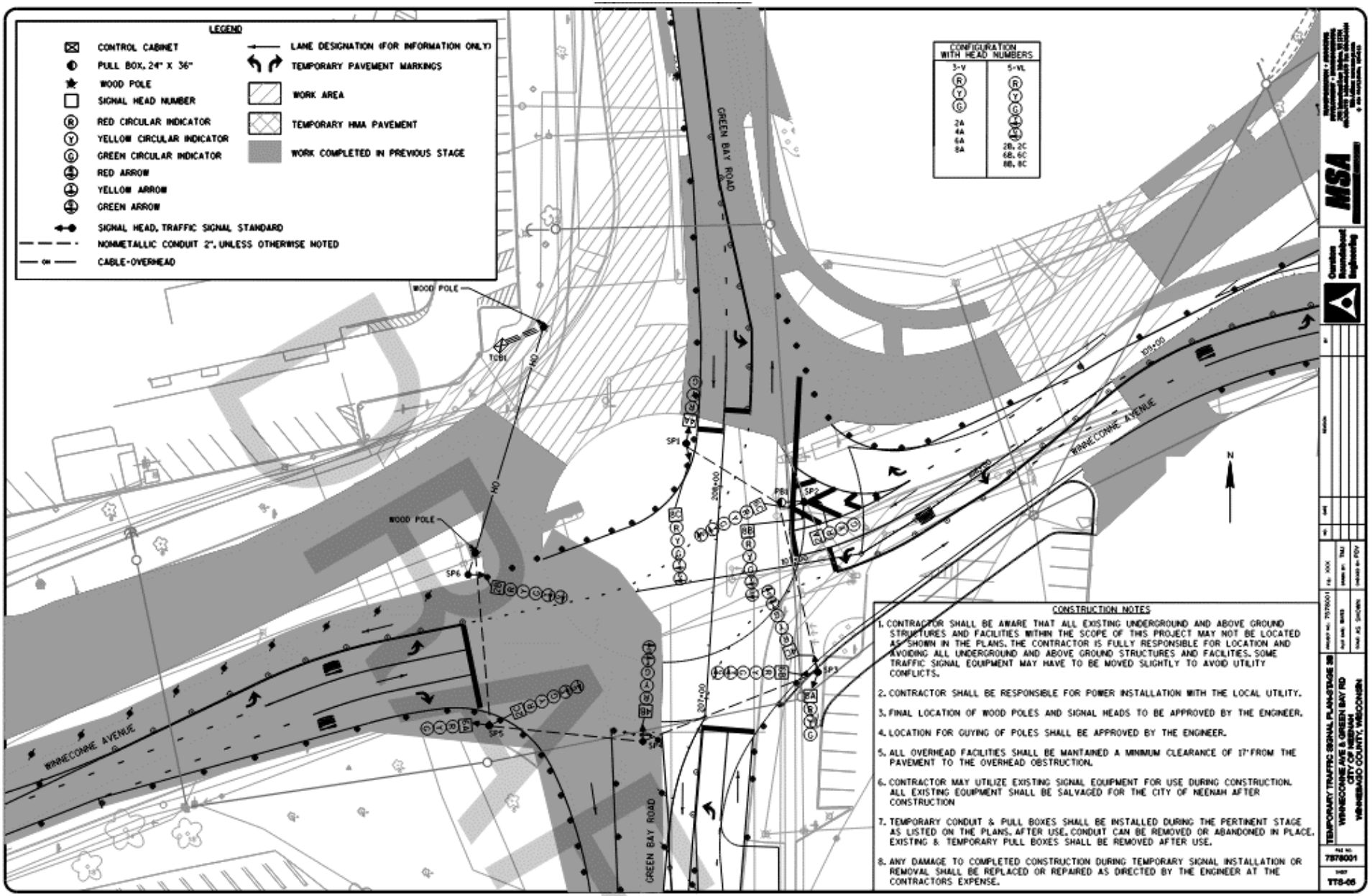

» **EXAMPLE 5** – PIECE-WORK WITH PAVE-THRU CONCEPT

N

STAGE 1

TIMING/COORDINATION DATA									
INTERSECTION: Winneconne Avenue & Green Bay Road									
TIMING PLAN	PHASE	1	2	3	4	5	6	7	8
	GREEN	8	48.5	7	11.5	6	50.5	6	12.5
	YELLOW	3	3	3	3	3	3	3	3
	ALL RED		1.5		1.5		1.5		1.5
	TOTAL	11	53	10	16	9	55	9	17
	MODE								
	OFFSET: N/A								
	CYCLE LENGTH: 90								
	TIME OF DAY: OFF PEAK								
	DAY OF WEEK: ALL								
TIMING PLAN	PHASE	1	2	3	4	5	6	7	8
	GREEN	9	53.5	11	11.5	6	56.5	7	15.5
	YELLOW	3	3	3	3	3	3	3	3
	ALL RED		1.5		1.5		1.5		1.5
	TOTAL	12	58	14	16	9	61	10	20
	MODE								
	OFFSET: N/A								
	CYCLE LENGTH: 100								
	TIME OF DAY: 4PM - 6PM								
	DAY OF WEEK: WEEKDAY								

STAGE 2A

TIMING/COORDINATION DATA									
INTERSECTION: Winneconne Avenue & Green Bay Road									
TIMING PLAN	PHASE	1	2	3	4	5	6	7	8
	GREEN	8	60.5	9	11.5	6	62.5	6	14.5
	YELLOW	3	3	3	3	3	3	3	3
	ALL RED		1.5		1.5		1.5		1.5
	TOTAL	11	65	12	16	9	67	9	19
	MODE								
	OFFSET: N/A								
	CYCLE LENGTH: 104								
	TIME OF DAY: OFF PEAK								
	DAY OF WEEK: ALL								
TIMING PLAN	PHASE	1	2	3	4	5	6	7	8
	GREEN	8	55.5	11	14.5	6	57.5	9	16.5
	YELLOW	3	3	3	3	3	3	3	3
	ALL RED		1.5		1.5		1.5		1.5
	TOTAL	11	60	14	19	9	62	12	21
	MODE								
	OFFSET: N/A								
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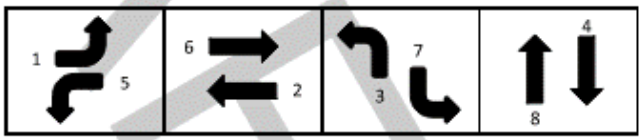
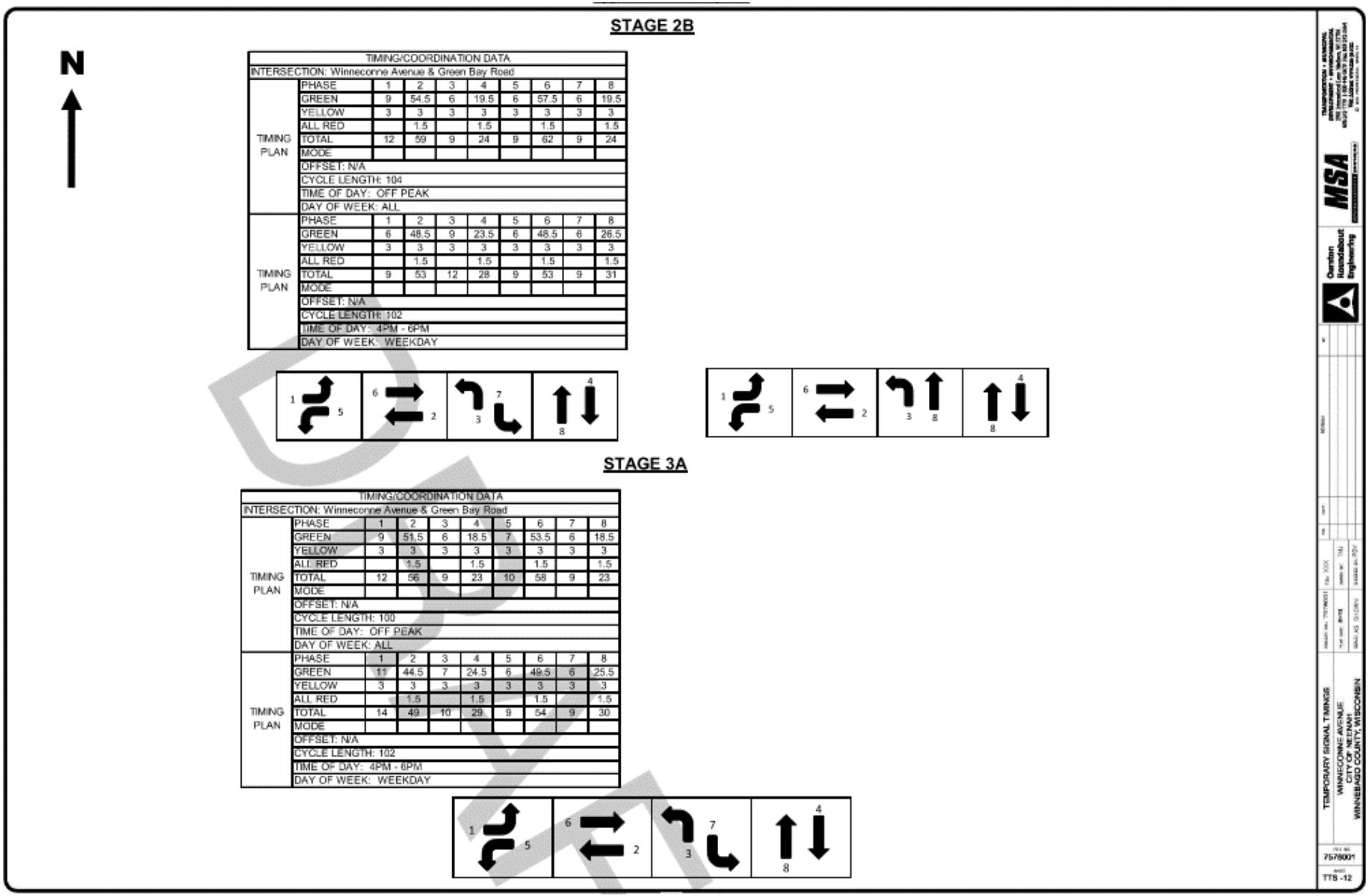
	TIME OF DAY: 4PM - 6PM								
	DAY OF WEEK: WEEKDAY								

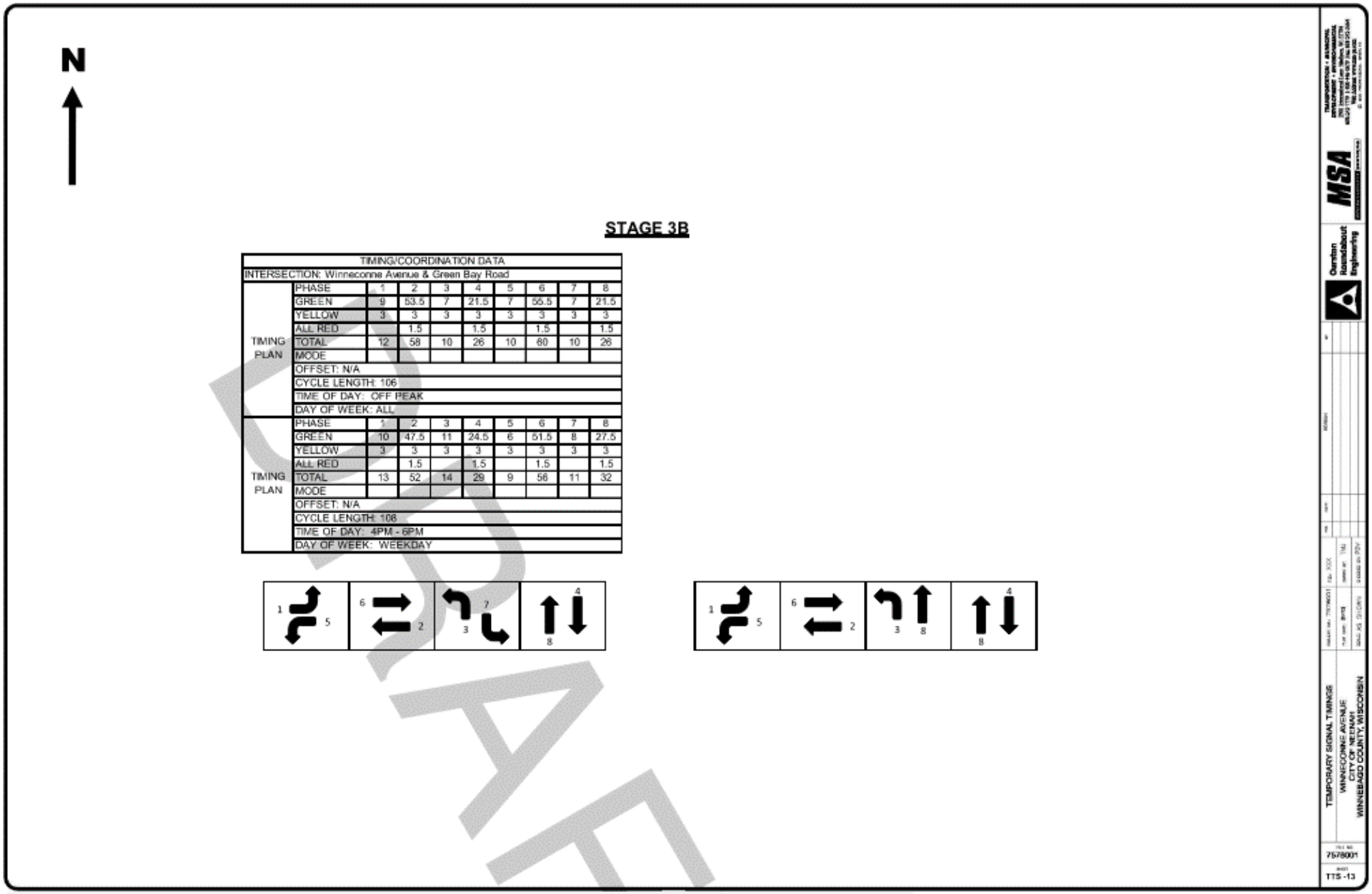


TEMPORARY SIGNAL TIMINGS
WINNECONNE AVENUE
CITY OF NEENAH
WINNEBAGO COUNTY, WISCONSIN
7578001
TTS -11

» **EXAMPLE 5** – TEMP. TRAFFIC SIGNAL TIMINGS FOR PIECE-WORK WITH PAVE-THRU CONCEPT

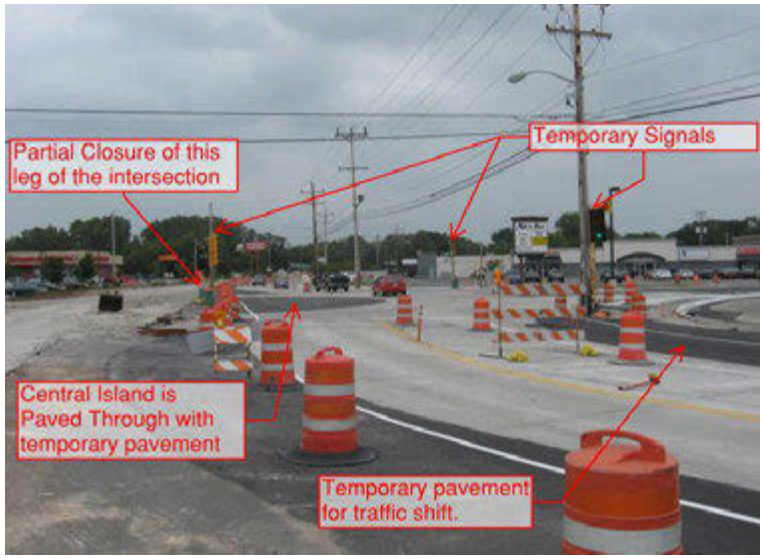


» **EXAMPLE 5** – TEMP. TRAFFIC SIGNAL TIMINGS FOR PIECE-WORK WITH PAVE-THRU CONCEPT



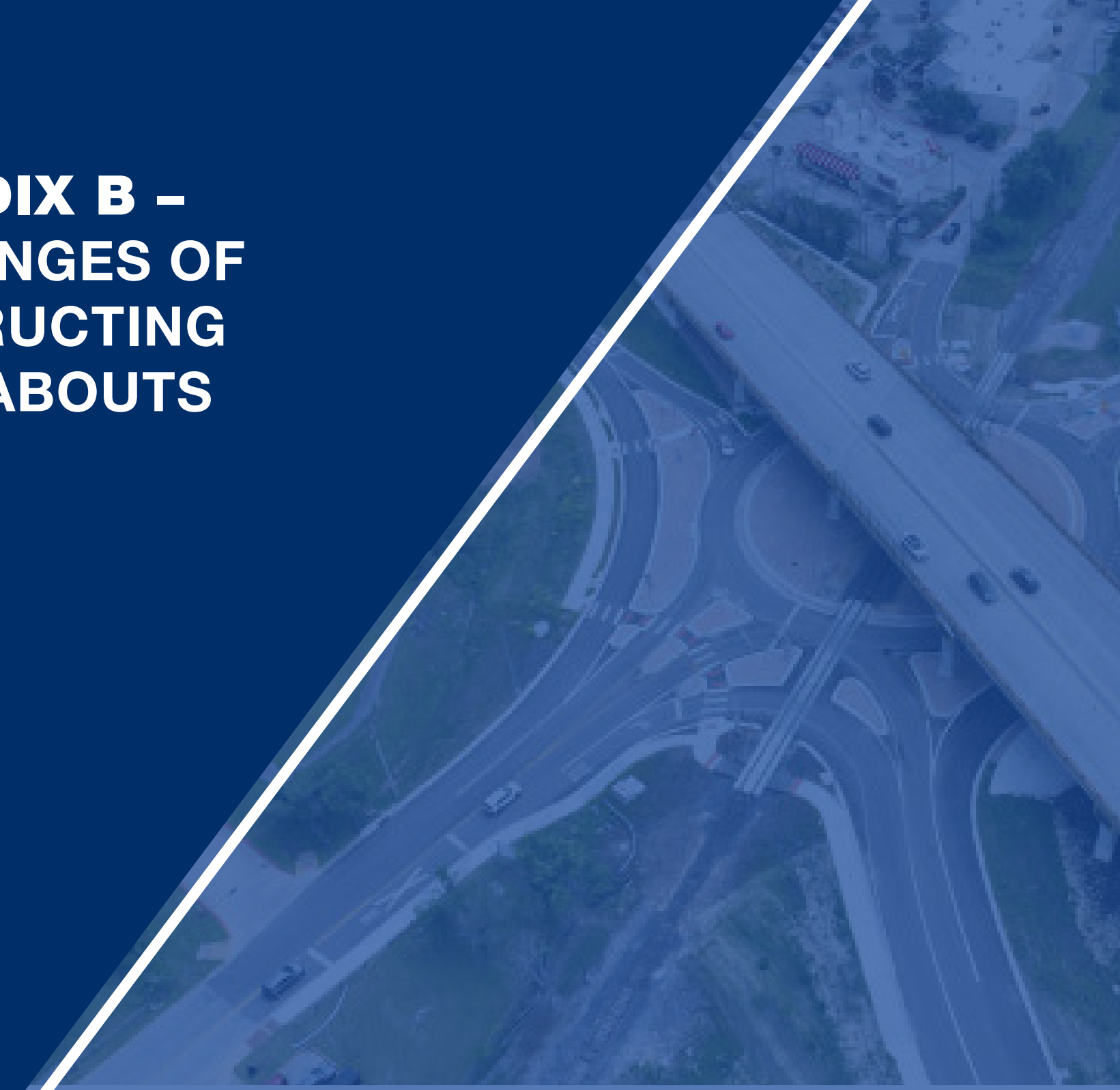
» **EXAMPLE 5** – TEMP. TRAFFIC SIGNAL TIMINGS FOR PIECE-WORK WITH PAVE-THRU CONCEPT

Example 5 Site Pictures during Construction of Roundabout



» **EXAMPLE 5** – TEMP. TRAFFIC SIGNAL TIMINGS FOR PIECE-WORK WITH PAVE-THRU CONCEPT

APPENDIX B – CHALLENGES OF CONSTRUCTING ROUNDABOUTS



APPENDIX B: Challenges of Constructing Roundabouts

Modern roundabout construction varies from a standard intersection construction process and requires some additional constructability considerations during the design phase. There are a few challenges that should be considered and identified early in the design phase that can improve the construction process. A few of the common pitfalls experienced by contractors include:

- Unintended re-mobilization
- Tear-out of pavement/curbs
- Inconsistent paving details
- Optimized construction timeline versus worker safety

UN-INTENDED RE-MOBILIZATION

Challenge	Mitigation Efforts
At existing intersections where a roundabout is to be retrofitted, several factors influence the ability to reduce the number of construction phases while maintaining existing traffic or providing partial traffic operations with detours.	Develop traffic control plans and conduct constructability reviews so additional re-mobilization efforts may be addressed to avoid later change orders, and a subsequent delays.
Minimize the number of separated paving operations	Prepare a TCP narrative and TCP plan sheets for each phase of construction to identify when paving is/is not occurring to make a contractor aware of this process prior to bidding to account for the additional mobilization efforts.
Phased construction of the roundabout may result in certain segments of curb being deferred until the end of the project.	Delaying construction of segments of curb can help facilitate the shifting of traffic within various phases of construction while the adjoining pavement section is built. This includes the central island curb as well as splitter island curb and curbing on the outermost portions of the circulatory roadway.

TEAR-OUT OF PAVEMENT/CURBS

Challenge	Mitigation Efforts
Routing of traffic to previously placed limits of permanent pavement, curb and gutter.	Require that some curb is not constructed within one phase or another. Evaluating pavement and curb elements built versus subsequent phases of traffic routing can minimize the contractor's need to remove previously placed pavement/curbs, ultimately saving schedule and cost.
Traffic control standard details are commonly applied to routine temporary work zone conditions.	Require specific traffic control plans to be developed for each construction phase. By analyzing and evaluating traffic routing and allowable boundaries of the roundabout that are able to be constructed within each phase, situations of tear-out/removal and reconstruction of pavement and curbs may ultimately be avoided.

INCONSISTENT PAVING DETAILS

Challenge	Mitigation Efforts
Paving details that specify differing depths of from existing to proposed surface pavement. Slight changes to the vertical depth and geometrics of subbase and subgrade material over short horizontal distances are a challenge to construct..	During the design process focus on details of stepped up and stepped down pavement sections where the subbase and subgrade portion of the pavement section mirrors overlying pavement zones. This affects lateral separation of temporary travel lanes from the edge of drop-offs or raised surfaces.
Use of brick pavers versus monolithic concrete surfaces in truck aprons and splitter islands.	Brick paver placement adds flexibility to the phasing of construction, but the long-term serviceability of pavers is not as good as monolithic colored and stamped concrete.
Subgrade preparation	a. Flexible Base crushed stone, crushed or uncrushed gravel, or crushed concrete may require additional excavation in order to remove existing material that would conflict with the horizontal and vertical limits of placement of the flexible base. Excavation quantities should b. Lime/Cement Stabilized reduces the excavation effort; however, it also presents challenges due to compaction problems similar to the flexible base method. c. A thickened concrete or asphalt pavement section can limit the amount and type of equipment needed within the work zone and decrease the construction timeline.

TEAR-OUT OF PAVEMENT/CURBS

Challenge	Mitigation Efforts
Worker safety	Maximize the construction phasing area for the safest construction environment. Balancing the construction timeline and worker safety needs to be proactively discussed at the constructability review to ensure safety is not sacrificed for expeditious construction.

REFERENCES

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6 Selecting Optimum Intersection or Interchange Alternatives. North Carolina Department of Transportation, Hummer, Joseph E. PhD, PE, State Traffic Management Engineer, 2024.

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