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April 8, 2016

Mr. Rodney Scheel
Director of Planning and Development
City of Stoughton
381 East Main Street
Stoughton, WI 53589

Re: Kettle Park West Traffic Impact Analysis Update Review

Dear Rodney,

We have completed a review of the Kettle Park West (KPW) Traffic Impact Analysis Update (TIAU) completed by JSD Professional Services, Inc. (JSD) dated February 29, 2016. After an initial review of the TIAU, we asked for clarification on several aspects of the study. JSD subsequently provided a revised TIAU on March 30, 2016. This letter summarizes our review of the revised TIAU and our recommendations.

1. Trip Generation

The study uses trip generation rates contained in the most recent Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition). JSD provided an exhibit of the proposed land uses; however, the quantity of individual land uses (such as building square footages and the number of residential dwelling units) was not provided. Assuming the land use quantities JSD has used in their trip generation tables reflect the latest proposed site plan, the trip generation provided in the revised TIAU is reasonable.

We completed independent trip generation calculations and arrived at similar total trips as those reported in the revised TIAU. The revised TIAU tends to use the trip equations provided by ITE, rather than the more commonly used average trip rates. It also uses the rates for the peak hour of the trip generator when available, rather than the peak hour of the adjacent street traffic. This results in total trips that are slightly conservative (higher). For the purposes of evaluating various access and circulation scenarios, as the revised TIAU does, this is a reasonable approach.

2. Trip Distribution and Assignment

Based on the traffic modeling outputs and trip generation provided in the revised TIAU, about 50 to 70 percent of the site trips have been assigned to the three intersections considered in the study: US 51 and Deer Point Drive/Roby Road; US 51 and Jackson Street; and WIS 138/Oak Opening Road. Considering the additional access points that will be provided on WIS 138 west of US 51, we find that this percentage of traffic using the study intersections is reasonable.

3. Traffic Modeling Results

Figure 1 shows the site plan provided by JSD.

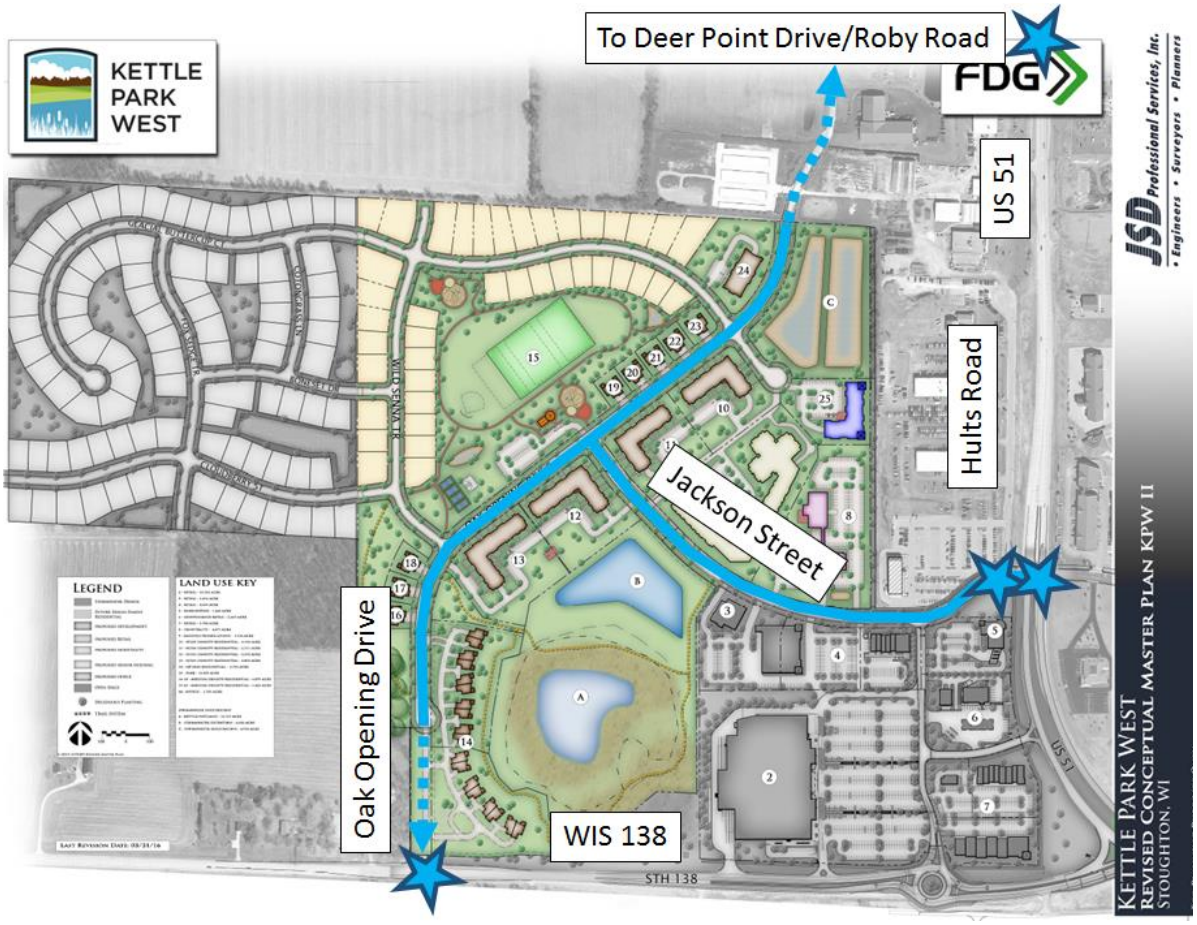

Figure 1 Site Plan and Study Intersections

The revised TIAU evaluates the following three conditions:

> Condition 1: No KPW connection to US 51 at Deer Point Drive/Roby Road, no KPW connection to WIS 138 at Oak Opening Drive.
> Condition 2: KPW connection to US 51 at Deer Point Drive/Roby Road (under both stop-control and traffic signal-control), no KPW connection to WIS 138 at Oak Opening Drive.
> Condition 3: KPW connection to US 51 at Deer Point Drive/Roby Road (under traffic signal-control) and KPW connection to WIS 138 at Oak Opening Drive.

JSD noted that the traffic signal phasings and timings at US 51 and Jackson Street and Jackson Street and Hults Road were provided by Wisconsin Department of Transportation (WisDOT) staff. JSD then optimized the signal phasing and timings using Synchro software. This is a standard approach; however,

during the optimization the signal phasings were altered in a manner that may not be preferred in the field. Specifically, some of the protected/permitted left-turn phases were altered from leading (when the protected left-turn phase precedes the permitted left-turn phase) to lagging (when the permitted left-turn phase precedes the protected left-turn phase). Lagging permitted/protected phasing is typically not used by WisDOT because of a particular phenomenon known as the "left-turn trap"[1]. JSD should confirm with WisDOT that the signal phasing in the report is acceptable or revise it to provide leading left-turn protected/permitted phasing and update the revised TIAU.

In the interest of time, Strand requested the traffic models WisDOT developed to evaluate the signals at US 51 and Jackson Street and Jackson Street and Hults Road. We added the other two study intersections to the WisDOT models and completed an independent evaluation of 2035 operations using the trip generation and distribution/assignment documented in the revised TIAU. Our analysis indicates that operations could be poorer than reported in the TIAU in 2035.

The City of Stoughton municipal code includes the following language regarding traffic impacts of proposed developments:

> *"Where the applicant's or the city's traffic impact analysis indicates that a project may cause off-site public roads, intersections, or interchanges to function below level of service (LOS) C, then the city may deny the application, may require a size reduction in the proposed development, and/or may require the developer to construct and/or pay for required off-site improvements to achieve LOS C for a planning horizon of a minimum of ten years assuming full build-out of the development;"*

The signalized intersections operate at LOS C or better overall in each of the scenarios considered except Condition 1 during the 2035 PM peak hour. Since this is not the recommended condition, it is not a significant concern.

Typically, minimum operational goals also aim to avoid any LOS F movements. The US 51 movements at the signals operate at LOS D or better. However, our analysis suggests that some of the turning movements at Jackson Street/Hults Road and US 51 and Jackson Street may operate at LOS F in 2035 under Conditions 1, 2, and 3. Additional detailed evaluation of the complicated signal timings and phasings at the two closely spaced Jackson Street signals may be able to partially or fully mitigate these poor operations. Our understanding is that both WisDOT and City of Stoughton staff are aware of potential delays and queuing on the Jackson Street approaches to these two signals.

Also, for Condition 3 the revised TIAU models the Oak Opening Drive connection at WIS 138 as a side-street stop-controlled intersection. The southbound left-turn is expected to operate at LOS F by 2025.

[1] The left turn trap occurs when a driver on approach 1 is waiting to make a left turn during the permissive phase and the left-turn phasing for the opposite approach 2 is lagging permitted/protected. The driver on approach 1 will see their permissive phase end (a yellow indication for their left-turn movement as well as the adjacent through movement) and may assume the opposing approach 2 through movement phase is also ending. It is common for drivers to assume the opposing through traffic will be stopping and to complete their left turn from approach 1 on the yellow indication. However, when a lagging left-turn phase is provided, the opposing through traffic on approach 2 will continue to receive a green indication and may not anticipate that the opposing left-turning vehicle on approach 1 is entering the intersection and attempting to complete their turn.

4. Recommendations

Following is our summary of the revised TIAU recommendations and comments regarding them.

> TIAU Recommendation: The City of Stoughton, Town of Rutland, WisDOT, and in coordination with the developer, program and execute improvements to signalize the intersection at US 51 and Deer Point Drive/Roby Road with turn lane improvements to meet the projected traffic demands on that intersection whether or not KPW connects to Oak Opening Drive on its north boundary.
>
> Agree. WisDOT has completed an Intersection Control Evaluation (ICE) at the US 51 intersection with Deer Point Drive/Roby Road. Upgrading the intersection to roundabout or traffic signal-control and connecting the KPW development to the intersection via Oak Opening Drive on the north boundary of KPW benefits overall traffic access and circulation and likely will improve operations at other intersections in the area.
>
> TIAU Recommendation: The developer should connect Oak Opening Drive on the north boundary of the proposed development to the intersection of US 51 and Deer Point Drive/Roby Road to provide secondary emergency service access. This would be in coordination with the Town of Rutland, City of Stoughton, and WisDOT, and be coordinated with programmed improvements to the intersection at Roby Road/Deer Point Drive and US 51.
>
> Agree. Full access to the KPW development at Deer Point Drive/Roby Road via Oak Opening Drive benefits overall traffic access and circulation and likely will improve operations at other intersections in the area.
>
> TIAU Recommendation: The developer, in coordination with the City of Stoughton and Town of Rutland, pursue access to WIS 138 at Oak Opening Drive.
>
> Agree. This connection will ultimately provide relief to the other KPW access points. From a planning perspective, a public street connection on the west end of the site is advisable considering the possibility of additional development north and west of KPW. Considering the anticipated poor operations of the southbound left-turn movement at this intersection, planning for upgraded roundabout or traffic signal-control according the WisDOT policies should be completed at this time.

Thank you for asking us to provide a review of the revised TIAU. Please call me any questions or if you require need additional information.

Sincerely,

STRAND ASSOCIATES, INC.®

Jeffrey S. Held, P.E., PTOE

JSH:plh\\\strand.com\projects\MAD\1000--1099\1040\068\Data\Traffic\2014-03 KPW TIA Review\2016-04-08 KPW TIAU Review Letter.docx

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Memorandum

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To:	Rodney Scheel, City of Stoughton
From:	Bill Dunlop, JSD
Re:	Traffic Impact Analysis - Update
JSD Project #:	15-7018
Date:	12 April 2016
cc:	Jeff Held, Mark Fisher, Strand; Dennis Steinkraus, FDG; Dave Jenkins, Adam Watkins; JSD; Jeff Fait, TADI

Rodney

We have reviewed the comments provided on 11 April 2016 concerning the TIA Update. We would like to provide the following clarifications and responses:

1. Trip Generation – No comments or response.

2. Trip Distribution and Assignment - No comments or response.

3. Traffic Modeling Results –

    a. We requested the model used by the reviewer to compare methodology. The model provided to the reviewer did not reflect the approved lane configuration for the west leg of Jackson Street at the intersection with USH 51/Hults Road. The west leg modeled in the TIA – Update had a left turn lane, a thru lane and a right turn lane. This matches the attached plan sheets approved by the City and DOT and which has been constructed. The model provided to the reviewer had two lanes, a thru-left land and a right turn lane.

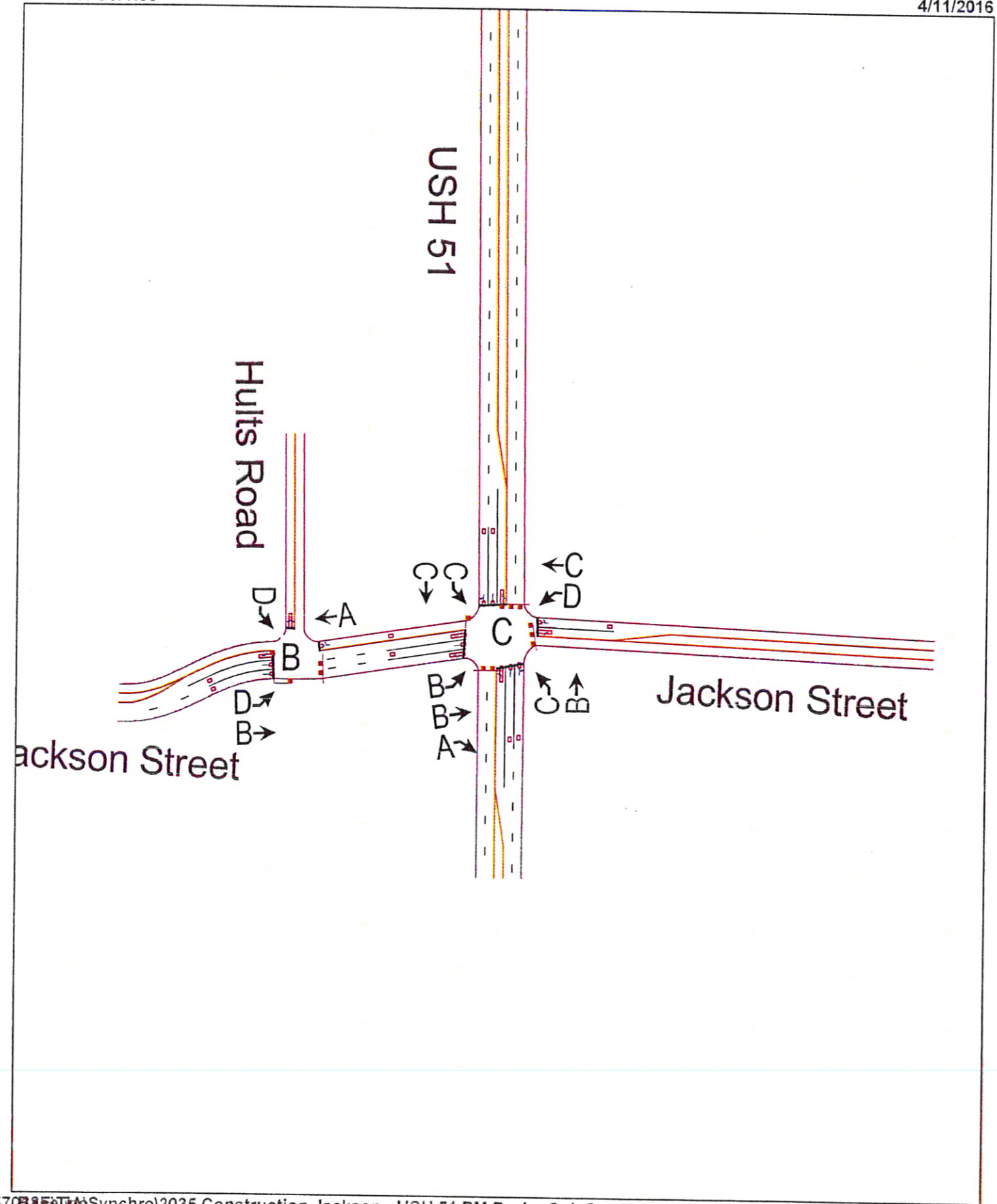
    The difference in the model would most likely account for difference in level of service (LOS) between the two analyses at the Jackson Street intersection in the 2035 analysis.

    b. As stated in the review, we did optimize the signal timing in the model which resulted in the lagging left versus the leading left. In our discussion with the reviewer, this signal timing is not typically used but can be used where required. Our analysis is provided as a reasonable assurance to the City and DOT that the intersection will function through 2035 at required levels. Ultimately, the DOT will operate the signal at the intersection of Jackson Street and USH51/Hults Road and set the signal timing based on field observations and performance of the signals once they are in place, as the reviewer stated.

    The current intersection design was developed using the approved TIA. The signal placement and timing was developed in coordination with and approved by the DOT and based on previous land use projections in that TIA. This TIA – Update was based on the revised neighborhood plan and current preliminary plat and the resulting the trip generation from Phases 2 and 3 of Kettle Park West. The changes in land uses from the original plans resulted in a decrease in projected traffic at the Jackson Street intersection frmo these phases. This would also indicate that the intersection will function as required through the horizon years since it was previously approved with higher traffic projections from Phase 2 and 3.

c. At the intersection of Oak Opening Drive and STH 138 the southbound left movement does operate at a LOS of F in both horizon years. The intersection operates at a LOS of A (2025) and B (2035) with the issues only with the southbound left movement. Since there would be two other access points from the subdivision to avoid the southbound left movement (Deer Point Drive and Jackson Street) that would provide the driver the opportunity reach the same destinations, we anticipate that traffic would eventually avoid this movement in peak hours. Signalization or a roundabout for the projected traffic volumes would probably not be warranted under WisDOT criteria at this time.

4. Recommendations – No comments or responses.


USH 51
Hults Road
Jackson Street
ackson Street
D
A
B
D
B
C
C
C
C
D
B
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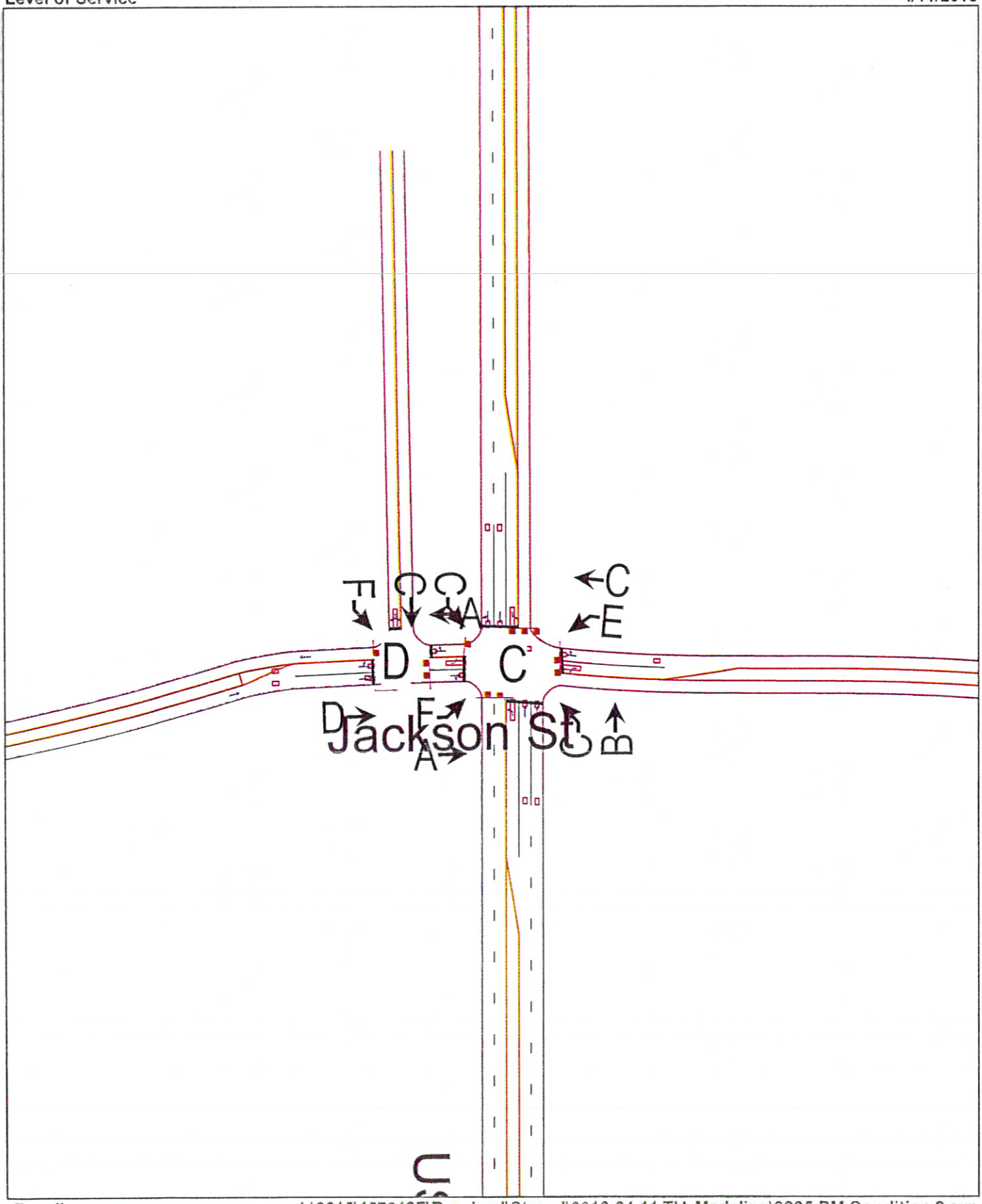
A
C
B

Map - I:\2015\157018E\Received\Strand\2016-04-11 TIA Modeling\2035 PM Condition 3.syn
Level of Service 4/11/2016



Baseline I:\2015\157018E\Received\Strand\2016-04-11 TIA Modeling\2035 PM Condition 3.syn

GENERAL PHASING NOTE:
ALL WORK UNLESS OTHERWISE NOTED SHALL BE CONSTRUCTED AS PART OF PHASE II. REFER TO GENERAL NOTES SHEET FOR PHASING DETAILS.

HULTS RD.

USH 51

JACKSON ST.

W11-2
36"X36"
NO. 1

PAVEMENT MARKING, BIKE LANE, EPOXY, 4-INCH (WHITE) (PHASE I)

STOP
R1-1F
36"X36"
ATTACH TO SIGNAL POLE UPON INSTALLATION

PAVEMENT MARKING, ARROWS, TYPE 2, EPOXY (WHITE) (PHASE I)

PAVEMENT MARKING, CENTERLINE, EPOXY, 4-INCH (DOUBLE YELLOW) (PHASE I)

PAVEMENT MARKING, CHANNELIZING, EPOXY, 8-INCH (WHITE) (PHASE I)

PAVEMENT MARKING, SYMBOLS, TYPE 2, EPOXY (WHITE) (PHASE I)

STOP
R1-1F
36"X36"
ATTACH TO SIGNAL POLE UPON INSTALLATION

PAVEMENT MARKING, ARROWS, TYPE 2, EPOXY (WHITE) (PHASE I)

PAVEMENT MARKING, STOP LINE, EPOXY, 18-INCH (WHITE) (PHASE I)

NO. 5
TO BE REMOVED UPON COMPLETION OF SIGNAL INSTALLATION

STOP
R1-1
36"X36"

STOP
R1-1F
36"X36"
ATTACH TO SIGNAL POLE UPON INSTALLATION

PAVEMENT MARKING, CROSSWALK, EPOXY, 6-INCH (WHITE)

PAVEMENT MARKING, EPOXY, CURB,(YELLOW) (TO 5' BEYOND RADIUS P.C.)

PAVEMENT MARKING, BIKE LANE, EPOXY, 4-INCH (WHITE) (PHASE I)

PAVEMENT MARKING, BIKE LANE ARROW, EPOXY, 4-INCH (WHITE) (PHASE I)

PAVEMENT MARKING, EPOXY,CURB, (YELLOW), (TO 5' BEYOND RADIUS P.C.)

STOP
R1-1F
36"X36"
ATTACH TO SIGNAL POLE UPON INSTALLATION

STOP
R1-1
36"X36"
NO. 2
TO BE REMOVED UPON COMPLETION OF SIGNAL INSTALLATION

PAVEMENT MARKING, STOP LINE, EPOXY, 18-INCH (WHITE)

PAVEMENT MARKING, CHANNELIZING, EPOXY, 8-INCH (WHITE)

PAVEMENT MARKING, CENTERLINE, EPOXY, 4-INCH (DOUBLE YELLOW)

PAVEMENT MARKING, ARROWS, TYPE 2, EPOXY (WHITE)

PAVEMENT MARKING, SYMBOLS, TYPE 2, EPOXY (WHITE)

PAVEMENT MARKING, CROSSWALK, EPOXY, 6-INCH (WHITE)

STOP
R1-1F
36"X36"
ATTACH TO SIGNAL POLE UPON INSTALLATION

PAVEMENT MARKING, STOP LINE, EPOXY, 18-INCH (WHITE)

PAVEMENT MARKING, CHANNELIZING, EPOXY, 8-INCH (WHITE)

W11-2
36"X36"
NO. 6

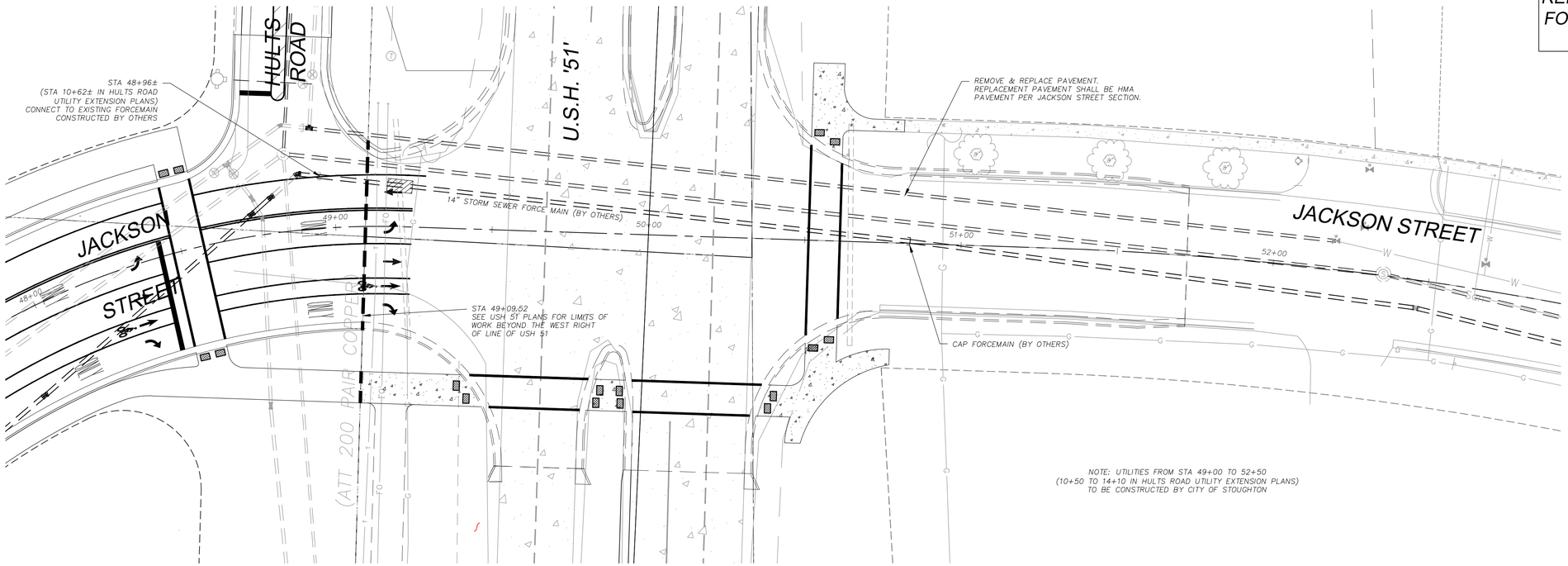
SIGN TABLE		
NO.	STATION	OFFSET
1	28+76 SB	21.75 RT
2	50+64	30.75 LT
3	52+06	27.25 LT
4	51+00	28.00 RT
5	49+26	39.25 RT
6	34+83 NB	28.75 LT

N

PROJECT NO: 09-3951E	HWY: USH 51	COUNTY: DANE	PLAN: USH 51 - JACKSON ST. PAVEMENT MARKING & SIGNAGE PLAN	SHEET 12	E

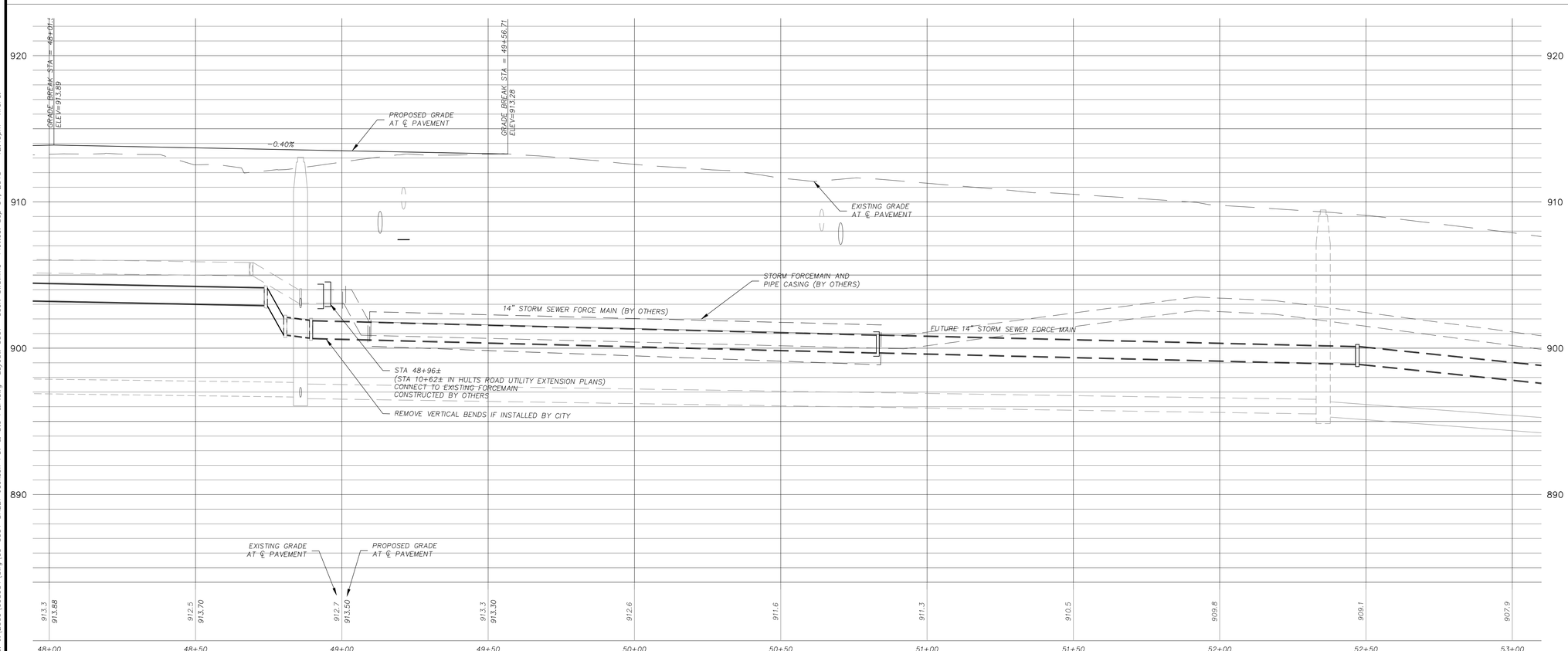
FILE NAME : J:\2009\093951\DWG\WDOT14\093951 JACKSON INTERSECTION WDOT14.DWG
**** - ****
PLOT DATE : 10/16/2015 8:11 AM PLOT BY : ADAM WATKINS PLOT NAME : PLOT SCALE : 1 IN:40 FT

REFER TO SHEETS C300-303 FOR SANITARY SEWER AND WATERMAIN PLANS



north

4'
0
20'
40'
SCALE IN FEET



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FDG

KETTLE PARK WEST

PROJECT LOCATION:
CITY OF STOUGHTON
DANE COUNTY, WI

JSD PROJECT NO.: 09-3951

SEAL/SIGNATURE:

ALTHOUGH EVERY EFFORT HAS BEEN MADE IN PREPARING THESE PLANS AND CHECKING THEM FOR ACCURACY, THE CONTRACTOR AND SUBCONTRACTORS MUST CHECK ALL DETAIL AND DIMENSIONS OF THEIR TRADE AND BE RESPONSIBLE FOR THE SAME.

DESIGN:	
DRAWN:	
APPROVED:	

PLAN MODIFICATIONS:	DATE:
ISSUED FOR CONSTRUCTION	09/01/15

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SHEET TITLE:
JACKSON STREET PAVING/STORM SEWER PLAN AND PROFILE STA 49+00 TO 52+50

SHEET NUMBER:
C307

File: J:\2009\09-3951\dwg\09-3951 SHEET Jackson Pav & Sto P&P.dwg Layout: C307 User: awatkins Plotted: Sep 01, 2015 - 12:43pm Xref's: