

# City of Carroll

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**MEMO TO:** Mike Pogge-Weaver, City Manager *MSP-w*

**FROM:** Randall M. Krauel, Director of Public Works *RMK*

**DATE:** October 21, 2021

**SUBJECT:** Union Pacific Railroad Quiet Zone Investigation Update – 2021

On April 12, 2021, the City entered an Agreement for Professional Services with Bolton & Menk, Inc. for the Union Pacific Railroad Quiet Zone Study Update. The Agreement included Study updates to the following street – railroad crossings:

Bella Vista Drive  
N. Grant Road  
N. Maple Street  
N. Clark Street  
N. Main Street  
N. Carroll Street  
Burgess Avenue

The Agreement Schedule include the following:

Review of Crossings, FRA & Traffic Data	May, 2021
Kickoff Meeting	May, 2021
Report Updates	May – June, 2021
Layout Updates	May – June, 2021
Opinion of Probable Cost Updates	May – June, 2021
Final Report – Submit to City	July 23, 2021
Final Report – City Review & Meetings	August – September, 2021
Final Report	2 weeks from return

Bolton & Menk, Inc. requested, and were administratively granted, a two-week extension on the submittal of the Final Report to the City. On August 9, 2021, Bolton & Menk, Inc. submitted the Union Pacific Railroad Quiet Zone Investigation Update to the City. City review has been ongoing since receipt of the Update. Mayor and City Council presentation has not been scheduled until October 25.

Representatives of Bolton & Menk, Inc. will be in attendance on October 25 to present the Update. Bolton & Menk, Inc. representatives will be able to address questions of the Mayor and City Council and prepare to incorporate desired changes into the Update Final Report.

RMK:ds



Real People. Real Solutions.

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August 9, 2021

Honorable Mayor and Council  
City of Carroll

Carroll, Iowa

RE: Union Pacific Railroad Quiet Zone Investigation Update - 2021  
Engineering Report  
City of Storm Lake, IA  
Project No.: 0A1.124378

Dear Mayor and Council:

This letter is a presentation of the updates to the Engineering Report completed in April of 2014 for the proposed railroad crossing safety improvements within the City of Carroll. There has been continued interest in the establishment of a quiet zone within the community and with changes since the original report, it was deemed that this update be the logical next step in this process.

## 1.0 Executive Summary

Bolton & Menk has completed updates to the preliminary investigations for the Quiet Zone (QZ) Feasibility Study along the Union Pacific mainline track within the community. The work has included a kickoff meeting with the City, review of changes to the physical conditions at the crossings within the proposed corridor, review of the Federal Rail Administration (FRA) and Union Pacific Railroad (UPRR) processes for establishing a quiet zone. Data collection included the field review of each crossing using city provided aerial photography and field observations of existing conditions along with traffic count information available from the Iowa Department of Transportation (IDOT).

It was requested by the City that additional options be considered at some of the crossings beyond the considerations in the original report. In the original report and based on previous experience, improvements were selected to minimize the City's costs while meeting the minimum safety requirements established per Federal Railroad Administration (FRA) criteria. For this update, more consideration was given to the impacts of the adjacent properties allowing the more cost intensive option of 4-quad gates to be assessed as well as other safety measures which typically include some mixture of the following:

- Medians or Channelization devices
- One-way streets with gates
- Four quadrant gates
- Crossing closures

The use of 4-quadrant gates as an SSM within a quiet zone requires additional costs that include design costs, equipment and installation costs and annual maintenance costs. An agreement must be executed with the UPRR for the design and integration of a 4-quadrant gate into their system, the exact amount of this agreement cannot be determined until the number of and makeup of the crossings is known. The construction costs are estimated at \$1,000,000 and may or may not include the engineering costs, but this is not classified in UPRR data and not a definitive number as the estimate on the UPRR website has been listed at \$500,000 for over a decade. The final cost is the annual maintenance agreement between the City and the UPRR for regular maintenance, repairs and integration verifications. This agreement will be based on the number of 4-quadrant gates included in the agreement and can be up to \$60,000 per year; however, the final amount would be negotiated between the parties.

For crossing closure, the UPRR will typically pay the City for the loss of the crossing. This amount is based on several factors and is part of the negotiation process when reviewing the crossings for the establishment of a quiet zone. The City must keep in mind that any crossing that is closed must have the right of way vacated and cannot be established as a crossing again in the future.

We have also taken Wayside Horns as a potential option for a crossing, but this is not an SSM. This will be discussed further in the body of the report.

Safety Improvements recognized by FRA fall into 2 categories:

**Supplementary Safety Measures (SSM's)** – Pre-approved risk reduction engineering treatments installed that maximize safety benefits and minimize risk.

**Alternative Safety Measures (ASM's)** – Safety Improvements that while not fully meeting the requirements are used to reduce risk, ASM's must be submitted to FRA for consideration of approval which may take a year for approval and are subject to an annual review of the ASM's effectiveness.

The recommended method for creating a Quiet Zone is to install SSM's at each public crossing within the corridor being considered. This reduces the risk significantly for the users of the highway/rail crossing and automatically qualifies for quiet zone establishment and is not subject to annual reviews. However, the installation of SSM's at every crossing is not practical in most communities, which then requires the investigator to consider what is feasible, both physically and politically at each crossing. Factors considered include:

- Is the crossing private or public
- Traffic volumes
- Location of driveways; commercial and residential
- Adjacent land uses and potential impacts
- Distance to adjacent side streets from the crossing
- Condition of the crossing, location of gate arms and signals
- Width of crossing pads
- Roadway and right of way widths
- Sidewalk locations and pedestrian movements

Bolton & Menk has consistently taken the approach that physical improvements such as raised medians in combination with crossing closures is the most practical approach to reduce risk. However, for this update considerations such as impacts to the adjacent properties and stakeholder buy-in is an increased significant factor. As such, the improvement scenarios discussed meet the FRA criteria for quiet zone creation as evidenced by the QZ calculator and scenario matrix. This approach leads to numerous potential scenarios that will allow for a quiet zone, but the final choice of scenario is left to the City of Carroll and its determination of cost, impacts and stakeholder buy-in.

The typical costs for installation of a raised median at a crossing assuming the crossing pads, gate arms and signals are adequate is in the range of \$100,000 to \$200,000, whereas the costs to install 4-quadrant gates at the same crossing would exceed \$1,000,000. The UPRR has made significant changes to how it handles the investigation and implementation of quiet zones. These changes will have impacts to schedules and budgets and will be discussed in more detail in the body of the report.

The corridor selected for your QZ extends from Bella Vista Road on the east side of Carroll to Burgess Avenue on the west. The total length of the QZ, if implemented, is approximately 3 miles in length and would cover the majority of the community impacted by the train horns.

Multiple options for consideration are provided for the Burgess, Main, Clark, Maple and Grant highway/rail crossings to meet local conditions.

**Burgess Street** – This crossing includes multiple options. Leaving the crossing open is the simplest option for consideration; however, this impacts what needs to be done at other crossings to achieve the quiet zone requirements. The installation of a 4-quadrant gate system also keeps the impacts to the adjacent streets to a minimum and does not impede or narrow traffic lanes for heavy industrial truck traffic but is the most expensive of the options. Installation of raised medians are a more economical method, but the proximity of the adjacent streets on the east side increase the difficulty of adding the medians as safety improvements. The fourth option is the installation of a wayside horn. The cost is comparable to the raised median method and given the location of the crossing in the community and the directional sound of the horns in this area, makes this a very viable option.

**Main Street** – We have provided three separate options due to the location of E 4<sup>th</sup> Street on the north side of the crossing. All options meeting the QZ requirements. The first option provides for raised medians but requires 4<sup>th</sup> Street to be shifted north and also removes on-street parking and restricts access within the median area south of the crossing. The 2<sup>nd</sup> option technically shows the crossing open within the FRA requirements and calculations, but includes additional safety improvements at the crossing, these can be considered optional. The third is for the installation of additional gates so that the crossing functions as a 4 Quadrant gate system.

**Maple Street** – We have provided two separate options for this crossing: closure of the crossing and installation of raised medians. We recommend that the City council seriously consider the closure of the Maple Street crossing due to its low traffic volumes and its lack of need for circulation across the community with the two adjacent crossings (Grant and Clark) proposed to remain open. The stakeholder and community buy-in for this option is a major determining factor to its viability. The raised median option is fairly straight forward and does not impact any adjacent properties significantly. Closing Maple could also help provide some negotiation leverage with the UP when looking at the crossing and the cost associated with them.



**Grant Street** – There are two options being considered for the crossing at Grant St.: leaving the crossing open, again with the potential option for short medians as an additional safety measure. The second is for the 4-quadrant gate system due to the impacts it can have on the quiet zone calculations due to the higher volume of traffic.

Appendix I – Crossing Improvement Matrix summarizes the feasibility of completing the implementation of the QZ based on the level of safety measures installed at each crossing in the corridor. Several more scenarios have been included in this update and we have included a generalized overall improvement cost for each of the scenarios. This is to provide the City of Carroll more opportunity to consider the various scenarios and coordinate that with potential funding and stakeholder support.

Appendix J - shows the Preliminary Opinion of Project Construction Costs for most of the crossing options. An overall total is not shown due to the multiple options for several of the crossings and therefore would not be a clear indicator of the cost for the seven crossings.

## 2.0 **Introduction**

The City of Carroll requested Bolton and Menk, Inc. to prepare this Engineering Report of railroad safety improvements for seven railroad crossings on the Union Pacific Railroad mainline tracks. The crossings evaluated in this report are shown on Attachment A and include:

- Bella Vista Road (FRA 911914P)
- N. Grant Road (FRA 190771A)
- N. Maple Street (FRA 190772G)
- N. Clark Street (FRA 190773N)
- N. Main Street (FRA 190774V)
- N. Carroll Street (FRA 190775C)
- Burgess Avenue (FRA 190778X)

This report will provide the information and potential recommendations for improvements at these intersections to allow the City of Carroll to determine the most beneficial scenario of crossing treatments so that they can begin the process of establishing a Quiet Zone (QZ) on the Union Pacific mainline.

## 3.0 **Union Pacific Quiet Zone Process**

There have been several significant changes to how the UPRR handles their internal processes for dealing with the proposed establishment of a quiet zone. They have released their engineering staff and no longer deal directly with the diagnostic review or any needed design elements for the improvements to their track systems. Currently, they are utilizing the services of two consultant engineering firms: one to manage the quiet zone establishment process and one to provide the design engineering services for any improvements needed to the railroad facilities.

To be able to initiate a quiet zone, the UPRR will require the execution of an agreement between the City and the UPRR for an amount of up to \$40,000. This is to be executed prior to the start of any work with the UPRR and is for their involvement through the quiet zone establishment process. At the beginning of the quiet zone review in 2014, a diagnostic meeting was held between Bolton & Menk, representatives from the FRA, UPRR, IDOT and the City of Carroll. However, due to the amount of time that has elapsed since that meeting and the potential for use of SSM's other than those discussed at the first meeting, the City will have to provide for another diagnostic review meeting when it is decided to move forward with the quiet zone process. This meeting along with review of proposed plans, notices, and coordination between the City and their consultant is what that agreement and fee to the UPRR will be used for.

Also, if any of the improvements that are being proposed will cause changes to the UPRR owned facilities including tracks, crossings or equipment, another agreement will need to be executed between the City and UPRR for the engineering and design of those facilities. We are not able to provide an estimated fee amount for this work since it will be largely dependent upon what facilities are added or changed and the number of crossings that are to be involved.

The UPRR has requirements that must be followed to install the SSM's or changes to their equipment. One of these is to provide for a minimum of 9' 3" from the center of the gate arm to the edge of the traveled roadway edge or 5' 3" to the face of the curb. This has impact to median installation as it dictates how much the road can be widened without relocating the gate arm and post. These required minimum dimensions have increased since the original study was completed in 2014. These increased dimensions have affected some of the alternatives and associated costs for some of the crossing the proposed quiet zone. The UPRR will also evaluate the condition of the existing road and sidewalk crossing panels adjacent the tracks. The UPRR required a minimum of 3' of clearance from the edge of traveled or walk way to the end of the crossing panel. As part of the new diagnostic review the existing crossing panels will be reviewed and determinations made if they will need to be extended which will be a cost required to be paid by the City. The UPRR also may require updates to any of the crossing panels or other equipment at a crossing that is considered to be substandard or worn out. UPRR will want to put the costs on the City's portion of the project costs, but we do not agree that these costs should be borne by the City alone and work to negotiate with the UP in these instances.

As discussed in the executive summary, the use of 4-quadrant gates as an SSM within a quiet zone requires additional costs that require an agreement be executed with the UPRR for the design and integration of a 4-quadrant gate into their system. The construction costs are estimated at \$1,000,000 and may or may not include the engineering costs, but this is not classified in UPRR data. There is also an annual maintenance agreement between the City and the UPRR for regular maintenance, repairs and integration verifications. This agreement will be based on the number of 4-quadrant gates included in the agreement and can be up to \$60,000 per year; however, the final amount would be negotiated between the parties.

For crossing closure, the UPRR will typically pay the City for the loss of the crossing. This amount is based on several factors and is part of the negotiation process when reviewing the crossings for the establishment of a quiet zone. The City must keep in mind that any crossing that is closed must have the right of way vacated and cannot be established as a crossing again in the future

#### 4.0 Wayside Horn

The use of wayside horns at crossings as a way to mitigate the noise levels is being used in locations all over the United States, but not in great numbers. Wayside horns operate on the same principal as the train horns as far as when they must be sounded and how long they will sound. They also have a minimum decibel level of 92 decibels that is required, this is only a slight decrease from that of a train horn. The main difference with the wayside horn compared to the train horn is the amount of area affected by the noise. The sound from train horns must travel ahead of the train and away from the crossing and still be loud enough to warn drivers in vehicles that may have their windows up and radios on that are approaching the crossing. This then engulfs the surrounding area with sound as the train horn moves along the tracks and approaches the crossing. The wayside horn is directed up the streets directly at the road crossings and thereby does not radiate out as far away from the crossing. A schematic is shown in Figure 1 and comes from a brochure from Quiet Zone Technologies, a supplier/installer of wayside horn systems.

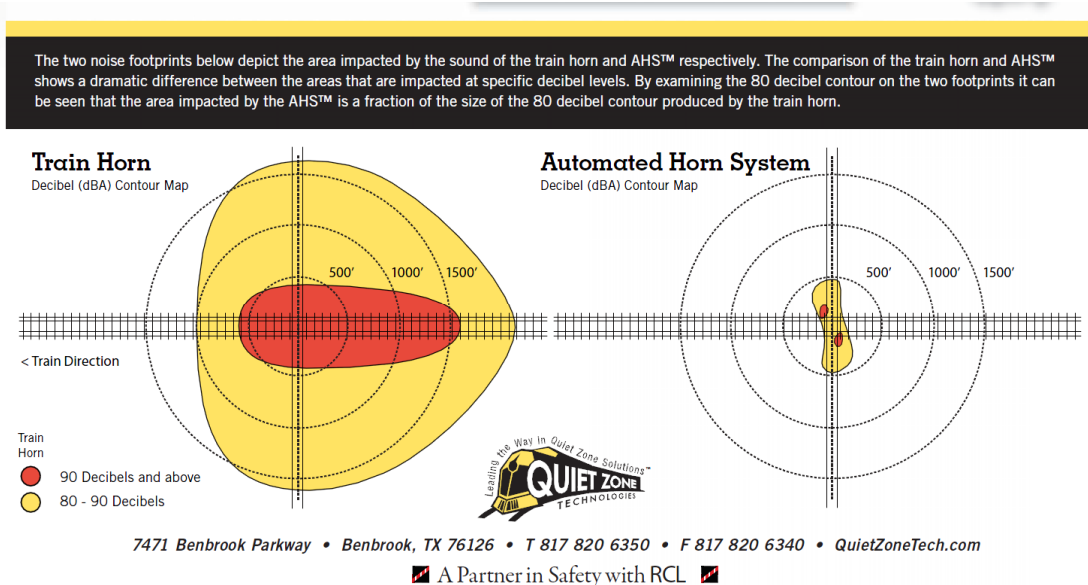


Figure 1 – Noise Level Schematic

The system itself consists of the wayside horn, post, confirmation device and circuitry integration equipment. The system is integrated with the railroad’s signal equipment so that when the train triggers the signals at the crossing, it also signals for the wayside horn to begin its sequence. Along with that, the system will trigger the confirmation device. This device signals to the locomotive operator that the wayside horn is functioning and that they do not have to sound the train horn. If the operator does not see the confirmation device activated, then he will sound the train horns as required. Just as with a quiet zone, the installation of the wayside horn system does not mean that train horns will not be sounded in certain situations. There are typically two horns installed at each crossing, one facing each direction of the oncoming vehicle traffic. Similarly, there are two confirmation devices installed for each crossing for each direction a train may be traveling. For multiple track crossings the system is integrated so that each track interacts with the wayside horn system and the confirmation devices are visible by either train in both directions.

If the city would decide to proceed with a wayside horn system at a crossing, there are several things that must be accomplished. The City must purchase the equipment and pay for the installation from a third-party supplier and installer. The equipment associated with the wayside horn system is fairly standard and the costs are typically \$30,000 – \$40,000. However, the conditions for placement at each crossing can vary significantly, which may vary the costs from \$15,000 to \$40,000.

The City would have to enter into an agreement with the UPRR to pay the railroad for their costs associated with integrating the wayside horn equipment with their switch and signal equipment and for their continued maintenance costs for verifying that the system is operational. These costs for integration can also vary significantly from \$15,000 – \$25,000 depending on the equipment already in place and any additional equipment needed for integration. The work required to integrate the wayside horn system to the railroad system must be completed by railroad crews. Additionally, there is an annual maintenance cost from UPRR for their work in maintaining the integration of the system, this can be \$1,000 - \$2,000 per crossing.

Finally, there will be costs associated with the wayside horn system that will come from City staff. The City is the owner and maintainer of the wayside horn equipment and as such will need to complete monthly inspections and more in-depth inspections every 6 months. The monthly and bi-annual inspections usually amount to about 10-man hours per year. This should not be a significant cost or time commitment unless the City does not have staff that can complete the work and has to hire outside crews. Also, any damaged or failed equipment that would result from accidents, storms, vandalism, etc. would be the City’s expense to repair or replace, which should be included in the City’s annual budget. The supplier of the equipment would be able to provide costs for individual components and a replacement schedule.

The following table summarizes the approximate costs associated with the wayside horn system:

Initial Expenses		
Item	Description	Amount
1	Wayside Horn Equipment	\$40,000
2	Installation	\$40,000
3	Railroad Integration	\$25,000
4	Engineering	\$20,000
	TOTAL	\$125,000
Annual Expenses		
A	Railroad Maintenance	\$2,500
B	City Maintenance (10 hours)	\$1,500

The FRA has defined the wayside horn as a one-for-one substitute for train horns. A crossing that includes a wayside horn system can be included with a proposed quiet zone, but that crossing does not influence the scoring from the quiet zone calculator in determining if a quiet zone would qualify. Therefore, when determining the length of the quiet zone, they are considered the same as a crossing with an SSM but are not considered in the calculations for the Quiet Zone Risk Index or Risk Index With Horns. For example, if a proposed quiet zone included 7 crossings and one of them was a wayside horn system, the quiet zone eligibility would be scored on the 6 other crossings.

## **5.0 Recommended Improvements**

### **5.1 Bella Vista Road (Attachment B)**

The existing crossing on Bella Vista Road is a 24 feet wide concrete rural section road with aggregate shoulders and an at-grade crossing with 3-foot asphalt approaches both north and south of the crossing. The pavement condition of the concrete road and asphalt approaches are sufficient for the improvements recommended in this report. The current traffic demand for this crossing is generally traffic that is bypassing the interior of the City with some occasional use by agricultural equipment to get to the south side of the City. There are no sidewalks along this stretch of road.

The improvement considered for this crossing include the installation a non-mountable median, widening of the pavement, new aggregate shoulders and new signage, as shown on Attachment B. The median would be 2 feet wide and 100 feet in length on the south and north sides of the crossing. The pavement width will need to widen in areas where the median is installed. The gate arms are currently located 6.5' from the edge of the road. Installation of a full curb will allow minor widening of the road to maintain a 12' wide lane in each direction. This would provide adequate room for most standard traffic and types of vehicles currently using this crossing. To provide for wider lanes to accommodate bigger vehicles or agricultural traffic, it is possible that additional Right of Way would need to be purchased in the northwest quadrant to accommodate the lane widening and necessary grading. This may also include the extension of existing culverts and other supplementary work. A detailed topographic survey and verification of the existing road right of way would be necessary to determine the full extent.

### **5.2 N. Grant Road (Attachment C)**

The railroad crossing on N. Grant Road is a 31-foot-wide concrete pavement with an at-grade crossing with 3-foot-wide asphalt approaches in both directions. The pavement is in good condition and should be sufficient for the improvements recommended in this report. Both sets of crossing panels are concrete and in fair to poor condition with a couple of smaller outer panels slightly sunken compared to others and one in the mainline that is damaged. N. Grant Road is a main north – south route on the east side of the City and does experience heavy traffic, including semi-truck and farm machinery. There is a recently constructed sidewalk along the east side of the crossing on the south side of the tracks with pedestrian warning panels and ADA compliant grades. The crossing has several industrial and large vehicle uses adjacent to it. The northwest quadrant is industrial use with semi traffic and vehicle parking directly adjacent to the crossing and railroad right of way. The northeast quadrant is the location of the County maintenance shop. The southwest has an aggregate access point for N. Elm Street and the southeast quadrant has a semi load scale.



The improvements considered for this crossing include leaving the crossing as an open crossing and the installation of a 4-quadrant gate system. If the crossing is left open, the City would have the option of installing a non-mountable median, new signage and closure of the N. Elm Street access, as shown on Attachment C as additional safety measures. The median would be 2 feet wide and 80 feet in length on the south side of the crossing while only 30 feet in length north of the crossing. The slightly shortened median to the south will allow access to the truck scale on the east side. The N. Elm Street access would be closed to improve safety and because the area has other access locations and minimal traffic. The shortened median length north of the crossing will provide access to both the industry on the west side and the maintenance shop on the east. No improvements to the sidewalks are necessary.

These improvements would be for increased safety at the crossing but would not improve the quiet zone rating because it does not meet the requirements of an approved supplementary safety measure (SSM) and would be considered “open” for the quiet zone calculations.

The second option as mentioned is for the installation of 2 additional crossing gates making the crossing a 4-quadrant gate system. Due to the higher traffic volumes at this crossing, the installation of a 4 quad system here has an impact to the quiet zone scoring and in turn provides for more flexibility in treatments at other crossings. There is the option to include some medians with the gates for increase safety measures, but these must be at least 60 feet in length to impact the quiet zone scoring. For the existing conditions on the north side of the crossing, this is not feasible, so no medians are included in this option. The 4-quadrant gate system is an expensive option but is feasible at this crossing.

### **5.3 N. Maple Street (Attachment D)**

The railroad crossing on N. Maple Street is a 31-foot-wide concrete street on the north side and 24-foot-wide hot mix asphalt street on the south side with at-grade crossing with a 3-foot-wide asphalt approach on both sides of the crossing. This crossing mainly includes local traffic patterns and limited heavy vehicles. A semi-tractor/trailer storage yard is adjacent to the crossing in the northeast quadrant with gated driveway access to Maple Street; however, it is our understanding that this access point is not being used. There is also a private aggregate road access on the northwest side of the crossing that is utilized mainly by the business on the northeast quadrant of N. Clark Street. The southwest quadrant is seeing the construction of a new City maintenance shop with three overhead doors facing to Maple Street. The southeast quadrant is residential. The asphalt pavement south of the crossing is showing signs of its age but is in overall fair condition. The pavement north of the crossing was reconstructed shortly before the initial report and is in good condition. The north track crossing uses concrete panels that are in decent condition although there is a gap between the end west panel that could be worsening. The south track panels are timber panels that appear to be in fair condition. There is one sidewalk on the east side at this crossing. The north side was recently reconstructed and appears to meet ADA requirements, but the south side is partially asphalt and has a steep grade south from the tracks.

There are two options being considered for this crossing, complete closure and full length raised medians, as shown on Attachments D-1 and D-2. The first option is total closure of the crossing with installation of paved hammerhead style turnarounds on both sides of the crossing and removal of the pavement and sidewalk within the railroad right of way. The City would also be required to vacate the right of way across the crossing. On the north side, the aggregate road would still be accessible from the turnaround and the trailer yard driveway would remain. This option improves the overall rating of the quiet zone because closure has an effectiveness rating of 1.0 in the calculations and the UPRR is always wanting to close crossings and eliminate those hazards. The Federal Code of Regulations Part 222, Appendix F – Diagnostic Team Considerations indicates that crossing closure is a preferred alternative and should be explored for crossings within a proposed quiet zone.

For the second option, the improvement considered for this crossing include installing a non-mountable median, widening of the pavement on the south side, new signage and sidewalk improvements as shown on Attachment D-2. The median would be 2 feet wide and 100 feet in length both north and south of the crossing. The full median length will have minimal impact on traffic while providing a significant positive impact to the safety of the crossing. The pavement width will need to widen south of the crossing to allow adequate space for vehicular traffic. With the new maintenance building construction, it should be considered to widen the road to at least to the proposed driveway entrance but would not be necessary. The pavement width north of the crossing is sufficient; however, curb and gutter should be installed for a portion on either side of the road to limit access to the commercial driveway and aggregate access point near the crossing. The sidewalk in the southeast quadrant would be improved to provide ADA compliant access to pedestrians. The commercial driveway pavement would be removed, and that access closed. The aggregate access on the west side would either have to be closed or possibly realigned to north of the 100-foot median. The cost for this realignment is not included in the cost opinion provided because this is a private driveway and is not City owned. There are two existing storm sewer intakes just south of the crossing, these would need to be relocated to the proposed curb location and depending upon their current condition may need to be replaced completely.

#### **5.4 N. Clark Street (Attachment E)**

The railroad crossing on N. Clark Street is a 31-foot-wide hot mix asphalt street with an at-grade crossing with a 3-foot asphalt approach from the north and south. The pavement on both sides of this crossing appears to be in overall good condition. Both sets of crossing panels are concrete and appear to be in overall good condition. The proximity of the intersection with E. 4<sup>th</sup> Street will limit the ability to place a full-length median without impacting traffic. In addition, there is a driveway in each of the other quadrants that appear to have fairly high usage, one of which is a lumber yard to the west and the other two are parking areas for businesses. It is anticipated these businesses will produce local traffic with occasional deliveries using large vehicles. There is a sidewalk on both sides of the crossing that is in good condition with pedestrian warning panels. The approaches on the north for the sidewalk have asphalt overlays with the east one showing deterioration. The southeast one is concrete and should not need repairs while the southwest is asphalt and is in decent condition, but the sidewalk ends shortly past the approach. The improvements considered for this crossing include installing a non-mountable median; 100' medians to the north and south, 100' median south and 60' north and 60' medians north and south and then a 4-quadrant gate system.

To begin, a reduced median is only allowed when an intersection roadway falls within that length and the shortest allowed is 60' to still be considered an SSM. There is no intersection within the 100' on the south side of this crossing; therefore, the 60' median option to the north and south of the crossing is not a feasible option for this crossing and was not considered any further. To approach this option would have to be done as an ASM and would require additional engineering to determine a proposed effectiveness rate and submittal to the FRA for approval.

Installation of the 100' to the south and 60' to the north, non-mountable median with placement of full curb within the median areas, curbed medians in the parking area and new signage as shown on Attachment E is the preferred option for this crossing. The median would be 2 feet wide and 100 feet in length south of the crossing, while only 60 feet in length north of the crossing. The median length north of the crossing is shortened to the minimum to allow traffic flow on to E. 4<sup>th</sup> Street. E. 4<sup>th</sup> Street will need to be realigned to the north to allow for straight ahead and left turn traffic movements past the median. This will also include reconfiguration of the west end of the City parking lot. Full curb and gutter needs to be installed on the east side of the street, north and south of the crossing to restrict access to the business parking areas within the center median areas. On the south side a 2-foot wide and 100 foot long raised median along with curb along the outside of the street would be installed. For the lumber yard in the southwest quadrant, their access will need to be relocated to the south side of their property. This change does not involve construction on the street but would require the property owner to rearrange a portion of their yard and move trailers and storage racks. These could be moved to the current access point to the north to restrict access within the median and at the same time open an access point to the south of the median. This would need to be sized for large semi-truck turning movements while avoiding an adjacent utility pole. For the east side a curbed median would be constructed along the edge of the road for the length of the center median to restrict traffic movements from the parking area in the front of the business. This area should have sufficient width for most passenger type cars and trucks to navigate and 90-degree park in front of the building. Semi traffic should still be able to access the building dock area by backing in from the south bound Main Street traffic lane or across Main Street from the relocated lumber yard access.

The installation of 100' long medians to both the north and south sides of the crossing was also reviewed. The impacts would be the same as described above for the properties and pavement on the south side of the crossing. If the median was extended to 100 feet on the north side of the crossing, then several more impacts to the adjacent properties would be seen. E. 4<sup>th</sup> Street from the west would become a right in/right out only street connection. This means that south bound traffic on Clark St. can turn right to go west on 4<sup>th</sup> St. and West bound traffic on 4<sup>th</sup> St. can turn right to go south on Clark St. All other turning movements at that intersection would be prohibited. The municipal parking lot to the north of 4<sup>th</sup> St. would continue to allow the same movements as it currently does. This could potentially lead to the parking lot access being used by traffic as a road more than 4<sup>th</sup> St. itself. In the northeast corner, the raised parking median would have to be extended the additional length to match the center raised median. The entrance area is reduced across this property from basically full width of the lot to just the north 25' give or take. The perpendicular stalls along the front of the building being used as is would allow about a 15' wide aisle between the parking median and the back end of the stalls. This would allow vehicles to navigate to and from the entrance but there would not be room for incoming and outgoing vehicles to meet. This configuration would make it difficult for trucks with trailers or larger trucks to navigate into and out of the parking lot, especially if there were cars in parking spaces at the front of the building.

While this is a feasible option, with the additional impacts to the property in the northeast quadrant and potential changing of traffic patterns in the northwest, this is not as desirable an option as the previous.

## **5.5 N. Main Street (Attachment F)**

The railroad crossing on the south side N. Main Street is a 48-foot-wide hot mix asphalt street with the at grade crossing with a 10-foot asphalt approach. The north side is a 38-foot-wide hot mix asphalt street with a 6-foot asphalt approach. The pavement on both sides of this crossing appears to be in overall fair condition. On the north side of the crossing there are City owned parking lots/streets with access points onto Main Street. These access points are in close proximity to the crossing and would limit the ability to place a full-length median without significantly affecting traffic patterns. The south side of the crossing has a restaurant with angled parking along the front of the building and limited access and parking off street. On the southeast side is a building and parking area that has loading docks and regularly has semi deliveries/trailer storage. The existing sidewalk at on the south side is in fair condition but does not have pedestrian warning panels or meet ADA requirements. The north side was recently improved with PCC and has the truncated dome panels in place.

The improvements considered for this crossing include: leaving the crossing open, installing a non-mountable median, 100' medians to the north and south and 100' median south and 60' north; and a 4-quadrant gate system. The open and 100'/60' median option is as shown on Attachments F-1 and F-2.

If the crossing is left open, the City would have the option of installing a non-mountable median, as shown on Attachment F-1 as additional safety measures. For the first option, the improvements considered for this crossing include installing a non-mountable median, new signage and sidewalk improvements. The median would be 2 feet wide and 40 feet in length on both sides of the crossing. The shortened median to the south will allow access to the parking along the front of the restaurant on the west side and complete access to vehicles entering and exiting the building on the east side. Full height curb would be installed on both sides of the street to restrict access within the median areas. The shortened median on the north side will allow the access points from the City parking lots on both sides to continue to operate as they currently are. The south side approaches of the sidewalks to the railroad crossing will need to be improved for ADA compliance. These improvements would be for increased safety at the crossing but would not improve the quiet zone rating because it does not meet the requirements of an approved supplementary safety measure (SSM) and would be considered "open" for the quiet zone calculations.

As was the case with the Clark St. crossing and the 60'/60' option, a reduced median is only allowed when an intersection roadway falls within that length, minimum of 60' to still be considered an SSM. There is no intersection within the 100' on the south side of this crossing; therefore, the 60' median option to the north and south of the crossing is not a feasible option for this crossing and was not considered any further. To approach this option would have to be done as an ASM and would require additional engineering to determine a proposed effectiveness rate and submittal to the FRA for approval.

The second of the median options includes installing a non-mountable median, placement of curb within the median area, realignment of the parking lot accesses, new signage and sidewalk improvements as shown on Attachment F-2. The median would be 2 feet wide and 100 feet in length on the south side of the crossing. In conjunction with the full median length, there will be full curb installed along the edges of the road to eliminate access points within the median area. This will have a significant impact on parking in front of the restaurant by eliminating at least five of the angled stalls. The 100-foot median will also severely impact the business on the east side of the street by installing a curbed median along the edge of the road to the end of the center median and eliminating access points within the median area. This curbed median will drastically reduce the width of the opening into the building loading dock area, restrict the size of vehicle that could do a right turn out of the driveway and eliminate three angled parking stalls along the front of the building. On the north side of the crossing, the median would be 2 feet wide and 60 feet in length. This length of median would require the realignment to the north of the parking access road and street on both sides of Main Street, which would include additional curb and gutter installation to channel traffic past the end of the center median, relocation of an intake and additional pedestrian ramp work. The sidewalk on the south side of the crossing would need to be improved to provide ADA compliant access for pedestrians. This is a feasible option but does have some significant impacts to the adjacent property owners on the south side and traffic movements on the north.

The third option as mentioned is for the installation of 2 additional crossing gates making the crossing a 4-quadrant gate system. Due to the higher traffic volumes at this crossing, the installation of a 4 quad system here has an impact to the quiet zone scoring and in turn provides for more flexibility in treatments at other crossings. There is the option to include some medians with the gates for increase safety measures, but these must be at least 60 feet in length to impact the quiet zone scoring. For the existing conditions on both sides of the crossing, this is not feasible, so no medians are included in this option. The 4-quadrant gate system is an expensive option but is feasible at this crossing.

## **5.6 N. Carroll Street (Attachment G)**

The railroad crossing on N. Carroll Street is a 31-foot-wide concrete street to the north and 36-foot-wide concrete street to the south with an at-grade crossing with a 3-foot asphalt approach from the north and south. The pavement on both sides of this crossing appears to be in overall good condition. The proximity of the intersection with 4<sup>th</sup> Street on the north will limit the ability to place a full-length median without impacting traffic. Both sets of crossing panels are concrete, there are a couple within the crossing that are loose and rocking when vehicles pass over them and showing signs of deterioration. In addition, on the south side there are access locations to Union Pacific property on both sides. There is a sidewalk on the east side of the crossing that was previously improved but may need to be verified for ADA compliance. Since the original report, the City has constructed a new 10' wide trail from within the Depot Park, across the UPRR and south down Carroll St. on the west side of the road. This is in good condition and appears to be ADA compliant.



The improvement considered for this crossing includes installing a non-mountable median, placement of full curb within the median areas, curbed medians and new signage as shown on Attachment G. The median would be 2 feet wide and 100 feet in length south of the crossing, while only 60 feet in length north of the crossing. The median length north of the crossing is shortened to the minimum to allow traffic flow on to 4<sup>th</sup> Street. However, the size of vehicle able to make a left hand turn off of west bound 4<sup>th</sup> Street to southbound Carroll St. will be limited due to the proximity of the median to the intersection and would be signed as such. On the south side a 2-foot wide and 100-foot-long raised median would be constructed. Full height curb would be installed on both sides of the street for the length of the center median. This curb will restrict access to the railroad property on both sides of the crossing. A commercial driveway on the west side of the street appears to be for the Union Pacific access to their rail yard property. This may have to be closed due to the median, but this along with other UPRR access issues would be discussed at the diagnostic meeting. Also, the sidewalk crosses from the west side to the east side within the raised median, this will require a drop within the raised median and pedestrian warning panels to allow pedestrian traffic to cross the road.

### **5.7 Burgess Ave (Attachment H)**

The railroad crossing on Burgess Ave is a 24-foot-wide concrete street with aggregate shoulders and an at-grade crossing with a 3-foot asphalt approach from the north and south. The pavement on both sides of this crossing appears to be in overall good condition. The proximity of the intersections with W. 6<sup>th</sup> Street on the north and Railroad Street on the south will limit the ability to place a full-length median without impacting traffic. This area sees some use by agricultural equipment during planting and harvest and to a repair business in the northeast quadrant. There are businesses in the northeast and southeast quadrants as well as access to the industrial park to the west that have a large percentage of truck traffic utilizing the crossing. There are three tracks at this crossing, two mainline tracks and one siding track. The mainline tracks are concrete panels and generally in good condition while the siding track is a timber panel in fair condition. The existing gate arms are about 8.5' off the edge of the roadway.

The improvements considered for this crossing include four options: leaving the crossing as an open crossing; installation of 60' medians on each side of the crossing; the installation of a 4-quadrant gate system; and the installation of a wayside horn system.

If the crossing is left open, the City would have the option of installing a non-mountable median, as shown on Attachment H-1 as additional safety measures. The improvements considered for this crossing include installing a non-mountable median, pavement widening and new signage. The median would be 2 feet wide and 40 feet in length on both sides of the crossing. These improvements would be for increased safety at the crossing and are considered an optional item but would not improve the quiet zone rating because it does not meet the requirements of an approved supplementary safety measure (SSM) and would be considered "open" for the quiet zone calculations. The shortened median to the south will allow the unrestricted access to Railroad Street of the large truck traffic in the area. Full height curb would be installed on both sides of the street to maximize the widening of the traffic lanes within the median areas. The short median on the north side will allow access to and from W. 6<sup>th</sup> Street. A left-hand turn from W. 6<sup>th</sup> Street may be restrictive for the largest semi/trailer combinations, in which they may need to use Highway 30 and access the industrial park and businesses on the south side of the tracks from the west. The widening of the road to maintain wider lanes through the median areas would require the relocation of both of the crossing gate arms, which is an additional expense for an optional safety measure.

The second option includes installing the minimum length non-mountable median, placement of curb within the median area, realignment of W. 6<sup>th</sup> Street and Railroad Street and new signage as shown on Attachment H-2. The median would be 2 feet wide and 60 feet in length on the south and north sides of the crossing. In conjunction with the median, there will be full curb installed along the edges of the road to maximize the pavement traffic lanes within the median area. However, this length of median would require the realignment of both W. 6<sup>th</sup> Street and Railroad Street. This realignment would require the purchase of additional right of way area from the adjacent property owners, construction of the new road base and obliteration of the existing roadbed. On the northwest side, an additional 12-foot-wide lane would have to be constructed on Burgess Avenue to allow for west bound traffic off of W. 6<sup>th</sup> Street to turn onto Burgess Ave. The widening of the road to maintain wider lanes through the median areas would require the relocation of both of the crossing gate arms, which is an additional expense along with the expense for the right of way and grading. This option has a significant impact to the adjacent properties on the east side of Burgess for the road relocations. In the northeast quadrant, this widening appears to encroach on an existing driveway within the property.

The third option as mentioned is for the installation of 2 additional crossing gates making the crossing a 4-quadrant gate system. There is the option to include some medians with the gates for increase safety measures, but these must be at least 60 feet in length to impact the quiet zone scoring. For the existing conditions on both sides of the crossing, the additional median is not feasible, so no medians are included in this option. The 4-quadrant gate system is an expensive option but is feasible at this crossing and reduces the impacts to the adjacent properties. The fourth option is the installation of the Wayside Horn System. As described in section 4.0, this system acts the same as a train horn, except that the horns are directed up and down the roadway, rather than along the tracks. This system does not require the installation of any medians or pavement widening and therefore has little impact on the adjacent properties. There would be no changes to the location of the existing gate as well. This option would include regular inspections completed by the City staff or hired by the City and the City would be responsible for all equipment costs for replacement, damage, malfunction, etc. This area is generally an industrial/commercial area with large spread-out properties towards the western edge of the community, this lends wayside horns to be a very feasible option for this crossing.

## **6.0 Summary**

The goal of the first quiet zone study was to provide the most cost-effective options for the creation of a quiet zone through the seven crossings within the City of Carroll. We did not consider other high costs options like 4 quadrant gates because overall costs were being kept to a minimum and based on our previous experience, medians were the best option for doing that.

For this report that goal has been modified. The goal for this report is to provide the City of Carroll with more potential treatments and more possible scenarios so that the City can determine what combination of treatments will best serve the community and the adjacent properties. While budget and costs are still an important factor, it is taken into account along with the other factors rather than being the primary factor.

Utilizing the Federal Railroad Administrations Quiet Zone Calculator, a comparison was completed between the existing crossing conditions and the same crossings with various scenarios of the proposed improvements listed above. A matrix of the various scenarios are included in Attachment I and includes an estimate of the anticipated construction costs and if an annual maintenance agreement with the UPRR is required. There are some scenarios shown that do not meet the requirements to establish a quiet zone, some scenarios automatically qualify for a quiet zone because there is an SSM at every crossing, some qualify but can be subject to review and others qualify without potential review by FRA.

The estimated Preliminary Opinion of Project Construction Costs for each of the recommended improvements at each crossing is shown in Attachment J. Improvement costs vary from minor costs for pedestrian crossing improvements on an open crossing, to approximately \$72,000 for minimal safety improvements at Grant Road, leaving the crossing “open,” to approximately \$242,00 for the land acquisition, road realignment and improvements at Burgess Avenue, to over \$1,000,000 for installation of a 4-quadrant gate at any of the proposed crossings. Engineering fees for the crossing treatments are not included in the estimated construction costs, neither are any fees to the UPRR for the quiet zone process agreement or for the agreement for railroad equipment design. The impacts of the pandemic and the material cost increases along with supply chain issues have yet to be fully understood. Steel for instance, has seen significant rises in material costs and electronics have had severe supply chain issues. These factors may have significant impacts to overall costs for any of the proposed improvements and since they are still very fluid we cannot quantify what those impacts may be.

We have not provided for recommended improvements at any of the seven crossings. The City will have to determine the most appropriate option for these crossings based on the information provided, cost estimates and input from adjacent property owners, the public, law enforcement and other stakeholders.

## **7.0 FRA Quiet Zone**

Completion of the improvements detailed in this report will allow the City of Carroll to qualify for designation of this corridor through the city as a quiet zone. The limits of the quiet zone would encompass the entire city. All treatments proposed are approved SSM's and this removes the requirement for annual review of the quiet zone for any ASM's. Qualified scenarios that have the Quiet Zone Risk Index (QZRI) below the Risk Index with Horns (RIWH) but above the Nationwide Significant Risk Threshold (NSRT) can be subject to review. If at a future time, changes in the elements of a crossing or crossings causes the RIWH fall below the QZRI, then additional measures would have to be implemented to bring the QZRI back below the RIWH. When qualified scenarios have the QZRI below the RIWH and the NSRT it is a more conservative method and therefore less likely to require additional treatments in the future if elements at crossing change. Both scenarios discussed above require affirmation and inventory form every 2.5 – 3 years.

Several notifications are required as outlined in the rules upon completion of the improvements to notify the Union Pacific, Highway authority (DOT) and the public of the intended action. These requirements may commence while the improvements are being constructed but cannot be completed until the improvements are in place.

Name: UPRR Quiet Zone Update

Date: August 9, 2021

Page: 17

As part of the process, the traffic counts for each crossing will need to be within 6 months of the estimated start date of the proposed quiet zone. This means that it is likely the City may have to complete a traffic count study for the seven crossings. Also, the quiet zone calculator evaluation will need to be updated for the scenario that is chosen to verify that it still meets the establishment requirements.

We appreciate the opportunity to assist the City with your engineering needs regarding the quiet zone establishment process. As the City progresses through the process of reviewing scenarios and determining the best fit, please do not hesitate to contact me with any questions. We would be happy to provide quiet zone calculations and overall costs if a scenario is desired other than the ones presented. Once a scenario is determined that the City wishes to pursue for a quiet zone, please contact us and we can prepare an agreement and scope of work to progress that scenario through construction and a quiet zone.

Sincerely,

**Bolton & Menk, Inc.**

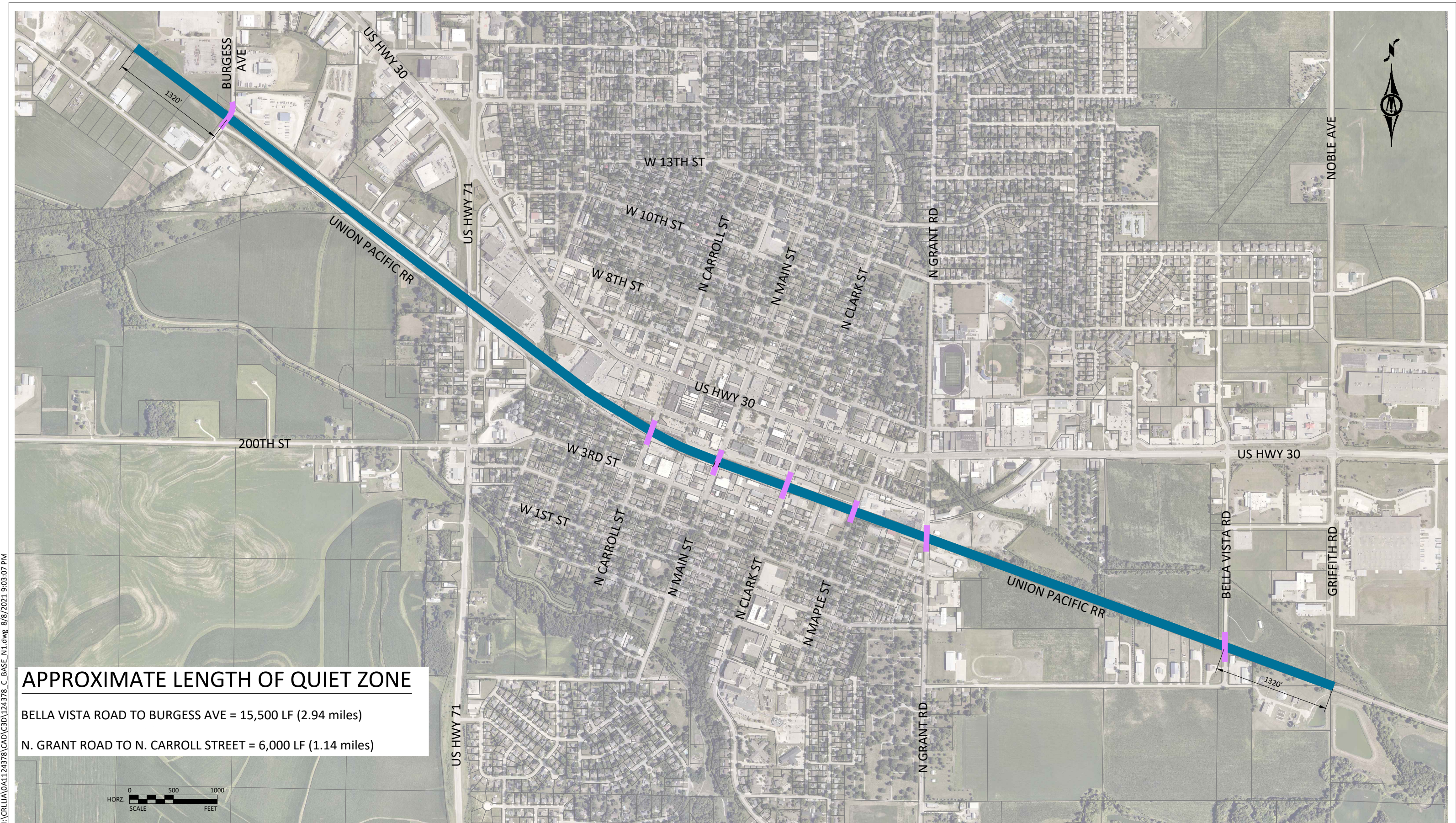


**James D. Leiding**  
Project Manager

Attachments

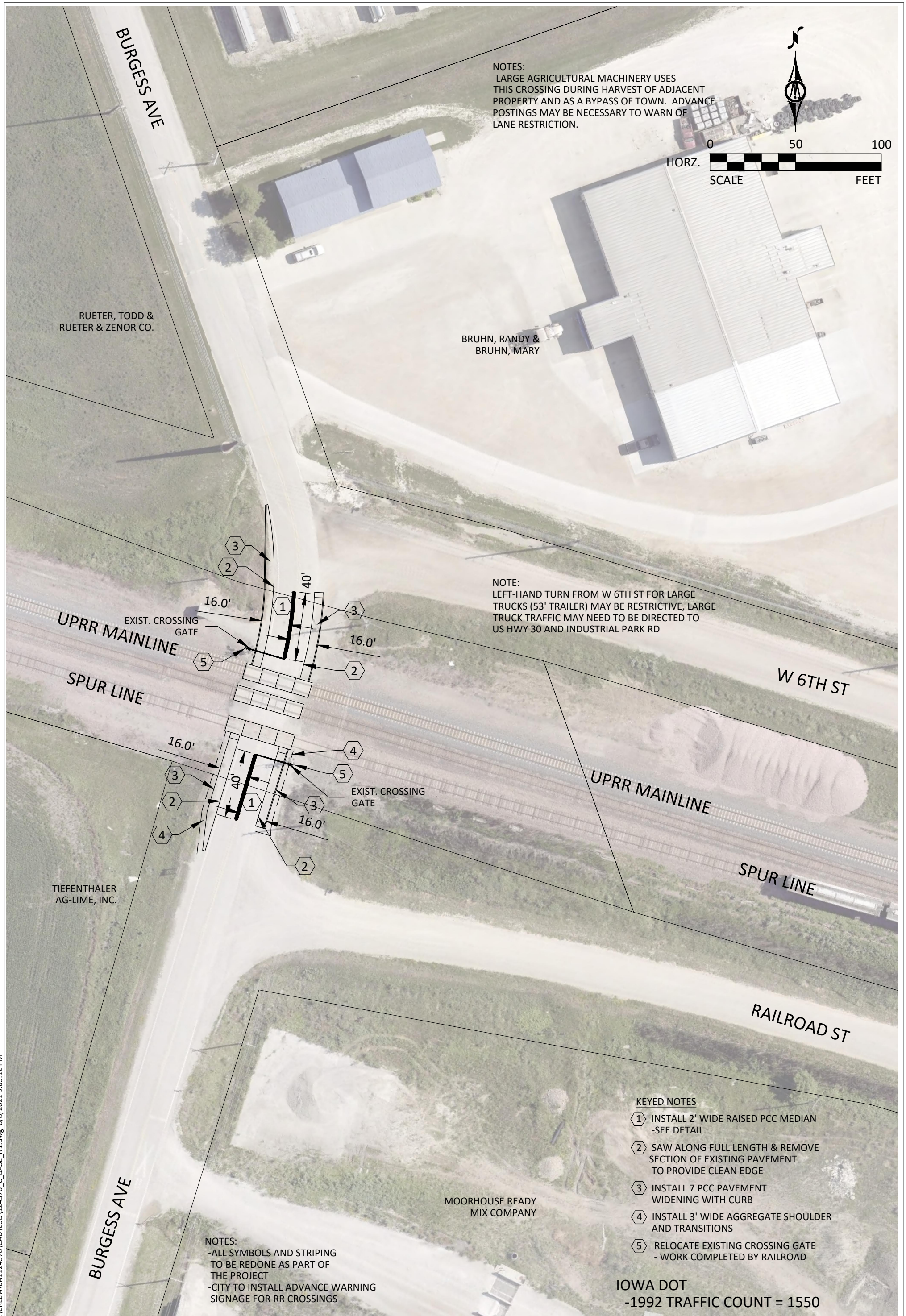
# **EXHIBITS**



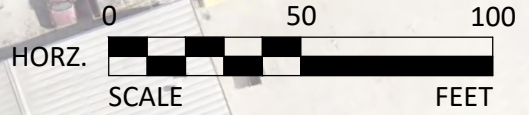


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NOTES:  
 LARGE AGRICULTURAL MACHINERY USES THIS CROSSING DURING HARVEST OF ADJACENT PROPERTY AND AS A BYPASS OF TOWN. ADVANCE POSTINGS MAY BE NECESSARY TO WARN OF LANE RESTRICTION.



RUETER, TODD & RUETER & ZENOR CO.

BRUHN, RANDY & BRUHN, MARY

NOTE:  
 LEFT-HAND TURN FROM W 6TH ST FOR LARGE TRUCKS (53' TRAILER) MAY BE RESTRICTIVE, LARGE TRUCK TRAFFIC MAY NEED TO BE DIRECTED TO US HWY 30 AND INDUSTRIAL PARK RD

UPRR MAINLINE

SPUR LINE

W 6TH ST

UPRR MAINLINE

SPUR LINE

TIEFENTHALER AG-LIME, INC.

RAILROAD ST

MOORHOUSE READY MIX COMPANY

NOTES:  
 -ALL SYMBOLS AND STRIPING TO BE REDONE AS PART OF THE PROJECT  
 -CITY TO INSTALL ADVANCE WARNING SIGNAGE FOR RR CROSSINGS

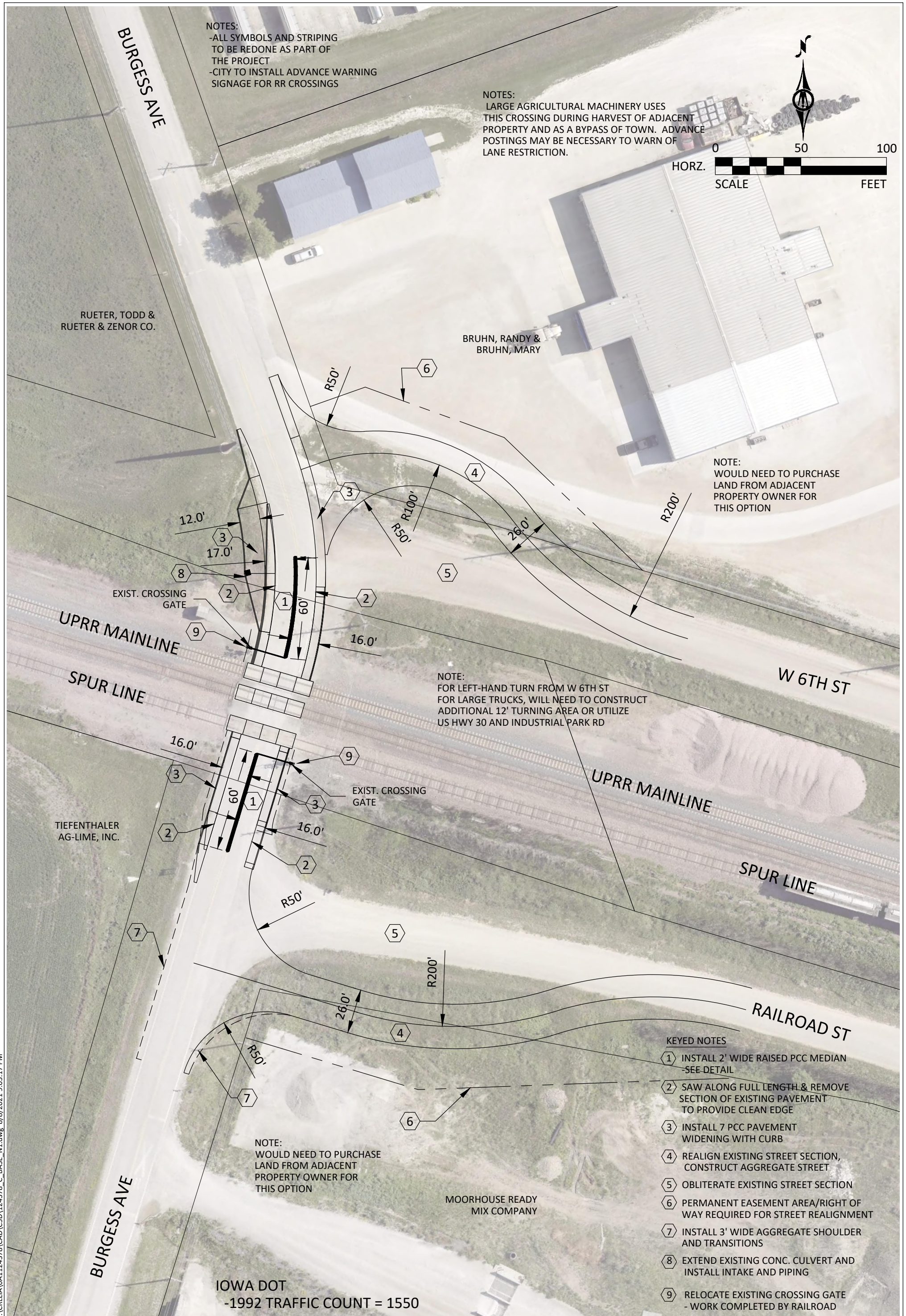
KEYED NOTES

- ① INSTALL 2' WIDE RAISED PCC MEDIAN -SEE DETAIL
- ② SAW ALONG FULL LENGTH & REMOVE SECTION OF EXISTING PAVEMENT TO PROVIDE CLEAN EDGE
- ③ INSTALL 7 PCC PAVEMENT WIDENING WITH CURB
- ④ INSTALL 3' WIDE AGGREGATE SHOULDER AND TRANSITIONS
- ⑤ RELOCATE EXISTING CROSSING GATE - WORK COMPLETED BY RAILROAD

IOWA DOT  
 -1992 TRAFFIC COUNT = 1550

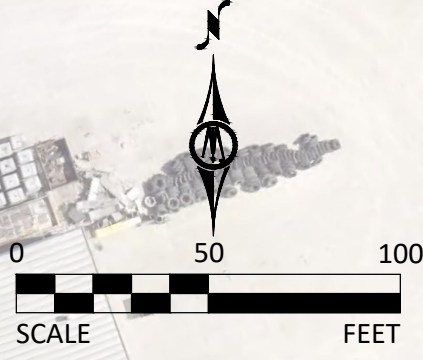
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NOTES:  
 -ALL SYMBOLS AND STRIPING TO BE REDONE AS PART OF THE PROJECT  
 -CITY TO INSTALL ADVANCE WARNING SIGNAGE FOR RR CROSSINGS

NOTES:  
 LARGE AGRICULTURAL MACHINERY USES THIS CROSSING DURING HARVEST OF ADJACENT PROPERTY AND AS A BYPASS OF TOWN. ADVANCE POSTINGS MAY BE NECESSARY TO WARN OF LANE RESTRICTION.



NOTE:  
 WOULD NEED TO PURCHASE LAND FROM ADJACENT PROPERTY OWNER FOR THIS OPTION

NOTE:  
 FOR LEFT-HAND TURN FROM W 6TH ST FOR LARGE TRUCKS, WILL NEED TO CONSTRUCT ADDITIONAL 12' TURNING AREA OR UTILIZE US HWY 30 AND INDUSTRIAL PARK RD

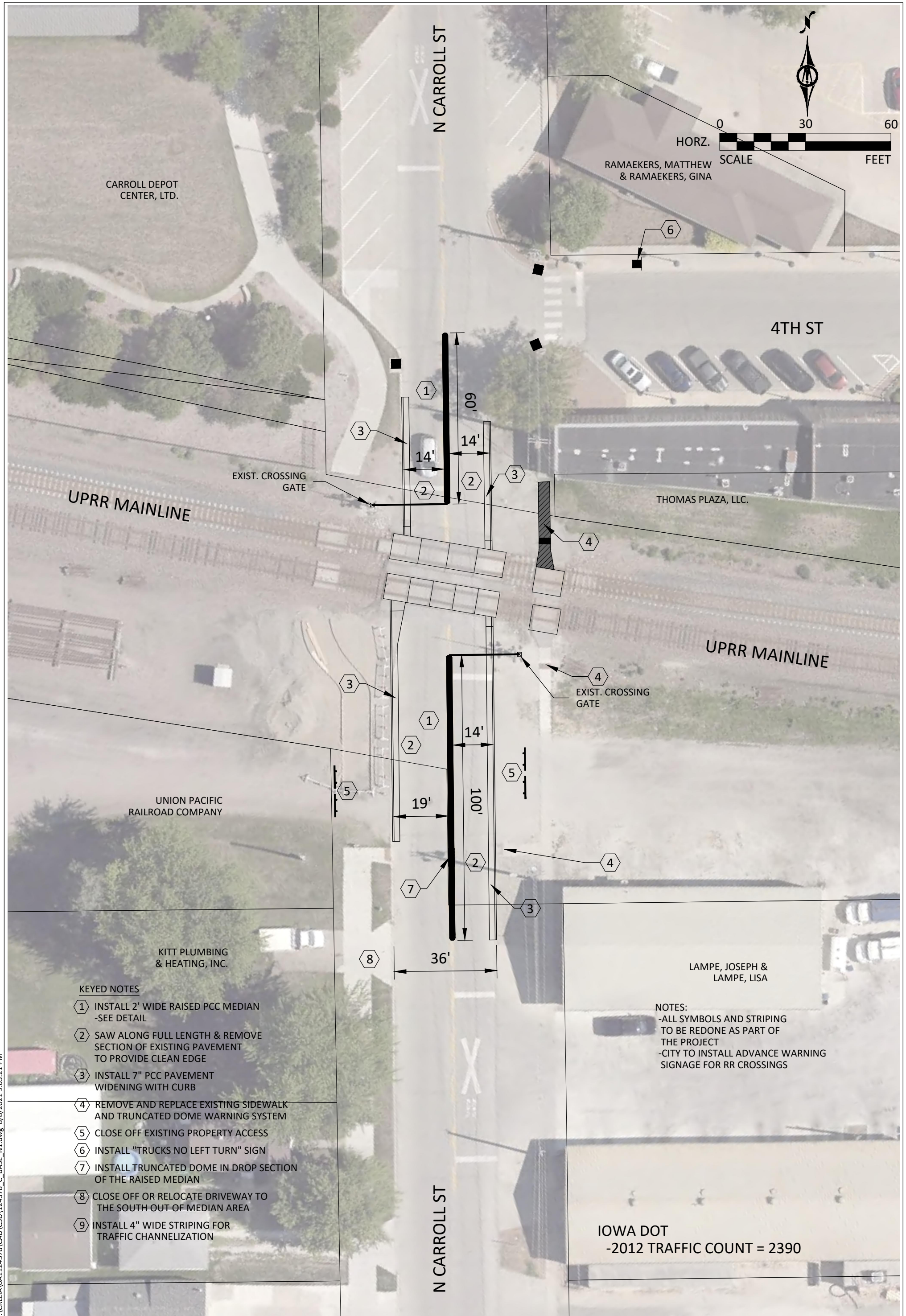
NOTE:  
 WOULD NEED TO PURCHASE LAND FROM ADJACENT PROPERTY OWNER FOR THIS OPTION

IOWA DOT  
 -1992 TRAFFIC COUNT = 1550

- KEYED NOTES
- 1 INSTALL 2' WIDE RAISED PCC MEDIAN -SEE DETAIL
  - 2 SAW ALONG FULL LENGTH & REMOVE SECTION OF EXISTING PAVEMENT TO PROVIDE CLEAN EDGE
  - 3 INSTALL 7' PCC PAVEMENT WIDENING WITH CURB
  - 4 REALIGN EXISTING STREET SECTION, CONSTRUCT AGGREGATE STREET
  - 5 OBLITERATE EXISTING STREET SECTION
  - 6 PERMANENT EASEMENT AREA/RIGHT OF WAY REQUIRED FOR STREET REALIGNMENT
  - 7 INSTALL 3' WIDE AGGREGATE SHOULDER AND TRANSITIONS
  - 8 EXTEND EXISTING CONC. CULVERT AND INSTALL INTAKE AND PIPING
  - 9 RELOCATE EXISTING CROSSING GATE - WORK COMPLETED BY RAILROAD

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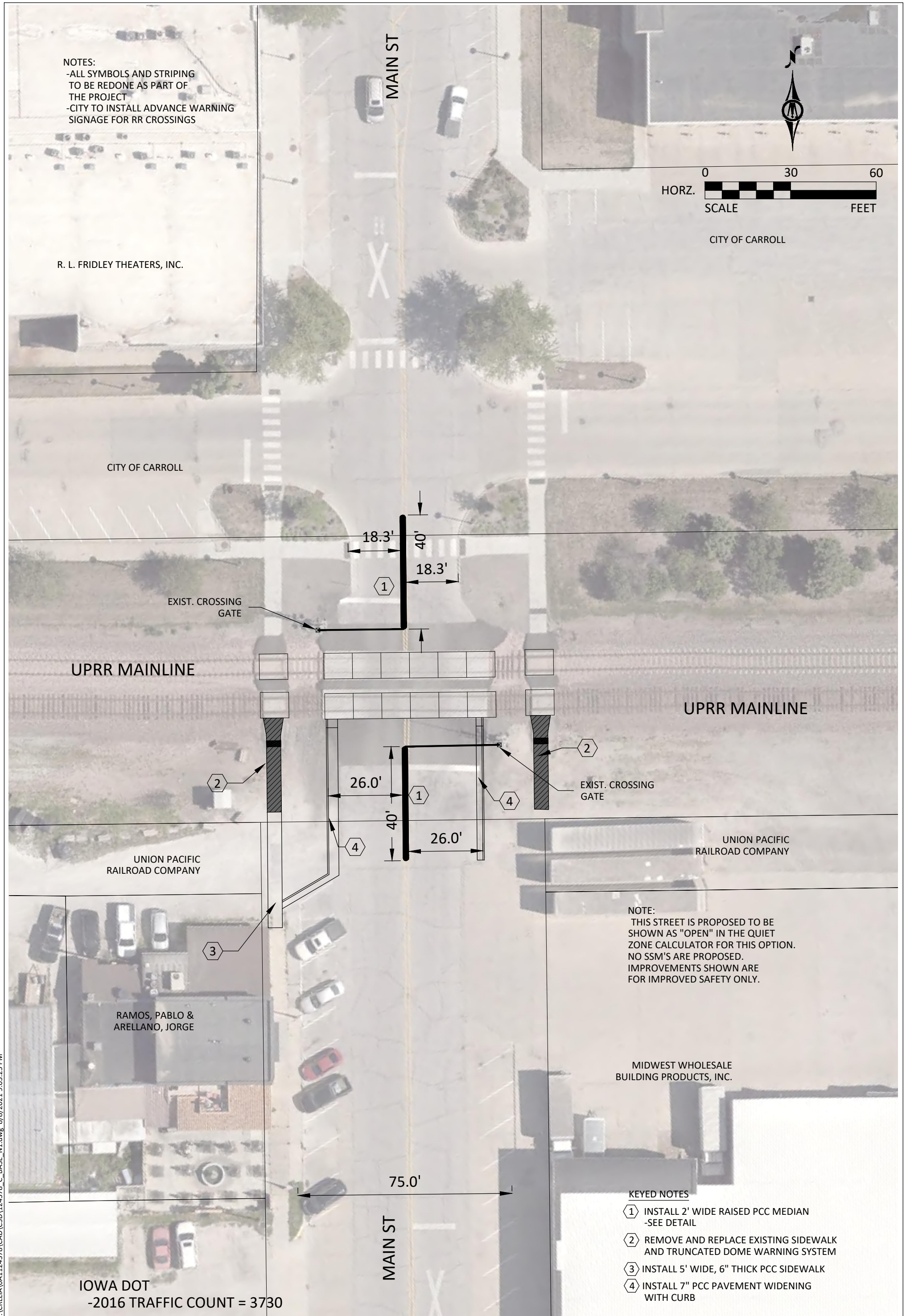
KEYED NOTES

- ① INSTALL 2' WIDE RAISED PCC MEDIAN -SEE DETAIL
- ② SAW ALONG FULL LENGTH & REMOVE SECTION OF EXISTING PAVEMENT TO PROVIDE CLEAN EDGE
- ③ INSTALL 7" PCC PAVEMENT WIDENING WITH CURB
- ④ REMOVE AND REPLACE EXISTING SIDEWALK AND TRUNCATED DOME WARNING SYSTEM
- ⑤ CLOSE OFF EXISTING PROPERTY ACCESS
- ⑥ INSTALL "TRUCKS NO LEFT TURN" SIGN
- ⑦ INSTALL TRUNCATED DOME IN DROP SECTION OF THE RAISED MEDIAN
- ⑧ CLOSE OFF OR RELOCATE DRIVEWAY TO THE SOUTH OUT OF MEDIAN AREA
- ⑨ INSTALL 4" WIDE STRIPING FOR TRAFFIC CHANNELIZATION

- NOTES:
- ALL SYMBOLS AND STRIPING TO BE REDONE AS PART OF THE PROJECT
  - CITY TO INSTALL ADVANCE WARNING SIGNAGE FOR RR CROSSINGS

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NOTES:  
 -ALL SYMBOLS AND STRIPING TO BE REDONE AS PART OF THE PROJECT  
 -CITY TO INSTALL ADVANCE WARNING SIGNAGE FOR RR CROSSINGS

R. L. FRIDLEY THEATERS, INC.

CITY OF CARROLL

EXIST. CROSSING GATE

UPRR MAINLINE

UPRR MAINLINE

UNION PACIFIC RAILROAD COMPANY

UNION PACIFIC RAILROAD COMPANY

RAMOS, PABLO & ARELLANO, JORGE

NOTE:  
 THIS STREET IS PROPOSED TO BE SHOWN AS "OPEN" IN THE QUIET ZONE CALCULATOR FOR THIS OPTION. NO SSM'S ARE PROPOSED. IMPROVEMENTS SHOWN ARE FOR IMPROVED SAFETY ONLY.

MIDWEST WHOLESALE BUILDING PRODUCTS, INC.

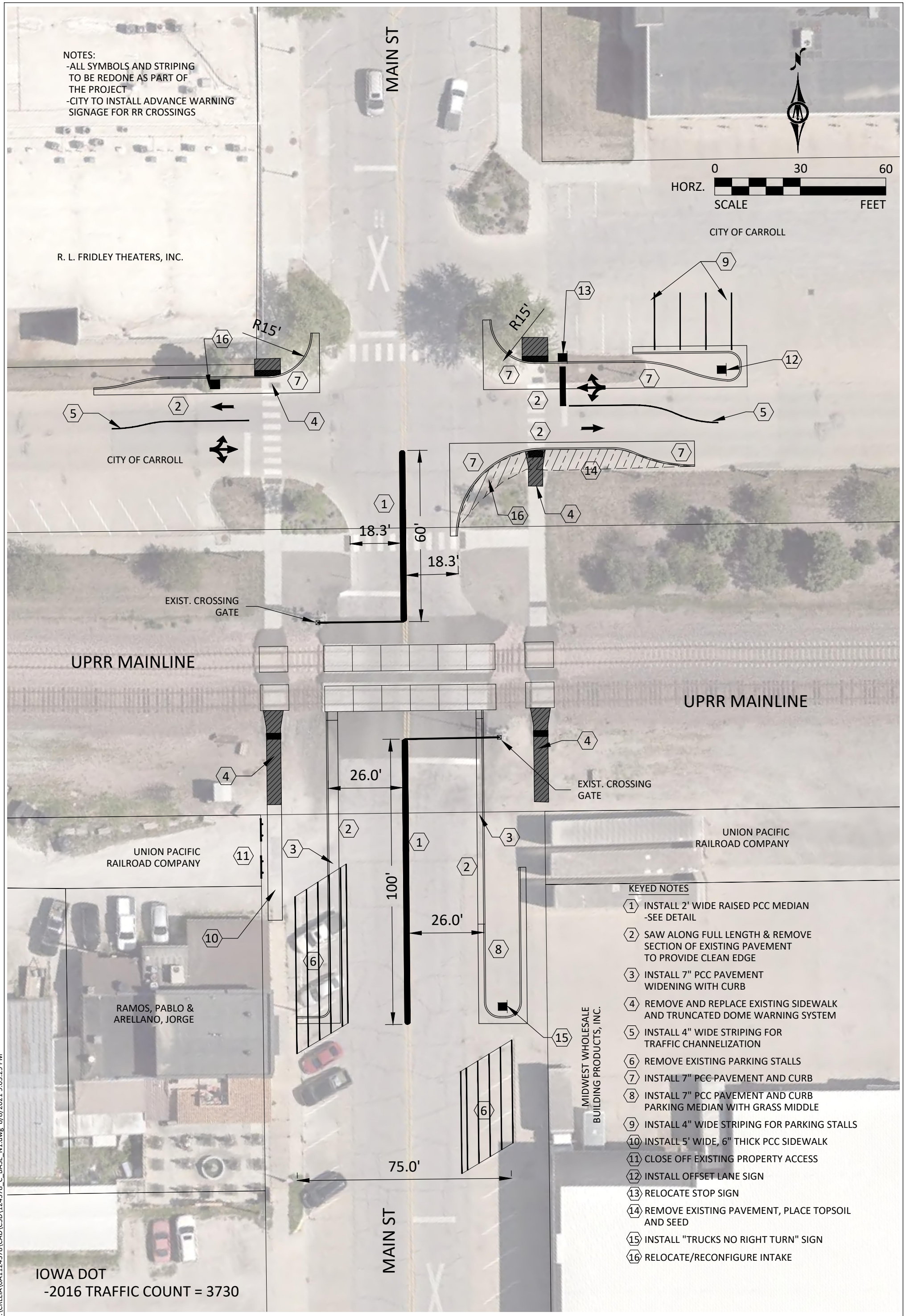
IOWA DOT  
 -2016 TRAFFIC COUNT = 3730

KEYED NOTES

- ① INSTALL 2' WIDE RAISED PCC MEDIAN -SEE DETAIL
- ② REMOVE AND REPLACE EXISTING SIDEWALK AND TRUNCATED DOME WARNING SYSTEM
- ③ INSTALL 5' WIDE, 6" THICK PCC SIDEWALK
- ④ INSTALL 7" PCC PAVEMENT WIDENING WITH CURB

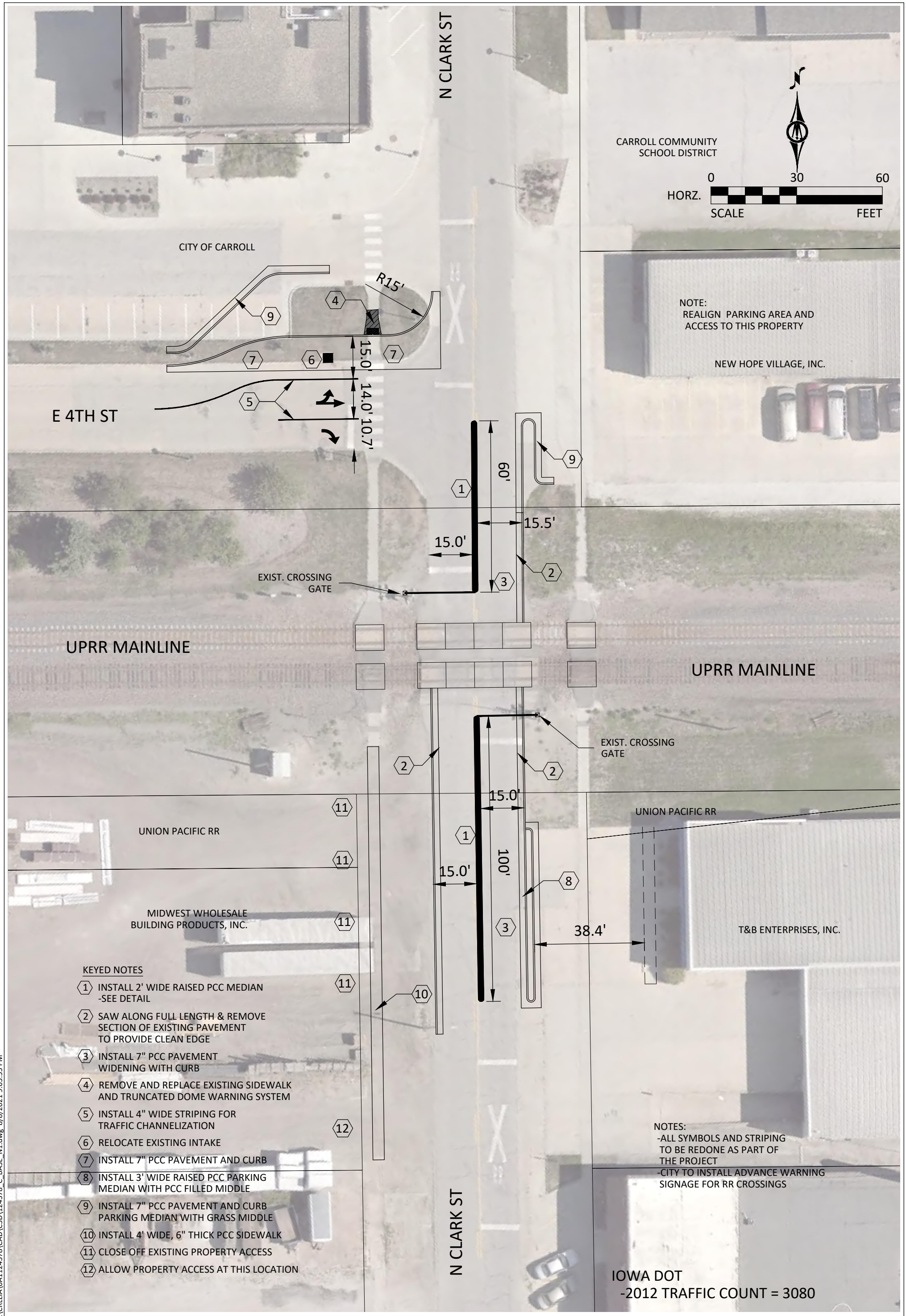
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NOTE:  
REALIGN PARKING AREA AND  
ACCESS TO THIS PROPERTY

NEW HOPE VILLAGE, INC.

UPRR MAINLINE

EXIST. CROSSING GATE

UNION PACIFIC RR

MIDWEST WHOLESALE  
BUILDING PRODUCTS, INC.

T&B ENTERPRISES, INC.

KEYED NOTES

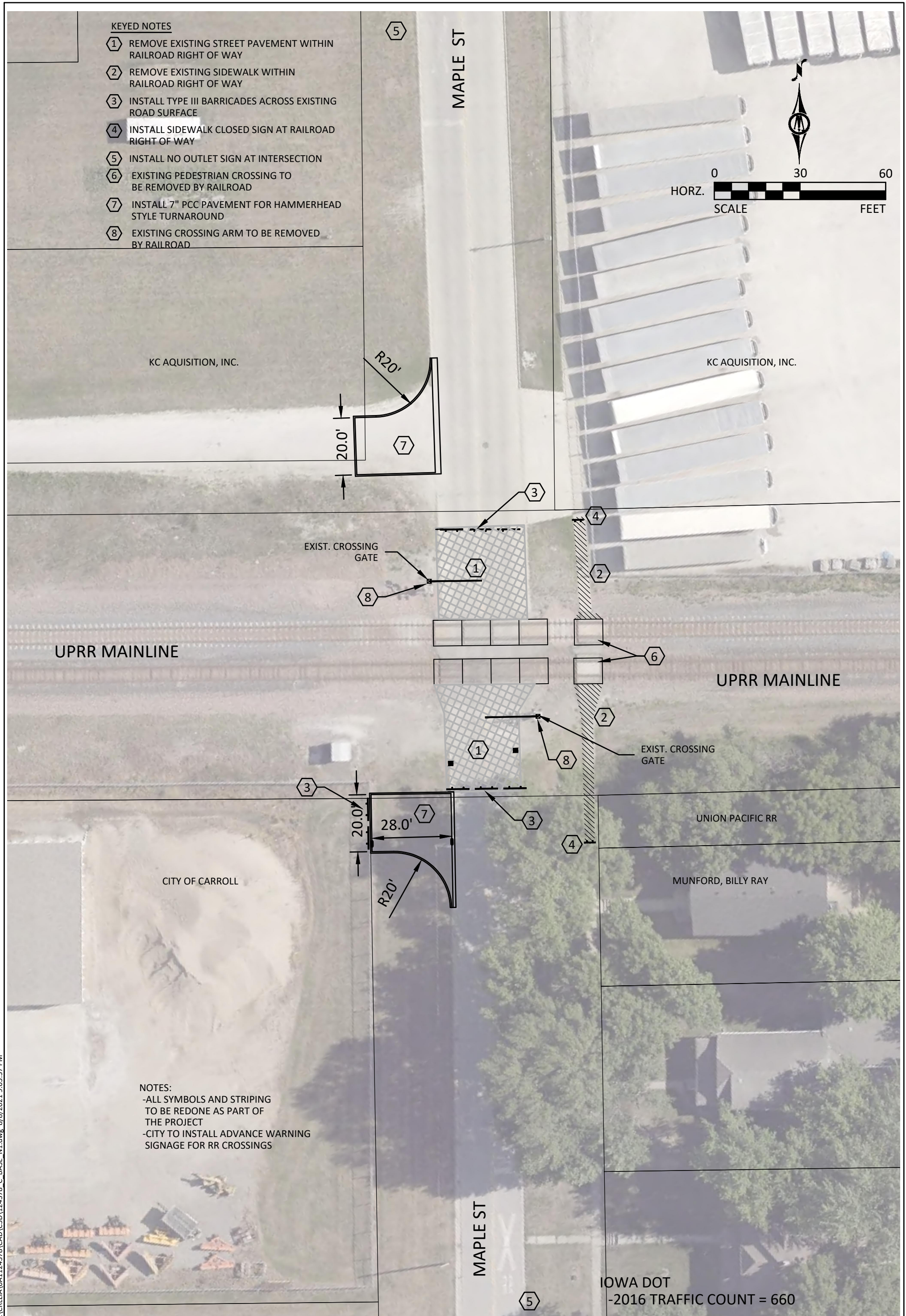
- ① INSTALL 2' WIDE RAISED PCC MEDIAN  
-SEE DETAIL
- ② SAW ALONG FULL LENGTH & REMOVE  
SECTION OF EXISTING PAVEMENT  
TO PROVIDE CLEAN EDGE
- ③ INSTALL 7" PCC PAVEMENT  
WIDENING WITH CURB
- ④ REMOVE AND REPLACE EXISTING SIDEWALK  
AND TRUNCATED DOME WARNING SYSTEM
- ⑤ INSTALL 4" WIDE STRIPING FOR  
TRAFFIC CHANNELIZATION
- ⑥ RELOCATE EXISTING INTAKE
- ⑦ INSTALL 7" PCC PAVEMENT AND CURB
- ⑧ INSTALL 3' WIDE RAISED PCC PARKING  
MEDIAN WITH PCC FILLED MIDDLE
- ⑨ INSTALL 7" PCC PAVEMENT AND CURB  
PARKING MEDIAN WITH GRASS MIDDLE
- ⑩ INSTALL 4' WIDE, 6" THICK PCC SIDEWALK
- ⑪ CLOSE OFF EXISTING PROPERTY ACCESS
- ⑫ ALLOW PROPERTY ACCESS AT THIS LOCATION

NOTES:  
-ALL SYMBOLS AND STRIPING  
TO BE REDONE AS PART OF  
THE PROJECT  
-CITY TO INSTALL ADVANCE WARNING  
SIGNAGE FOR RR CROSSINGS

IOWA DOT  
-2012 TRAFFIC COUNT = 3080

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**KEYED NOTES**

- ① REMOVE EXISTING STREET PAVEMENT WITHIN RAILROAD RIGHT OF WAY
- ② REMOVE EXISTING SIDEWALK WITHIN RAILROAD RIGHT OF WAY
- ③ INSTALL TYPE III BARRICADES ACROSS EXISTING ROAD SURFACE
- ④ INSTALL SIDEWALK CLOSED SIGN AT RAILROAD RIGHT OF WAY
- ⑤ INSTALL NO OUTLET SIGN AT INTERSECTION
- ⑥ EXISTING PEDESTRIAN CROSSING TO BE REMOVED BY RAILROAD
- ⑦ INSTALL 7" PCC PAVEMENT FOR HAMMERHEAD STYLE TURNAROUND
- ⑧ EXISTING CROSSING ARM TO BE REMOVED BY RAILROAD

KC AQUISION, INC.

KC AQUISION, INC.

UPRR MAINLINE

UPRR MAINLINE

CITY OF CARROLL

UNION PACIFIC RR

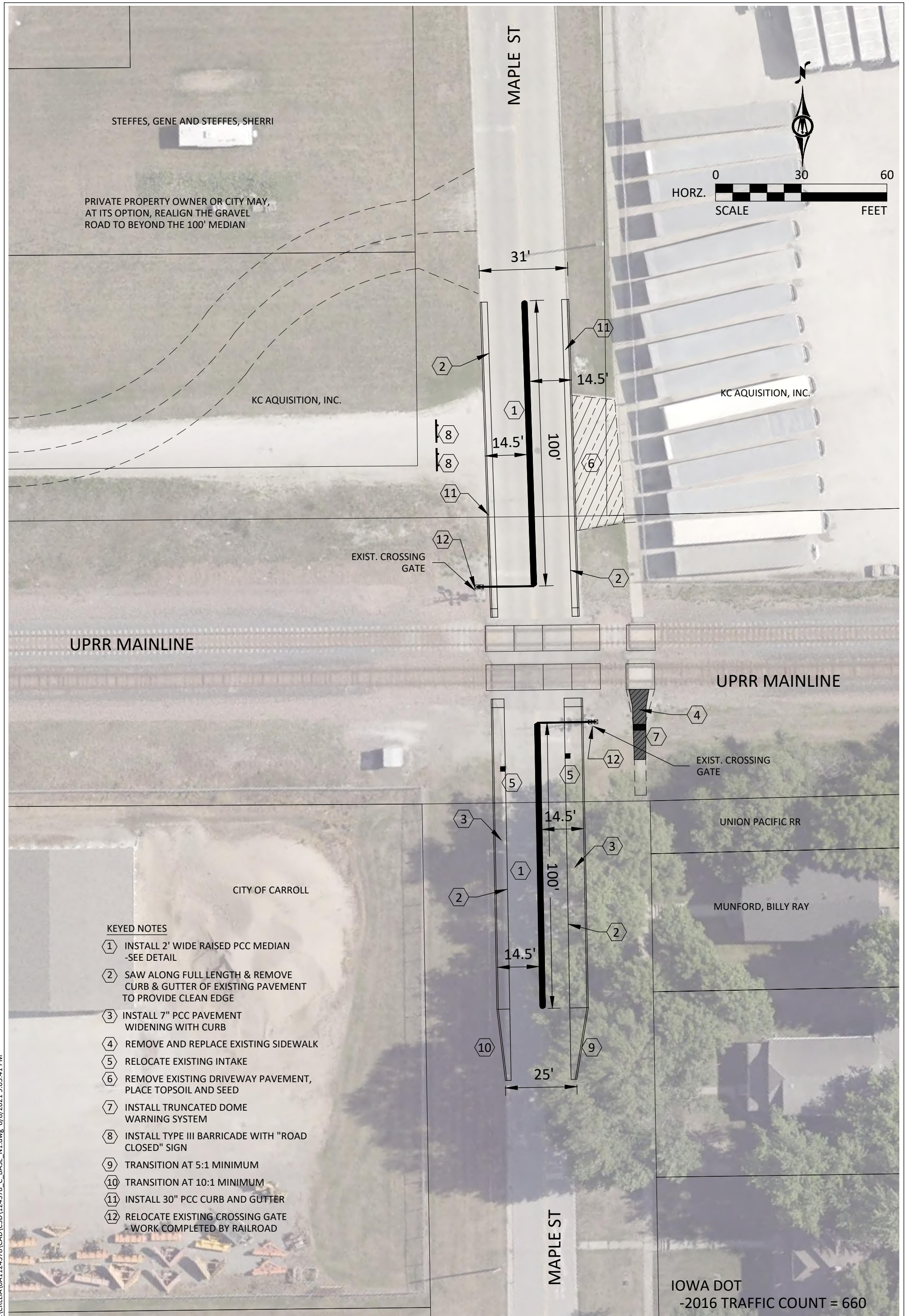
MUNFORD, BILLY RAY

**NOTES:**  
 -ALL SYMBOLS AND STRIPING TO BE REDONE AS PART OF THE PROJECT  
 -CITY TO INSTALL ADVANCE WARNING SIGNAGE FOR RR CROSSINGS

IOWA DOT  
 -2016 TRAFFIC COUNT = 660

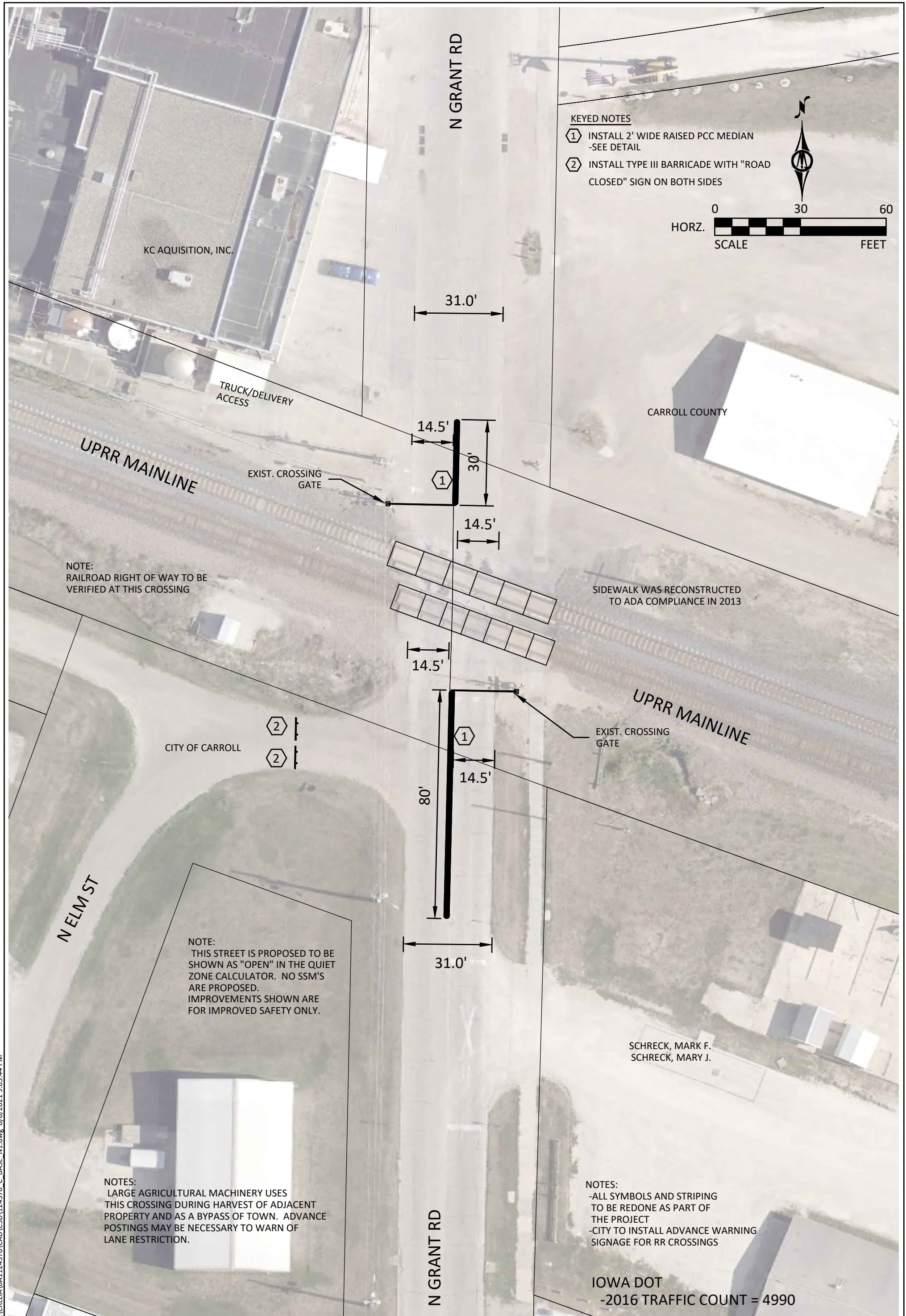
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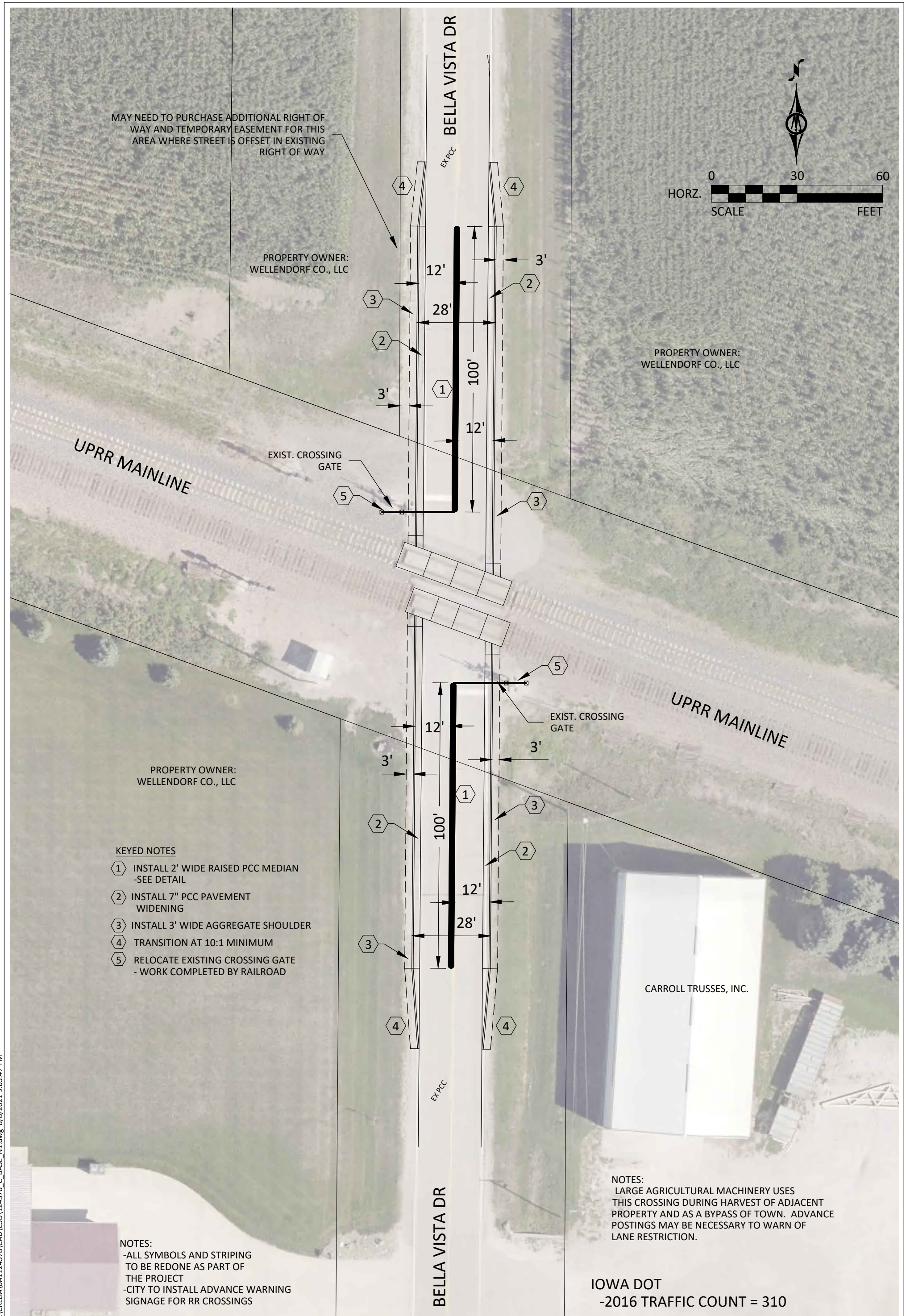
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MAY NEED TO PURCHASE ADDITIONAL RIGHT OF WAY AND TEMPORARY EASEMENT FOR THIS AREA WHERE STREET IS OFFSET IN EXISTING RIGHT OF WAY

PROPERTY OWNER: WELLENDORF CO., LLC

PROPERTY OWNER: WELLENDORF CO., LLC

PROPERTY OWNER: WELLENDORF CO., LLC

CARROLL TRUSSES, INC.

**KEYED NOTES**

- ① INSTALL 2' WIDE RAISED PCC MEDIAN -SEE DETAIL
- ② INSTALL 7" PCC PAVEMENT WIDENING
- ③ INSTALL 3' WIDE AGGREGATE SHOULDER
- ④ TRANSITION AT 10:1 MINIMUM
- ⑤ RELOCATE EXISTING CROSSING GATE - WORK COMPLETED BY RAILROAD

**NOTES:**

- ALL SYMBOLS AND STRIPING TO BE REDONE AS PART OF THE PROJECT
- CITY TO INSTALL ADVANCE WARNING SIGNAGE FOR RR CROSSINGS

NOTES:  
LARGE AGRICULTURAL MACHINERY USES THIS CROSSING DURING HARVEST OF ADJACENT PROPERTY AND AS A BYPASS OF TOWN. ADVANCE POSTINGS MAY BE NECESSARY TO WARN OF LANE RESTRICTION.

IOWA DOT  
-2016 TRAFFIC COUNT = 310

# **IMPROVEMENT MATRIX**



City of Carroll, Iowa  
Quiet Zone Investigation - Update

**CROSSING IMPROVEMENT MATRIX**

0A1.124378

Attachment I

	Open	No work or minimal medians installed for safety	<b>Quiet Zone Establishment Criteria</b>  SSM @ All Crossings = <b>Automatic</b> ; send affirmation and inventory form every 4.5-5 years QZRI < or = NSRT = Qualified; send affirmation and inventory form every 2.5-3 years QZRI < or = RIWH = reviewable; send affirmation and inventory form every 2.5-3 years
	Closed	No through traffic allowed	
	Wayside Horn	Directional horn at roadway	
	4 Quad Gate	Gate installed for all traveled directions	
	SSM Applied	SSM = Supplementary Safety Measure, Raised median	

Crossing Scenario	QZ Calc Scenario	Burgess Ave 1550	N Grant Rd 4990	Maple St 660	N Clark St 3080	N Main St 5600	N Carroll St 2390	Bella Vista 310	Quiet Zone Risk Index ( QZRI )	Nationwide Significant Risk Threshold ( NSRT )	Risk Index with Horns ( RIWH )	Quiet Zone	UPRR Annual Contract	Estimated Cost
<b>EXISTING CONDITIONS</b>														
EX-1	_64863													
<b>WAYSIDE HORN 2 CROSSINGS QUIET ZONE</b>														
BB-1	_64866								44746.19	15488.00	26826.25	Denied	Y	\$250,000.00
BB-2	_64910								24329.66	15488.00	26826.25	reviewable	Y	\$1,529,000.00
BB-3	_64872								24166.96	15488.00	26826.25	reviewable	Y	\$585,500.00
BB-4	_64870								17026.09	15488.00	26826.25	reviewable	Y	\$817,000.00
BB-5	_64901								16843.14	15488.00	26826.25	reviewable	Y	\$1,679,000.00
BB-6	_64902								16636.53	15488.00	26826.25	reviewable	Y	\$2,529,000.00
BB-7	_64871								15902.68	15488.00	26826.25	reviewable	Y	\$735,500.00
BB-8	_64903								15509.55	15488.00	26826.25	reviewable	Y	\$2,447,500.00
BB-9	_64904								15336.14	15488.00	26826.25	Qualified	Y	\$3,340,500.00
BB-10	_64911								8540.71	15488.00	26826.25	<b>Automatic</b>	Y	\$2,667,000.00
<b>WAYSIDE HORN 1 CROSSING QUIET ZONE</b>														
BA-1	_64865								42257.06	15488.00	25333.97	Denied	Y	\$125,000.00
BA-2	_64909								21268.43	15488.00	25333.97	reviewable	Y	\$1,551,500.00
BA-3	_64869								21132.85	15488.00	25333.97	reviewable	Y	\$608,000.00
BA-4	_64867								15182.12	15488.00	25333.97	Qualified	Y	\$839,500.00
BA-5	_64906								15170.04	15488.00	25333.97	Qualified	Y	\$1,689,500.00
BA-6	_64908								15029.66	15488.00	25333.97	Qualified	Y	\$1,701,500.00
BA-7	_64907								15009.95	15488.00	25333.97	Qualified	Y	\$1,689,500.00
BA-8	_64868								14245.95	15488.00	25333.97	Qualified	Y	\$758,000.00
BA-9	_64905								8110.97	15488.00	25333.97	<b>Automatic</b>	Y	\$2,689,500.00

City of Carroll, Iowa  
Quiet Zone Investigation - Update

**CROSSING IMPROVEMENT MATRIX**

0A1.124378

Attachment I

	Open	No work or minimal medians installed for safety	<b>Quiet Zone Establishment Criteria</b>  SSM @ All Crossings = <b>Automatic</b> ; send affirmation and inventory form every 4.5-5 years QZRI < or = NSRT = Qualified; send affirmation and inventory form every 2.5-3 years QZRI < or = RIWH = reviewable; send affirmation and inventory form every 2.5-3 years
	Closed	No through traffic allowed	
	Wayside Horn	Directional horn at roadway	
	4 Quad Gate	Gate installed for all traveled directions	
	SSM Applied	SSM = Supplementary Safety Measure, Raised median	

Crossing Scenario	QZ Calc Scenario	Burgess Ave 1550	N Grant Rd 4990	Maple St 660	N Clark St 3080	N Main St 5600	N Carroll St 2390	Bella Vista 310	Quiet Zone Risk Index ( QZRI )	Nationwide Significant Risk Threshold ( NSRT )	Risk Index with Horns ( RIWH )	Quiet Zone	UPRR Annual Contract	Estimated Cost
<b>7 CROSSING QUIET ZONE</b>														
AA-1	_64864								7032.97	15488.00	23424.49	Automatic	Y	\$7,000,000.00
AC-2	_64878								21768.01	15488.00	23424.49	reviewable	N	\$564,500.00
AC-3	_64879								20965.58	15488.00	23424.49	reviewable	N	\$483,000.00
AC-4	_64876								15864.95	15488.00	23424.49	reviewable	N	\$714,500.00
AC-5	_64913								15854.6	15488.00	23424.49	reviewable	Y	\$1,564,500.00
AC-6	_64916								15717.38	15488.00	23424.49	reviewable	Y	\$1,564,500.00
AC-7	_64877								15062.52	15488.00	23424.49	Qualified	N	\$633,000.00
AC-8	_64918								15031.16	15488.00	23424.49	Qualified	Y	\$2,564,500.00
AC-9	_64915								14969.48	15488.00	23424.49	Qualified	Y	\$1,483,000.00
AC-10	_64917								14914.95	15488.00	23424.49	Qualified	Y	\$1,483,000.00
AC-11	_64920								14836.25	15488.00	23424.49	Qualified	Y	\$2,345,000.00
AC-12	_64919								14248.09	15488.00	23424.49	Qualified	Y	\$2,345,000.00
AC-13	_64873								13583.59	15488.00	23424.49	Qualified	N	\$714,500.00
AC-14	_64874								12781.16	15488.00	23424.49	Qualified	N	\$633,000.00
AC-15	_64914								9803.97	15488.00	23424.49	Qualified	Y	\$2,564,500.00
Quiet Zone Calculator Computations were completed on August 1, 2021														

# **COST OPINIONS**

**Railroad Quiet Zone Investigation  
Carroll, Iowa**

Notes: - Engineering fees are not included in the costs shown for the construction costs  
 - Measurements and quantities are based on available GIS and aerial information and visual inspection, topographic survey will be required at the design phase to verify  
 - quantities do not include costs for existing crossing panels and equipment that may need to be improved for a quiet zone project by UPRR

**Attachment J**

**PRELIMINARY OPINION OF PROJECT CONSTRUCTION COSTS  
August 9, 2021**

Line No.	Description	Unit	Unit Price	Attachment B		Attachment C		Attachment D-1		Attachment D-2		Attachment E	
				Bella Vista Road		North Grant Road		Maple Street - Option 1		Maple Street - Option 2		North Clark Street	
				Quantity	Extension	Quantity	Extension	Quantity	Extension	Quantity	Extension	Quantity	Extension
1	MOBILIZATION	LS	VARIES	1.00	\$24,000.00	1.00	\$12,000.00	1.00	\$15,000.00	1.00	\$29,000.00	1.00	\$23,000.00
2	REMOVE PAVEMENT	SY	\$12.00	80.00	\$960.00	0.00	\$0.00	225.00	\$2,700.00	55.00	\$660.00	180.00	\$2,160.00
3	REMOVE SIDEWALK/DRIVEWAY	SY	\$15.00	0.00	\$0.00	0.00	\$0.00	45.00	\$675.00	95.00	\$1,425.00	15.00	\$225.00
4	CONSTRUCT 7" PCC PAVEMENT WIDENING	SY	\$65.00	405.00	\$26,325.00	0.00	\$0.00	170.00	\$11,050.00	215.00	\$13,975.00	270.00	\$17,550.00
5	CONSTRUCT P.C.C. RAISED MEDIAN	SF	\$25.00	400.00	\$10,000.00	220.00	\$5,500.00	0.00	\$0.00	400.00	\$10,000.00	480.00	\$12,000.00
6	CONSTRUCT 6" P.C.C. DRIVEWAY/SIDEWALK	SY	\$55.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	5.00	\$275.00	5.00	\$275.00
7	CONSTRUCT 4" P.C.C. SIDEWALK	SY	\$45.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	10.00	\$450.00	55.00	\$2,475.00
8	PED RAMP DETECTABLE WARNING SYSTEM	SF	\$50.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	8.00	\$400.00	8.00	\$400.00
9	SEEDING, PERMANENT	SQ	\$40.00	170.00	\$6,800.00	0.00	\$0.00	70.00	\$2,800.00	55.00	\$2,200.00	55.00	\$2,200.00
10	TRAFFIC CONTROL	EA	\$40,000.00	0.14	\$5,714.28	0.14	\$5,714.28	0.14	\$5,714.28	0.14	\$5,714.28	0.14	\$5,714.28
11	GRANULAR SUBBASE, ROADSTONE	TON	\$35.00	95.00	\$3,325.00	0.00	\$0.00	55.00	\$1,925.00	70.00	\$2,450.00	115.00	\$4,025.00
12	EROSION AND SEDIMENT CONTROL	EA	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00
13	SIGNAGE, STRIPING AND SYMBOLS	EA	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00
14	PROVIDE RAILROAD FLAG CREW	DAY	\$2,000.00	15.00	\$30,000.00	10.00	\$20,000.00	10.00	\$20,000.00	15.00	\$30,000.00	15.00	\$30,000.00
15	CONSTRUCTION CONTINGENCIES	EA	VARIES	1.00	\$19,000.00	1.00	\$9,000.00	1.00	\$11,000.00	1.00	\$16,000.00	1.00	\$18,000.00
	<b>SUBTOTAL</b>				<b>\$138,624.28</b>		<b>\$64,714.28</b>		<b>\$83,364.28</b>		<b>\$125,049.28</b>		<b>\$130,524.28</b>
16	LAND ACQUISITION	ACRE	\$10,000.00	0.15	\$1,500.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00
17	UP PERMITS/QZ PROCESS	LS	\$50,000.00	0.14	\$7,142.85	0.14	\$7,142.85	0.14	\$7,142.85	0.14	\$7,142.85	0.14	\$7,142.85
18	RELOCATE GATE ARM	EA	\$20,000.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	2.00	\$40,000.00	0.00	\$0.00
	<b>SUBTOTAL</b>				<b>\$8,642.85</b>		<b>\$7,142.85</b>		<b>\$7,142.85</b>		<b>\$47,142.85</b>		<b>\$7,142.85</b>
	<b>TOTAL OPINION OF PROBABLE CONSTRUCTION COSTS</b>				<b>\$147,267.13</b>		<b>\$71,857.13</b>		<b>\$90,507.13</b>		<b>\$172,192.13</b>		<b>\$137,667.13</b>

**Railroad Quiet Zone Investigation  
Carroll, Iowa**

**PRELIMINARY OPINION OF PROJECT CONSTRUCTION COSTS  
August 9, 2021**

Notes: - Engineering fees are not included in the costs shown for the construction costs  
 - Measurements and quantities are based on available GIS and aerial information and visual inspection, topographic survey will be required at the design phase to verify  
 - quantities do not include costs for existing crossing panels and equipment that may need to be improved for a quiet zone project by UPRR

**Attachment J**

Line No.	Description	Unit	Unit Price	Attachment F-1		Attachment F-2		Attachment G		Attachment H-1		Attachment H-2	
				North Main Street - Option 1		North Main Street - Option 2		North Carroll Street		Burgess Avenue - Option 1		Burgess Avenue - Option 2	
				Quantity	Extension	Quantity	Extension	Quantity	Extension	Quantity	Extension	Quantity	Extension
1	MOBILIZATION	LS	VARIES	1.00	\$14,000.00	1.00	\$25,000.00	1.00	\$18,000.00	1.00	\$24,000.00	1.00	\$40,000.00
2	REMOVE PAVEMENT	SY	\$12.00	15.00	\$180.00	275.00	\$3,300.00	35.00	\$420.00	90.00	\$1,080.00	55.00	\$660.00
3	REMOVE SIDEWALK/DRIVEWAY	SY	\$15.00	65.00	\$975.00	83.00	\$1,245.00	30.00	\$450.00	0.00	\$0.00	0.00	\$0.00
4	CONSTRUCT 7" PCC PAVEMENT WIDENING	SY	\$65.00	50.00	\$3,250.00	340.00	\$22,100.00	84.00	\$5,460.00	150.00	\$9,750.00	373.00	\$24,245.00
5	CONSTRUCT P.C.C. RAISED MEDIAN	SF	\$25.00	160.00	\$4,000.00	320.00	\$8,000.00	320.00	\$8,000.00	160.00	\$4,000.00	240.00	\$6,000.00
6	CONSTRUCT 6" P.C.C. DRIVEWAY/SIDEWALK	SY	\$55.00	60.00	\$3,300.00	39.00	\$2,145.00	15.00	\$825.00	0.00	\$0.00	0.00	\$0.00
7	CONSTRUCT 4" P.C.C. SIDEWALK	SY	\$45.00	25.00	\$1,125.00	60.00	\$2,700.00	12.00	\$540.00	0.00	\$0.00	0.00	\$0.00
8	PED RAMP DETECTABLE WARNING SYSTEM	SF	\$50.00	32.00	\$1,600.00	74.00	\$3,700.00	24.00	\$1,200.00	0.00	\$0.00	0.00	\$0.00
9	SEEDING, PERMANENT	SQ	\$40.00	15.00	\$600.00	50.00	\$2,000.00	45.00	\$1,800.00	76.00	\$3,040.00	262.00	\$10,480.00
10	TRAFFIC CONTROL	EA	\$40,000.00	0.14	\$5,714.28	0.14	\$5,714.28	0.14	\$5,714.28	0.14	\$5,714.28	0.14	\$5,714.28
11	GRANULAR SUBBASE, ROADSTONE	TON	\$35.00	20.00	\$700.00	128.00	\$4,480.00	30.00	\$1,050.00	82.00	\$2,870.00	746.00	\$26,110.00
12	EROSION AND SEDIMENT CONTROL	EA	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00	1.00	\$5,000.00
13	SIGNAGE, STRIPING AND SYMBOLS	EA	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00	1.00	\$7,500.00
14	PROVIDE RAILROAD FLAG CREW	DAY	\$2,000.00	10.00	\$20,000.00	15.00	\$30,000.00	15.00	\$30,000.00	10.00	\$20,000.00	20.00	\$40,000.00
15	CONSTRUCTION CONTINGENCIES	EA	VARIES	1.00	\$11,000.00	1.00	\$20,000.00	1.00	\$14,000.00	1.00	\$12,000.00	1.00	\$25,000.00
	<b>SUBTOTAL</b>				<b>\$78,944.28</b>		<b>\$142,884.28</b>		<b>\$99,959.28</b>		<b>\$94,954.28</b>		<b>\$190,709.28</b>
16	LAND ACQUISITION	ACRE	\$10,000.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	0.45	\$4,500.00
17	UP PERMITS/QZ PROCESS	LS	\$50,000.00	0.14	\$7,142.85	0.14	\$7,142.85	0.14	\$7,142.85	0.00	\$0.00	0.14	\$7,142.85
18	RELOCATE GATE ARM	EA	\$20,000.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00	2.00	\$40,000.00	2.00	\$40,000.00
	<b>SUBTOTAL</b>				<b>\$7,142.85</b>		<b>\$7,142.85</b>		<b>\$7,142.85</b>		<b>\$40,000.00</b>		<b>\$51,642.85</b>
	<b>TOTAL OPINION OF PROBABLE CONSTRUCTION COSTS</b>				<b>\$86,087.13</b>		<b>\$150,027.13</b>		<b>\$107,102.13</b>		<b>\$134,954.28</b>		<b>\$242,352.13</b>

**FEDERAL RAILROAD**  
**ADMINISTRATION**





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## GUIDE TO THE QUIET ZONE ESTABLISHMENT PROCESS

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AN INFORMATION GUIDE

**Federal Railroad Administration**

1200 New Jersey Avenue S.E.  
Washington, DC 20590  
Telephone: 202-493-6299

[www.fra.dot.gov](http://www.fra.dot.gov)

**Federal Railroad Administration**

**Highway-Rail Crossing and Trespasser Programs Division**

Follow FRA on [Facebook](#) and [Twitter](#)

## Purpose of the Guide

This brochure was developed to serve as a guide for local decision makers seeking a greater understanding of train horn sounding requirements and how to establish quiet zones. Its purpose is to provide a general overview and thus does not contain every detail about the quiet zone establishment process. For more detailed and authoritative information, the reader is encouraged to review the official regulations governing the use of locomotive horns at public highway-rail grade crossings and the establishment of quiet zones that are contained in 49 CFR Part 222. A copy of the rule can be downloaded or printed at <http://www.fra.dot.gov/eLib/Details/L02809>.

## About Quiet Zones



FRA is committed to reducing the number of collisions at highway-rail grade crossings, while establishing a consistent standard for communities who opt to preserve or enhance quality of life for their residents by establishing quiet zones within which routine use of train horns at crossings is prohibited.

Federal regulation requires that locomotive horns begin sounding 15–20 seconds before entering public highway-rail grade crossings, no more than one-quarter mile in advance. Only a public authority, the governmental entity responsible for traffic control or law enforcement at the crossings, is permitted to create quiet zones.

A quiet zone is a section of a rail line at least one-half mile in length that contains one or more consecutive public highway-rail grade crossings at which locomotive horns are not routinely sounded when trains are approaching the crossings. The prohibited use of train horns at quiet zones only applies to trains when approaching and entering crossings and does not include train horn use within passenger stations or rail yards. Train horns may be sounded in emergency situations or to comply with other railroad or FRA rules even within a quiet zone. Quiet zone regulations also do not eliminate the use of locomotive bells at crossings. Therefore, a more appropriate description of a designated quiet zone would be a “reduced train horn area.”

Communities wishing to establish quiet zones must work through the appropriate public authority that is responsible for traffic control or law enforcement at the crossings.

## Historical Context

Historically, railroads have sounded locomotive horns or whistles in advance of grade crossings and under other circumstances as a universal safety precaution. Some States allowed local communities to create whistle bans where the train horn was not routinely sounded. In other States, communities created whistle bans through informal agreements with railroads.

In the late 1980's, FRA observed a significant increase in nighttime train-vehicle collisions at certain gated highway-rail grade crossings on the Florida East Coast Railway (FEC) at which nighttime whistle bans had been established in accordance with State statute. In 1991, FRA issued Emergency Order #15 requiring trains on the FEC to sound their horns again. The number and rate of collisions at affected crossings returned to pre-whistle ban levels.



In 1994, Congress enacted a law that required FRA to issue a Federal regulation requiring the sounding of locomotive horns at public highway-rail grade crossings. It also gave FRA the ability to provide for exceptions to that requirement by allowing communities under some circumstances to establish "quiet zones."

The Train Horn Rule became effective on June 24, 2005. The rule set nationwide standards for the sounding of train horns at public highway-rail grade crossings. This rule changed the criteria for sounding the horn from distance-based to time-based. It also set limits on the volume of a train horn. The rule also established a process for communities to obtain relief from the routine sounding of train horns by providing criteria for the establishment of quiet zones. Locomotive horns may still be used in the case of an emergency and to comply with Federal regulations or certain railroad rules.

Because the absence of routine horn sounding increases the risk of a crossing collision, a public authority that desires to establish a quiet zone usually will be required to mitigate this additional risk. At a minimum, each public highway–rail crossing within a quiet zone must be equipped with active warning devices: flashing lights, gates, constant warning time devices (except in rare circumstances) and power out indicators.

***In order to create a quiet zone, one of the following conditions must be met***

1. ***The Quiet Zone Risk Index (QZRI) is less than or equal to the Nationwide Significant Risk Threshold (NSRT)*** with or without additional safety measures such as Supplementary Safety Measures (SSMs) or Alternative Safety Measures (ASMs) described below. The QZRI is the average risk for all public highway-rail crossings in the quiet zone, including the additional risk for absence of train horns and any reduction in risk due to the risk mitigation measures. The NSRT is the level of risk calculated annually by averaging the risk at all of the Nation’s public highway-rail grade crossings equipped with flashing lights and gates where train horns are routinely sounded.
2. ***The Quiet Zone Risk Index (QZRI) is less than or equal to the Risk Index With Horns (RIWH)*** with additional safety measures such as SSMs or ASMs. The RIWH is the average risk for all public highway-rail crossings in the proposed quiet zone when locomotive horns are routinely sounded.
3. ***Install SSMs at every public highway-rail crossing.*** This is the best method to reduce to reduce risks in a proposed quiet zone and to enhance safety.

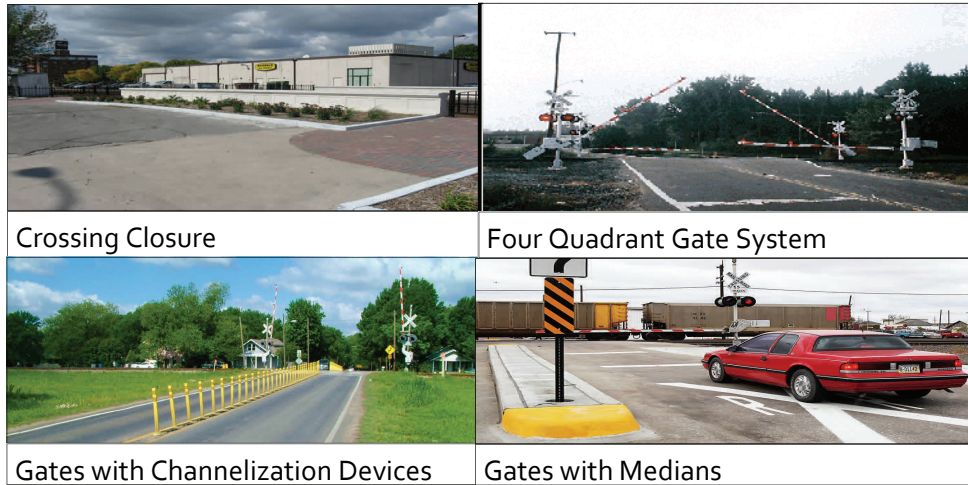
SSMs are pre-approved risk reduction engineering treatments installed at certain public highway-rail crossings within the quiet zone and can help maximize safety benefits and minimize risk. SSMs include: medians or channelization devices, one-way streets with gates, four quadrant gate systems, and temporary or permanent crossing closures. Examples of SSMs are shown on the next page.

ASMs are safety systems, other than SSMs, that are used to reduce risk in a quiet zone. ASMs typically are improvements that do not fully meet the requirements to be SSMs and their risk reduction effectiveness must be submitted in writing and approved by FRA.

FRA strongly recommends that all crossings in the quiet zone be reviewed by a diagnostic team. A diagnostic team typically consists of representatives from the public authority, railroad, and State agency responsible for crossing safety and FRA grade crossing managers.

**Public Safety Considerations continued**

**Examples of SSMs**



**Wayside Horns** The train horn rule also provides another method for reducing the impact of routine locomotive horn sounding when trains approach public highway-rail grade crossings. A wayside horn may be installed at highway-rail grade crossings that have flashing lights, gates, constant warning time devices (except in rare circumstances), and power out indicators. The wayside horn is positioned at the crossing and will sound when the warning devices are activated. The sound is directed down the roadway, which greatly reduces the noise footprint of the audible warning. Use of wayside horns is not the same as establishing a quiet zone although they may be used within quiet zones.

**Cost Considerations**

The enabling Federal statute did not provide funding for the establishment of quiet zones. Public authorities seeking to establish quiet zones should be prepared to finance the installation of SSMs and ASMs used. Costs can vary from \$30,000 per crossing to more than \$1 million depending on the number of crossings and the types of safety improvements required.

**Legal Considerations**

The courts will ultimately determine who will be held liable if a collision occurs at a grade crossing located within a quiet zone, based upon the facts of each case, as a collision may have been caused by factors other than the absence of an audible warning. FRA’s rule is intended to remove failure to sound the horn as a cause of action in lawsuits involving collisions that have occurred at grade crossings within duly established quiet zones.



## The Quiet Zone Establishment Process

Under the Train Horn Rule, only public authorities are permitted to establish quiet zones. Citizens who wish to have a quiet zone in their neighborhood should contact their local government to pursue the establishment of a quiet zone. The following is a typical example of the steps taken to establish a quiet zone:

1. **Determine** which crossings will be included in the quiet zone. All public highway-rail crossings in the quiet zone must have, at a minimum, an automatic warning system consisting of flashing lights and gates. The warning systems must be equipped with constant warning time devices (except in rare circumstances) and power out indicators. The length of the quiet zone must be at least one-half mile in length.
2. **Identify** any private highway-rail grade crossings within the proposed quiet zone. If they allow access to the public or provide access to active industrial or commercial sites, a diagnostic review must be conducted and the crossing(s) treated in accordance with the recommendations of the diagnostic team.
3. **Identify** any pedestrian crossings within the proposed quiet zone and conduct a diagnostic review of those crossings too. They also must be treated in accordance with the diagnostic team's recommendations. *NOTE:* While it is not required by the regulations, FRA recommends that every crossing within a proposed quiet zone be reviewed for safety concerns.
4. **Update** the U.S. DOT Crossing Inventory Form to reflect current physical and operating conditions at each public, private, and pedestrian crossing located within a proposed quiet zone.
5. **Provide** a Notice of Intent (NOI) to all of the railroads that operate over crossings in the proposed quiet zone, the State agency responsible for highway safety and the State agency responsible for crossing safety. The NOI must list all of the crossings in the proposed quiet zone and give a brief explanation of the tentative plans for implementing improvements within the quiet zone. Additional required elements of the NOI can be found in 49 CFR 222.43(b). The railroads and State agencies have 60 days in which to provide comments to the public authority on the proposed plan.
6. **Alternative Safety Measures** – If ASMs are going to be used to reduce risk, an application to FRA must be made. The application must include all of the elements provided in 49 CFR 222.39(b)(1) and copies of the application must be sent to the entities listed in 49 CFR 222.39(b)(3). They will have 60 days to provide comments to FRA on the application. FRA will provide a written decision on the application typically within three to four months after it is received.



## The Quiet Zone Establishment Process continued

7. **Determine** how the quiet zone will be established using one of the following criteria: (Note that Options 2 through 4 will require the use of the FRA Quiet Zone Calculator available at <http://safetydata.fra.dot.gov/quiet/>.)

1. Every public highway-rail crossing in the proposed quiet zone is equipped with one or more SSMs.
2. The Quiet Zone Risk Index (QZRI) of the proposed quiet zone is less than or equal to the Nationwide Significant Risk Threshold (NSRT) without installing SSMs or ASMs.
3. The QZRI of the proposed quiet zone is less than or equal to the Nationwide Significant Risk Threshold (NSRT) after the installation of SSMs or ASMs.
4. The QZRI of the proposed quiet zone is less than or equal to the Risk Index with Horns (RIWH) after the installation of SSMs or ASMs.



8. **Complete** the installation of SSMs and ASMs and any other required improvements determined by the diagnostic team at all public, private, and pedestrian crossings within the proposed quiet zone.

9. **Ensure** that the required signage at each public, private, and pedestrian crossing is installed in accordance with 49 CFR Sections 222.25, 222.27, and 222.35, and the standards outlined in the Manual on Uniform Traffic Control Devices. These signs may need to be covered until the quiet zone is in effect.

10. **Establish** the quiet zone by providing a Notice of Quiet Zone Establishment to all of the parties that are listed in 49 CFR Section 222.43(a)(3). Be sure to include all of the required contents in the notice as listed in 49 CFR Section 222.43(d). The quiet zone can take effect no earlier than 21 days after the date on which the Notice of Quiet Zone Establishment is mailed.

**\*\*\*Appendix C to the Train Horn Rule provides detailed, step by step guidance on how to create a quiet zone.\*\*\***

## Required Documentation

Public authorities interested in establishing a quiet zone are required to submit certain documentation during the establishment process. FRA has provided checklists for the various documents that can be found at <http://www.fra.dot.gov/Elib/Details/L03055>.

FRA's Regional Grade Crossing Managers are available to provide technical assistance. A State's department of transportation or rail regulatory agency also may be able to provide assistance to communities pursuing quiet zones.

Public authorities are encouraged to consult with the agencies in their State that have responsibility for crossing safety. Some States may have additional administrative or legal requirements that must be met in order to modify a public highway-rail grade crossing.

## Role of Railroads

Communities seeking to establish a quiet zone are required to send a Notice of Intent and a Notice of Quiet Zone Establishment to railroads operating over the public highway-rail grade crossings within the proposed quiet zone. Railroad officials can provide valuable input during the quiet zone establishment process and should be included on all diagnostic teams. Listed below are links to the Class I Railroads and Amtrak.

<a href="#">BNSF Railway (BNSF)</a>	<a href="#">Canadian Pacific (CP)</a>
<a href="#">CSX Transportation (CSX)</a>	<a href="#">Norfolk Southern (NS)</a>
<a href="#">Canadian National (CN)</a>	<a href="#">Union Pacific (UP)</a>
<a href="#">Kansas City Southern (KCS)</a>	<a href="#">Amtrak (ATK)</a>

## FINAL NOTE

*The information contained in this brochure is provided as general guidance related to the Quiet Zone Establishment Process and should not be considered as a definitive resource. FRA strongly recommends that any public authority desiring to establish quiet zones take the opportunity to review all aspects of safety along its rail corridor. Particular attention should be given to measures that prevent trespassing on railroad tracks since investments made to establish a quiet zone may be negated if the horn has to be routinely sounded to warn trespassers.*

## POINTS OF CONTACT

### General Questions:

Inga Toye, 202-493-6305

Debra Chappell, 202-493-6018

Ron Ries, 202-493-6285

### Regional Contacts

**Region 1** Connecticut, Maine, Massachusetts, New Hampshire, New Jersey,  
New York, Rhode Island, and Vermont

1-800-724-5991

**Region 2** Delaware, Maryland, Ohio, Pennsylvania, Virginia, West Virginia ,  
and Washington, D.C.

1-800-724-5992

**Region 3** Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina,  
South Carolina, and Tennessee

1-800-724-5993

**Region 4** Illinois, Indiana, Michigan, Minnesota, and Wisconsin

1-800-724-5040

**Region 5** Arkansas, Louisiana, New Mexico, Oklahoma, and Texas

1-800-724-5995

**Region 6** Colorado, Iowa, Kansas, Missouri, and Nebraska

1-800-724-5996

**Region 7** Arizona, California, Nevada, and Utah

1-800-724-5997

**Region 8** Alaska, Idaho, Montana, North Dakota, South Dakota, Oregon,  
Washington, and Wyoming

1-800-724-5998



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### **U.S. Department of Transportation Federal Railroad Administration**

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FEDERAL CODE OF REGULATIONS

TITLE 49

SUBTITLE B

CHAPTER II

PART 222

USE OF LOCOMOTIVE HORNS AT PUBLIC HIGHWAY – RAIL GRADE CROSSINGS

[https://www.ecfr.gov/cgi-bin/text-idx?SID=55e4cd72d1135c4509cbd6266a4fc8fb&mc=true&node=pt49.4.222&rgn=div5#ap49.4.222.0000\\_0nbspnbspnbspnbspn.a](https://www.ecfr.gov/cgi-bin/text-idx?SID=55e4cd72d1135c4509cbd6266a4fc8fb&mc=true&node=pt49.4.222&rgn=div5#ap49.4.222.0000_0nbspnbspnbspnbspn.a)