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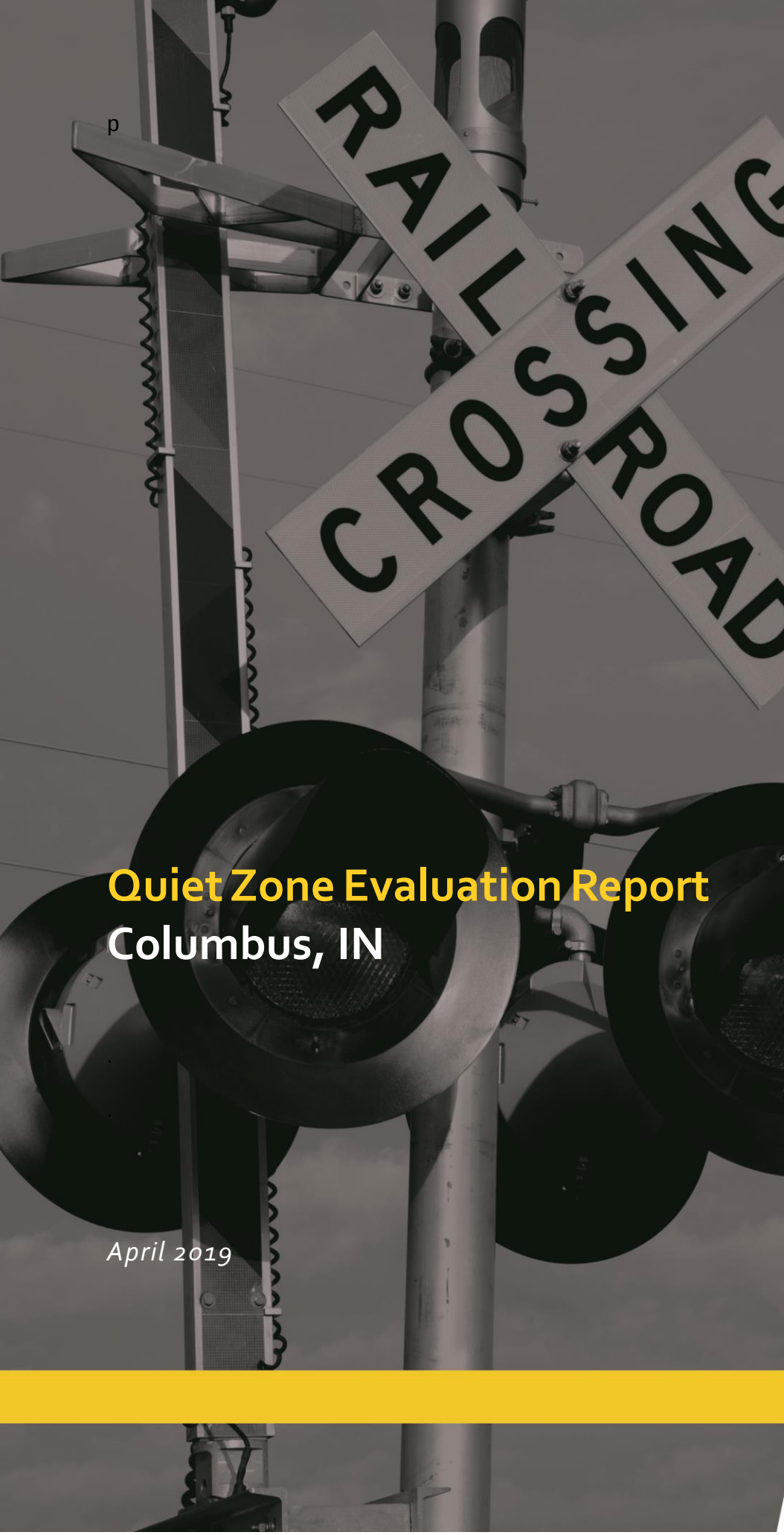


Quiet Zone Evaluation Report
Columbus, IN

April 2019

CTC inc

Contents

I. Background

On August 17, 2006, the Federal Railroad Administration (FRA) issued 49 CFR Parts 222 and 229, the *Final Rule on Use of Locomotive Horns at Highway-Rail Grade Crossings* (Final Rule). The purpose of the rule is to mandate a federal requirement for the sounding of locomotive horns at all public highway-rail grade crossings. The rule also establishes both minimum and maximum decibel levels for the locomotive horns themselves. While the purpose of the rule was to require the sounding of locomotive horns, it also created a methodology by which communities could create quiet zones. The following is an overview of this methodology.

Requirements for Public Quiet Zone Crossings

In accordance with the Final Rule, each public highway-rail grade crossing within a quiet zone must be equipped with flashing lights, gates, and at least one bell. Each public crossing must also be equipped with a *Constant Warning Time Device* where reasonably practical. A Constant Warning Time Device is an electronic device that activates the railroad gates and lights based on the speed of an approaching train, ensuring consistent warning times for motorists before the train's arrival.

Supplemental Safety Measure (SSM)

Routine locomotive horn hounding is not required if each highway-rail grade crossing in the proposed quiet zone is equipped with ***Supplemental Safety Measures* (SSMs)**. SSMs are safety measures that have been determined by the FRA to adequately compensate for the lack of a locomotive horn. Examples of SSMs include:

Temporary closure of roadway (can only be used in a Partial Quiet Zone).

Figure 1 - Temporary Roadway Closure

Four-quadrant gate system installed with or without vehicle detection.

Figure 2 - Four-Quadrant Gate System

Gates with non-traversable median barriers for each roadway approach, extending at least 100 feet from the gate (or at least 60 feet when an intersection or commercial driveway is within 100 feet of a gate).

Figure 3 - Gates with Non-Traversable Median

Gates with channelization devices for each roadway approach, extending at least 100 feet from the gate (or at least 60 feet when an intersection or commercial driveway is within 100 feet of a gate).

Figure 4 - Gates with Channelization Devices

One-way streets with gates that completely close off the roadway.

Figure 5 - One Way Street with Gates

Permanent closure of roadway.

Figure 6 - Permanent Roadway Closure

Each SSM has been assigned an effectiveness rate which is defined as a number between zero and one and represents the reduction of the likelihood of a collision at a public highway-rail grade crossing. This reduction is a result of the installation of an SSM or ASM when compared to the same crossing equipped with conventional active warning systems of flashing lights and gates. Zero effectiveness means that the SSM or ASM provides no reduction in the probability of a collision, while an effectiveness rating of one means that the SSM or ASM is 100% effective in eliminating collision risk.

The effectiveness rate for SSMs are as follows:

Approved Supplemental Safety Measure (SSM)	Effectiveness Rate
Temporary or Permanent Closure of a crossing	1.00
One-Way Street with gates	0.82
Gates with Medians (non-traversable curbs)	0.80
Four Quadrant Gate System with presence detection	0.77
Gates with channelization devices	0.75

Alternative Safety Measure (ASM)

Another possibility for use as a treatment, in lieu of a SSM, is an ***Alternative Safety Measure*** **(ASM)**. An ASM is a safety system or procedure, other than a SSM, determined to be an effective substitute for the locomotive horn in the prevention of highway-rail casualties at the crossing. Examples of ASMs include:

- **Modified SSMs** consisting of SSMs that do not fully comply with the requirements for an SSM (under 49 CFR 222, Appendix A)
- **Non-Engineering ASMs** such as programmed enforcement, public educations and awareness, and photo enforcement programs
- **Engineering ASMs** consisting of engineering improvements that address underlying geometric conditions, such as sight distance, that are the source of increased risk at crossings

Wayside Horn System

Another possibility for use as a treatment, in lieu of a SSM, is the *Wayside Horn System* (WHS). The WHS is a traffic control device that is mounted at the highway-rail grade crossing and interconnected to the railroad's grade crossing warning system. It is activated by an approaching train in the same manner as gates and lights and ceases when the train enters the crossing. It is required to sound at a minimum level of 92 dB 100 feet away from the crossing, measured along the roadway approach from the nearest track (49 CFR 222, Appendix E, 4).

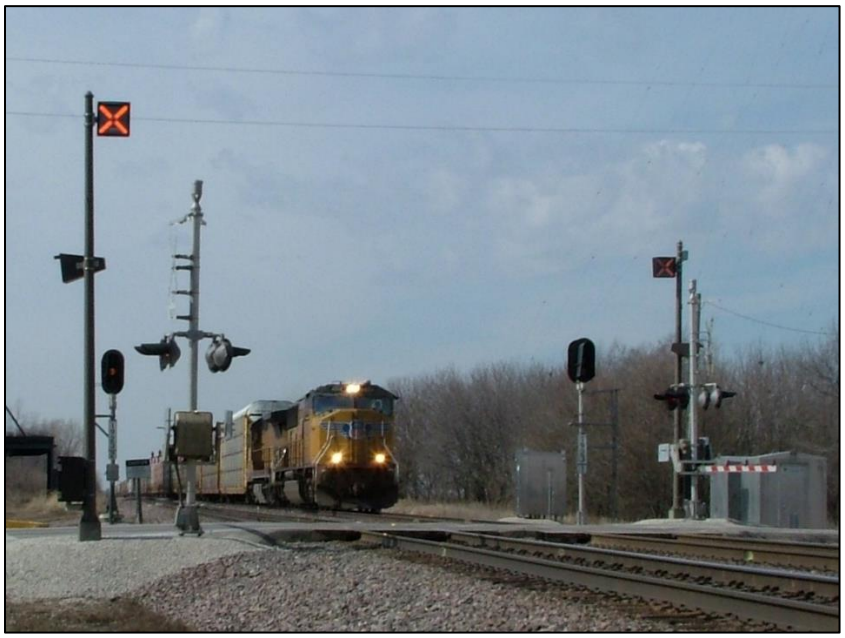


Figure 7 - Wayside Horn System

Many communities have implemented this technology as a means of reducing train horn noise levels due to its directable sound and smaller sound contour within the area surrounding the crossing. The WHS may be used either within or outside of a quiet zone as a one-for-one replacement for the train horn.

Quiet Zone Risk Index Level

In addition, locomotive horn sounding is not required within highway-rail grade crossing corridors that have a Quiet Zone Risk Index (QZRI) at or below the Nationwide Significant Risk Threshold (NSRT) or the Risk Index with Horns (RIWH). Definitions of each of these terms are listed below:

> **Quiet Zone Risk Index (QZRI)** is the average collision risk in the proposed quiet zone taking into consideration the increased risk caused by the lack of train horns and the reductions in risk attributable to the installation of SSMs or ASMs.
>
> **Nationwide Significant Risk Threshold (NSRT)** is the measure of collision risk, calculated on a nationwide basis, which reflects the average level of risk to the motoring public at public highway-rail grade crossings equipped with flashing lights and gates and at which locomotive horns are sounded.
>
> **Risk Index with Horns (RIWH)** is the average initial amount of collision risk in the proposed quiet zone with the train horn sounding.

Highway-rail grade crossing corridors that have a *QZRI* ≤ *NSRT* or *QZRI* ≤ *RIWH* have been deemed, by the FRA, to constitute categories of highway-rail grade crossings that do not present a significant risk with respect to loss of life or serious personal injury or that fully compensate for the absence of the warning provided by the locomotive horn. As a result, communities with highway-rail grade crossing corridors that meet either of these standards may prohibit the routine sounding of locomotive horns within the crossing corridor if all other applicable quiet zone requirements have been met. For more information about Quiet Zone Qualification, see section IV.

Sounding Horn Within a Quiet Zone

The establishment of a quiet zone does not result in total elimination of all train horn noise. The Final Rule allows for the locomotive engineer to sound the locomotive horn before starting movement, to warn men or equipment performing work around or on track, or to comply with other operating rules. It also allows engineers to provide a warning to vehicle operators, animals, pedestrians, trespassers, or crews on other trains in an emergency if, in the locomotive engineer's sole judgment, such action is appropriate to prevent imminent injury, death, or property damage.

The Final Rule does not prohibit the use of the locomotive horn at a grade crossing when:

1. Active grade crossing devices have malfunctioned and use of the horn is required.

2. Crossing warning systems are temporarily out of service during inspection, maintenance, or testing.

3. The SSM or ASM no longer complies with the requirements of the Final Rule or as approved by the FRA.

4. Announcing the approach to roadway workers under chapter 49 or required purposes under railroad operating rules.

5. When a wayside horn system is malfunctioning.

The Agency should make every effort to educate the public through public meetings, website, and news articles that some trains will sound horns after the quiet zone is established. Experience has also indicated that it takes approximately 30-45 days for all locomotive engineers to become familiar with a new quiet zone and cease blowing the train horns on a consistent basis. The Agency should make the public aware of the "grace period" needed once the quiet zone is established. Once the quiet zone is in effect, routine sounding of locomotive horns will be restricted for all railroads who may operate through the crossings.

II. Proposed Quiet Zone Corridor

The City of Columbus, Indiana (City), in its effort to explore the possibility of prohibiting the routine sounding of train horns along the Louisville & Indiana Railroad (Railroad) through their community, requested CTC, Inc. (CTC) to conduct an evaluation to determine the feasibility, required improvements, and approximate cost associated with creating a new quiet zone through Columbus, Indiana. The proposed quiet zone corridor is shown in Figure 1.

The Railroad currently operates approximately 13 trains per day *and is expected to operate up to 18 per day by 2020*. The maximum authorized train speed is 49 MPH through SR-46 and 20 MPH through 5th Street, 8th Street, and 11th Street. The highway-rail grade crossings that were evaluated are described in the table below. The limits of the proposed quiet zone will extend an actual length of 1.12 miles. CSX Transportation has operating rights through all crossings in the corridor. As an operating railroad through the crossings, CSX Transportation must be included as a recipient of all quiet zone notifications. See Section VI for more information.

Table 1. Proposed Quiet Zone Crossings

Street/Pathway	DOT No.	Railroad Milepost	Crossing Type	Nearest Parallel Street
SR-46	535495H	QSL 41.46	Public	SR-11
Columbus People Trail	TBD	QSL 41.46	Pedestrian Pathway	N/A
5th Street	535496D	QSL 41.20	Public	Lindsey St
8th Street	535497W	QSL 40.98	Public	Lindsey St
11th Street	535498D	QSL 40.84	Public	Lindsey St

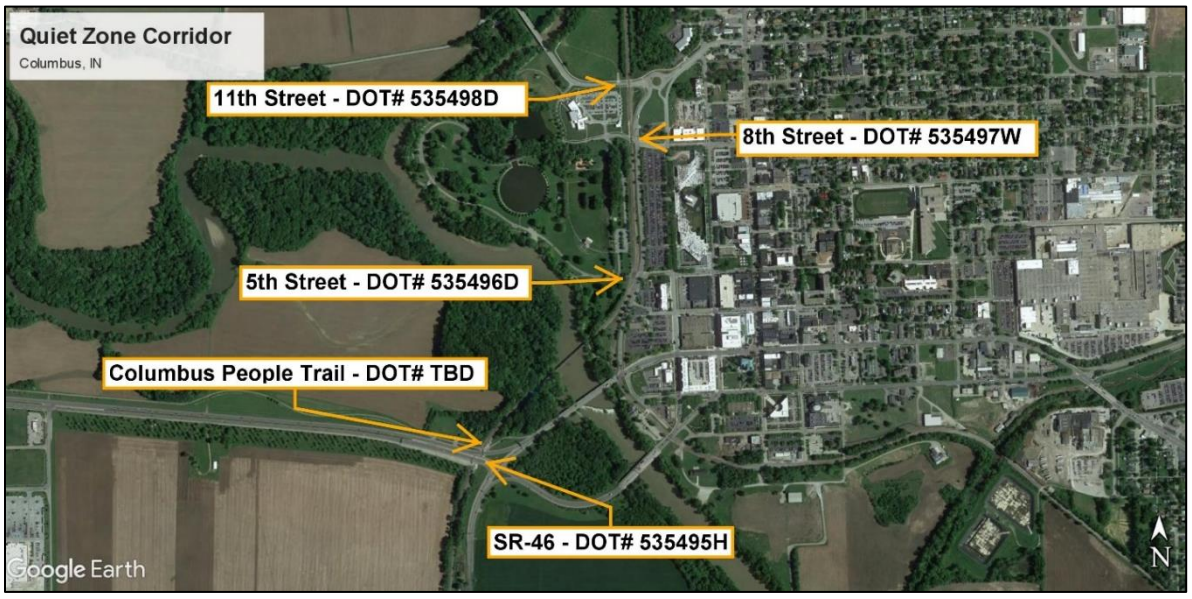


Figure 8. Overall View of Proposed Quiet Zone

III. Summary of Quiet Zone Safety Improvement Options

CTC conducted a field review of the grade crossings within the proposed Columbus quiet zone on December 17, 2018. The purpose of the review was to evaluate proposed crossings for basic quiet zone requirements and review quiet zone concepts with the City in preparation for a future diagnostic meeting with the Railroad and the FRA. Options available to the City for the creation of the quiet zone were presented after the field evaluation. Factors considered in the evaluation were safety, compliance with the FRA rules, public acceptance, and budgetary constraints for the implementation of the proposed quiet zone.

A diagnostic inspection meeting was conducted on December 18, 2018 consisting of representatives from the City of Columbus, Louisville and Indiana Railroad, FRA and CTC, which reviewed each of the highway-rail grade crossings in the proposed quiet zone for consideration of the options for approved SSMs as provided in 49 CFR 222, Appendix A. The diagnostic team members in attendance are listed in Appendix A and the diagnostic notes are in Appendix B.

The options of converting the existing two-way streets at 5th Street and 8th Street to one-way streets were discussed with the City during preliminary evaluation but were unfavorable due to the anticipated impact on access to Mill Race Park, public acceptance, and the ability to maintain effective traffic flow throughout the City. Although the wayside horns result in a significant reduction in the number of citizens that would hear the horns, the horn systems would continue to impact the downtown area as well as Mill Race Park. The City did not find that acceptable as part of an effective quiet zone in the downtown area.

After consideration of remaining quiet zone treatment options for implementing safety improvements at each crossing, the following table was created to outline the preferred option for each location. The team also identified which options were acceptable at each crossing as shown in the following table.

The results of that evaluation are show as follows:

- P – Preferred Supplemental Safety Measure
- O – Optional Supplemental Safety Measure
- U – Undesirable (due to public acceptability or budget constraints)

Table 2. Supplemental Safety Measures Options (Roadway Crossings)

Street Name	DOT No.	Crossing Closure (SSM)	Four-Quadrant Gate System (SSM)	Concrete/ Channelization Median Barrier (SSM or ASM)	One-Way Street (SSM)	Wayside Horn System
SR-46	535495H	U	U	**P**	U	U
5th Street	535496D	O	**P**	U	O	U
8th Street	535497W	U	O	**P**	O	U
11th Street	535498D	U	U	**P**	U	U

This review also determined if the existing railroad active grade crossing warning devices meet the minimum requirements for establishment of a quiet zone. The train horn rule requires that each public highway-rail grade crossing in the quiet zone must be equipped with flashing lights and gates, a constant warning time device, and power out indicator in accordance with 49 CFR Subpart C 222.35(3)(b). The following table provides the results of that review:

Table 3. Active Grade Crossing Warning Devices (Roadway Crossings)

Street or Road Name	DOT No.	Flashing Lights, Gates and Bells	Constant Warning Time Devices	Power Out Indicator
SR-46	535495H	✓	✓	✓
5th Street	535496D	x	✓	✓
8th Street	535497W	x	✓	✓
11th Street	535498D	x	✓	✓

As indicated in the table above, three of the four crossings in this corridor do not meet the minimum requirements for quiet zone establishment concerning railroad warning devices due to the lack of flashing lights and gates. Therefore, these crossings will require the Railroad to install flashing lights, automatic gates, and bells, at the expense of the City. An overview of each crossing and discussion of specific safety improvements and recommendations are described in the following section.

IV. Crossing Overviews

General Information

The quiet zone evaluation for this corridor includes the following assumptions:

- MUTCD-compliant signs and pavement markings will be installed at each crossing, including the "No Train Horn" signs required under the train horn rule.
- All channelization and median lengths are measured from the railroad gate for quiet zone qualification. An additional 5 feet of length is used in construction cost calculations, as the median will extend inside the gates to a minimum of 10 feet from near rail.
- All non-traversable concrete median must be a minimum of 6 inches in height. Median width is recommended as a minimum of 1 foot but can be increased if roadway widths allow.
- All sidewalk and pathway crossings are to have detectable warning installed on each approach, 15 feet from the centerline of track.
- The City will install pedestrian escape paths with one-way swing gates adjacent to the automatic gate on each pathway or sidewalk approach. This allows for an exit path for pedestrians between the gates while railroad gates are lowered, as well as prevent access past the lowered gates. An example design is included below. Example specifications for design is included in Appendix E.

Figure 8 - Ped Escape Gate Example

- The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way to prevent trespassing. Ideally, the fence would resemble the following example, which cannot be easily jumped or passed through:

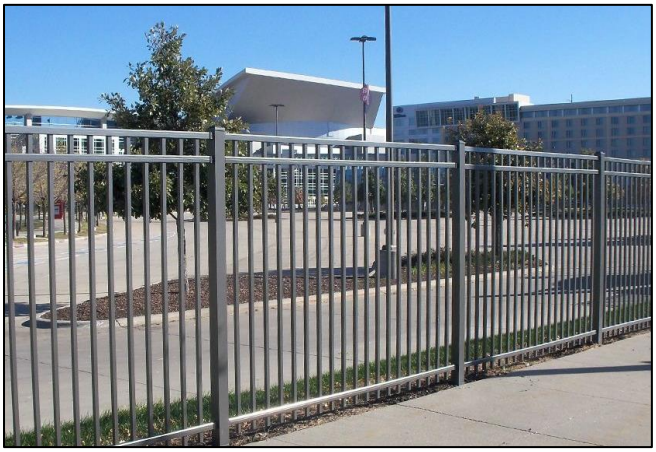


Figure 9 - Alumi-Guard Fencing Example 1

Figure 10 - Alumi-Guard Fencing Example 2

SR-46 – DOT# 535495H (MP QSL 41.64) – SSM Mountable Medians w/ Channelization

SR-46 is a six-lane roadway with an adjacent pedestrian pathway (Columbus People Trail) crossing one main track. The existing warning devices include flashing lights, automatic gates, and two bells. Constant warning time circuitry and a power out indicator are present. This roadway will undergo a two-year-long grade separation project beginning Fall 2019.

Figure 11 SR-46 - Aerial View

The FRA recommended to the diagnostic team that, prior to the start of the project, the pedestrian crossing be designated as a separate crossing with a new DOT number assigned. The new DOT number is required by the FRA because the pedestrian pathway is greater than 25 feet from the edge of the travel way of SR-46. This also allows the pathway to remain within the designated quiet zone boundary following the grade separation of SR-46.

The City plans to install a minimum of 100 feet of channelization (measured from the railroad gate) on top of the existing traversable concrete median each roadway approach. Alternatively, the City will discuss raising the existing median to 6 inches or greater for a minimum length of 100 feet on each roadway approach. Raising median is not preferred, as the roadway will be removed within 3 years and the installation of channelization will be more cost-efficient. Regardless of the City's decision, both improvement options will qualify as a SSM.

All pedestrian improvements at the pathway can be found in the following page under the *Columbus People Trail*.

Proposed Railroad Work (funded by City):

- Assign a new DOT number for Columbus People Trail.

Proposed City Work:

- Install channelization or concrete median on each roadway approach.
- Install all required signs and pavement markings.

Columbus People Trail – DOT# TBD (Approx. MP QSL 41.62) – Pedestrian Only

Columbus People Trail is a pedestrian pathway crossing one main track. The existing warning devices include flashing lights, automatic gates, and two bells. Constant warning time circuitry and a power out indicator are present. The adjacent roadway will undergo a two-year-long grade separation project beginning Fall 2019. The FRA recommended establishing the pathway as a separate crossing with a new DOT number prior to the grade separation project. Establishing the pathway crossing under a new DOT number allows the pathway to remain within the designated quiet zone boundary following the grade separation of SR-46.

Figure 13. SR-46 – Aerial View

Per the FRA Train Horn Rule (49 CFR 222.27(b)), all pedestrian crossing improvements must be determined by a diagnostic team. The diagnostic team recommends the installation of pedestrian escape paths and one-way swing gates on pathway approaches adjacent to existing railroad gates. The team also recommends the placement of edge lines along the pathway approaching the crossing to help guide pedestrians and other users through the crossing.

The diagnostic team also recommends the installation of barrier fencing north of the crossing along Railroad right-of-way (30 feet from the centerline of track) on each side of the tracks to prevent trespassing. The fencing length is recommended to span 40 feet in length on the east side of the tracks and 50 feet in length on the west side of the track. Fencing will be installed starting from the north edge of the pathway. Once SR-46 becomes grade separated, the City will install fencing south of the pathway crossing on each side of the track, each spanning approximately 100 feet in length. Final determination of the span length and location of the fence will be determined by the City and Railroad.

Proposed Railroad Work (funded by City):

- Assign a new DOT number for Columbus People Trail.

Proposed City Work:

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install edge lines on pathway for each approach to the crossing.
- Install barricade fencing along railroad right-of-way.
- Install all required signs and pavement markings.

5th Street – DOT# 535496D – MP QSL 41.20 – Four-Quad Gate System (preferred)

Fifth Street is a two-lane roadway crossing one main track and one industrial track. The existing warning devices include flashing lights and one bell. Constant warning time circuitry and a power out indicator are present. The intersection of 5th Street and Lindsey Street is not signalized but does include a pedestrian hybrid beacon across Lindsey Street along the north edge of 5th Street. The beacon is not interconnected to the railroad warning system.

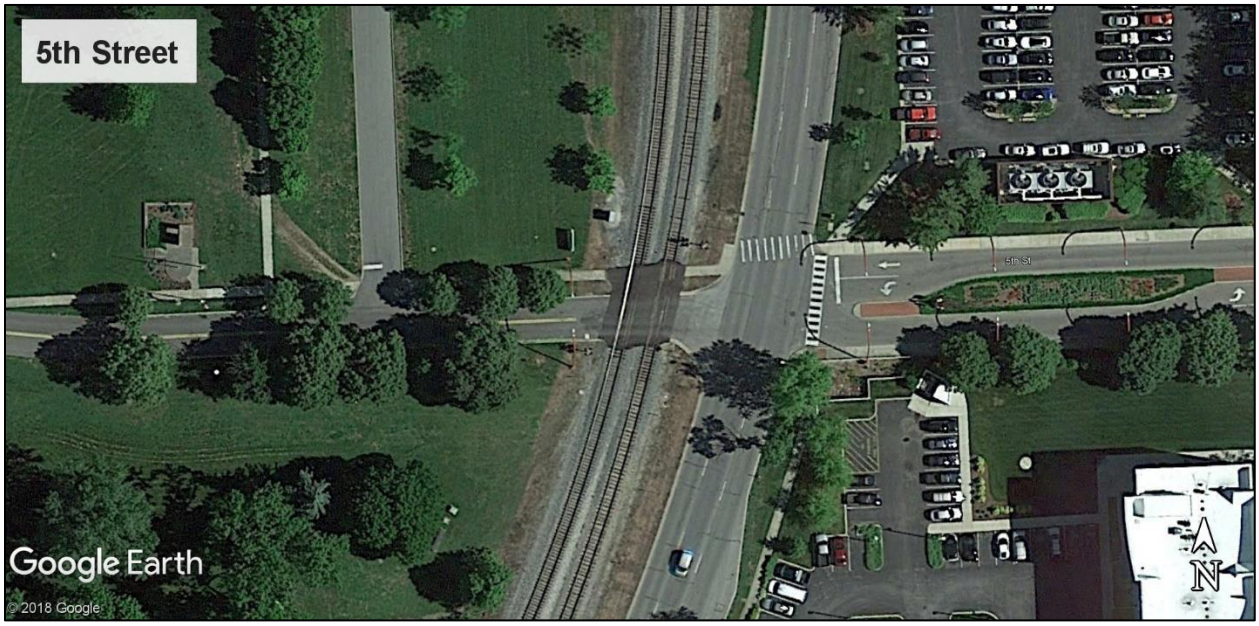


Figure 14. 5th Street – Aerial View

The FRA Train Horn Rule (49 CFR 222) defines the minimum length of a new quiet zone as one-half mile along the length of the railroad and requires that all crossings within one-half mile of the new quiet zone where locomotive horns are routinely sounded be included in the quiet zone. Third Street, which crosses the Columbus Industrial Lead track, is less than one-half mile south of the 5th Street crossing. The FRA stated during the diagnostic meeting that they would not require the City to include the crossings on the Columbus Industrial Lead in the new quiet zone because it is designated as a different railroad subdivision. The City understands that trains will continue to sound their horns on the Industrial Lead.

After evaluation, the diagnostic team agreed on the following quiet zone crossing improvement options at the 5th Street crossing. Final determination of improvement will be made by the City.

Option A – Four-Quadrant Gate System (preferred):

This improvement includes the installation of a four-quadrant gate control system with vehicle presences detection loops. This improvement will qualify as a SSM. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells for each sidewalk approach with pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 100 feet south of the existing roadway and will span north to the 8th Street crossing. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work (funded by City):

- Install four-quadrant gate system w/ vehicle detection.
- Install pedestrian warning devices on sidewalk approaches.

Proposed City Work:

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install barrier fencing.

Option B – SSM Closure:

This improvement includes complete roadway and sidewalk closure at the crossing. The Railroad will remove all warning devices, crossing equipment, and crossing surface. The City will remove all asphalt approaches and sidewalk material within 30 feet of nearest track centerline. The City will install Type III barricade and concrete curb and gutter on both approaches to the crossing to prevent vehicle access.

The diagnostic team recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 100 feet south of the centerline of the existing roadway and will span north to the 8th Street crossing. Final determination of the span length and location of the fence will be determined by the City and Railroad.

Proposed Railroad Work (funded by City):

- Remove crossing surface, warning devices, and crossing equipment.

Proposed City Work:

- Remove asphalt approaches and sidewalks.
- Remove all railroad-related signs and pavement markings.
- Remove existing pedestrian hybrid beacon.
- Install curb and gutter on each approach.
- Install Type III barricades.
- Install barrier fencing.

Option C – Roadway Closure w/ Pedestrian-Only Crossing:

This improvement includes complete roadway closure at the crossing. The existing sidewalk will remain open as a pedestrian crossing. The Railroad will remove all roadway warning devices and roadway crossing surface. The City will install Type III barricade and concrete curb and gutter at both roadway approaches to the crossing to prevent vehicle access to the crossing. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells for each sidewalk approach and pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 100 feet south of the existing sidewalk and will span north to the 8th Street crossing. Final determination of the span length and location of the fence will be determined by the City and Railroad.

Proposed Railroad Work (funded by City):

- Remove crossing surface and warning devices on roadway.
- Install pedestrian warning devices on sidewalk approaches.

Proposed City Work:

- Remove asphalt approaches on roadway.
- Remove all railroad-related signs and pavement markings on roadway.
- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install curb and gutter on each approach.
- Install Type III barricades.
- Install barrier fencing.

Option D – One-Way Street (Westbound):

This improvement includes traffic to be restricted to one-way westbound over the crossing. The Railroad will install flashing lights and one entrance gate east of the tracks. The existing sidewalk will remain open as a pedestrian crossing. Railroad will remove all roadway warning devices and roadway crossing surface. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells for each sidewalk approach and pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 100 feet south of the existing roadway and will span north to the 8th Street crossing. Final determination of the span length and location of the fence will be determined by the City and Railroad.

Proposed Railroad Work (funded by City):

- Remove crossing surface and warning devices on roadway.
- Install pedestrian warning devices on sidewalk approaches.

Proposed City Work:

- Remove asphalt approaches on roadway.
- Remove all railroad-related signs and pavement markings on roadway.
- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install curb and gutter on each approach.
- Install Type III barricades.
- Install barrier fencing.

8th Street – DOT# 535497W – MP QSL 40.98 – Modified SSM Concrete Median

Eighth Street is a two-lane roadway crossing one main track. The existing warning devices include flashing lights and bells. Constant warning time circuitry and a power out indicator are present. The intersection of 8th Street and Lindsey Street is signalized and interconnected to the railroad warning system.

Figure 15. 8th Street – Aerial View

The City plans to install non-traversable concrete median approximately 25 feet in length on the east approach and a minimum of 100 feet in length on the west approach. Final width of the median will be determined by the City. The Railroad will upgrade the existing roadway warning devices to include flashing lights, automatic gates, and bells. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells on both sidewalk approaches with pedestrian escape paths and one-way swing gates adjacent to each railroad gate. This treatment will not qualify as a SSM due to the intersection of 8th Street and Lindsey Street within 60 feet of the proposed railroad gate east of the crossing.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 450 feet to the north from the north edge of the sidewalk and 1,250 feet to the south from the south edge of the roadway. Final determination of the span length and location of the fence will be determined by the City and Railroad.

Proposed Railroad Work (funded by City):

- Remove existing warning devices.
- Install new warning devices with flashing lights, automatic gates, and bells.
- Install pedestrian warning devices with flashing lights, automatic gates, and bells on sidewalk approaches.

Proposed City Work:

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install concrete median on each roadway approach.
- Install barrier fencing.

11th Street – DOT# 535498D – MP QSL 40.84 – SSM Concrete Median

Eleventh Street is a two-lane roadway crossing one main track. The existing warning devices include flashing lights and bells. Constant warning time circuitry and a power out indicator are present. The circular intersection north of the crossing is currently signalized for entering northbound traffic on Brown Street. The existing traffic signal is interconnected to the railroad warning system.

Figure 16. 11th Street – Aerial View

The City plans to install non-traversable concrete median a minimum of 100 feet in length on the east approach and approximately 70 feet in length on the west approach. The Railroad will upgrade the existing warning devices to include flashing lights, automatic gates, and bells. This improvement will qualify as a SSM. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells on all sidewalk and pathway approaches with pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 450 feet to the south from the south edge of the crossing. Final determination of the span length and location of the fence will be determined by the City and Railroad.

Proposed Railroad Work (funded by City):

- Install new warning devices with flashing lights, automatic gates, and bells.
- Install pedestrian warning devices with flashing lights, automatic gates, and bells on sidewalk approaches.

Proposed City Work:

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install concrete median on each roadway approach.
- Install barrier fencing.

Summary of Estimated Quiet Zone Safety Improvement Costs

The Summary of Quiet Zone Options table summarizes the proposed quiet zone improvements and approximate costs for each crossing location and improvement approach. *These are budget estimates to evaluate alternatives for planning purposes only.*

Specific detailed cost estimates should be obtained from Railroad, traffic engineering firms, and construction contractors once the City has determined the final quiet zone plan. Civil engineering and design cost of projects varies widely depending on the level of complexity of each improvement. Typical civil engineering and design cost estimates based on a percentage of total cost may not be accurate for quiet zone construction projects.

Alternatives are provided for comparison of cost and types of quiet zone methods that are available to the City for establishing the quiet zone.

- **Approach 1** – Enough SSMs to reduce the QZRI below RIWH with Four-Quadrant Gate System at 5th Street.
- **Approach 2** – Enough SSMs to reduce the QZRI below RIWH with complete (SSM) closure of 5th Street.
- **Approach 3** – Enough SSMs to reduce the QZRI below RIWH with roadway closure at 5th Street, leaving sidewalk open as pedestrian crossing with warning devices.
- **Approach 4** – Enough SSMs to reduce the QZRI below RIWH with One-Way Street at 5th Street.
- **Approach 5** – SSMs at every crossing w/ no closure.

Safety Improvement Factors

The intent of the quiet zone rule is to provide safety improvements at each crossing that compensate for the elimination of the routine sounding of the locomotive horns. The FRA also provides a quiet zone calculator that is used to generate the existing collision risk with horns, the quiet zone risk, and the risk after safety improvements are implemented. The Quiet Zone Risk Index represents the average severity weighted collision risk for all public highway-rail grade crossings that are part of the quiet zone. The current risk with horns for the existing crossings is 19,856 which increases to 33,120 when the train horns are eliminated. Once the proposed safety improvements are provided under Approach A, for example, the risk is reduced to **9,647** which is a **51%** reduction in collision risk compared to the existing conditions at the crossing today.

In addition to creating a safer crossing for vehicle traffic, the quiet zone plans include safety improvements for pedestrian and bicycle users. The proposed improvements include pedestrian railroad flashing lights and gates that will prevent pedestrians from entering the crossing as a train approaches. The design also includes pedestrian

emergency exit swing gates that provide egress for any pedestrian that is on the crossing as the gates are lowered. The proposed plans include fencing at each crossing to prevent pedestrians from walking around lowered gates and onto the track while a train is approaching. The fencing will also extend along the railroad right-of-way between crossings to prevent trespassers from entering the railroad right of way.

Table 4. Summary of Quiet Zone Options

Street Name	DOT No.	Approach 1 (preferred) QZRI<RIWH w/ Four-Quad Gate System at 5th St	Approach 2 QZRI<RIWH w/ complete closure at 5th St	Approach 3 QZRI<RIWH w/ ped only crossing at 5th St	Approach 4 QZRI<RIWH w/ One-Way at 5th Street	Approach 5 SSMs at every crossing w/ no closure
SR-46	535495H	SSM Channelization	SSM Channelization	SSM Channelization	SSM Channelization	SSM Channelization
5th Street	535496D	SSM Four-Quad Gate System	SSM Closure	Pedestrian Only	SSM One-Way Street	SSM Four-Quad Gate System
8th Street	535497W	Non-SSM Concrete Median	Non-SSM Concrete Median	Non-SSM Concrete Median	Non-SSM Concrete Median	SSM Four-Quad Gate System
11th Street	535498D	SSM Concrete Median	SSM Concrete Median	SSM Concrete Median	SSM Concrete Median	SSM Concrete Median

Approach 1 (preferred) – Enough SSMs to reduce the QZRI below RIWH with Four-Quadrant Gate System at 5th Street:

In this approach, the Railroad will install a four-quadrant gate system with vehicle presences detection at 5th Street. Flashing lights and gates, as well as pedestrian fencing, will be installed to warn pedestrians on the sidewalk approaching the crossing.

The advantages of this option are as follows:

- Maintains vehicle and pedestrian access to Mill Race Park at 5th Street.
- Pedestrian hybrid beacon across Lindsey Street remains.

The disadvantages of this option are as follows:

- Higher construction cost due to four-quadrant gate system.
- Higher annual maintenance cost due to four-quadrant gate systems. (approximately $10,000 per year).

- No Railroad contribution available for closure of 5th Street.
- Requires re-authorization of quiet zone every 2 ½ years.

Approach 2 – Enough SSMs to reduce the QZRI below RIWH with complete (SSM) closure of 5th Street:

This option includes the installation of SSM-compliant channelization at SR-46 SSM-compliant concrete medians at 11th Street, complete (SSM) closure of 5th Street, and Non-SSM-compliant concrete medians at 8th Street. This option uses the method of installing enough SSM-medians/channelization to reduce the QZRI below the RIWH.

The advantages of this approach are as follows:

- Lowest-cost approach for City due to no Railroad upgrades at 5th Street.
- Requires only two crossing warning system upgrades (8th Street and 11th Street).
- Railroad contribution is available for closure of 5th Street.
- Railroad will raise speed by 10 MPH (per diagnostic discussion).
  No lifetime maintenance cost for four-quadrant gate system.

The disadvantages of this approach are as follows:

- 5th Street crossing is completely closed for vehicles and pedestrians, eliminating one of three access points into Mill Race Park.
- Removal of pedestrian hybrid beacon across Lindsey Street.
- Requires re-authorization of quiet zone every 2 ½ years instead of 4 ½ years when every crossing is treated with SSM compliant improvements.

Approach 3 – Enough SSMs to reduce the QZRI below RIWH with roadway closure at 5th Street, leaving sidewalk open as pedestrian only crossing with warning devices:

This option is identical to Approach 1 with the exception of 5th Street. The roadway portion of the 5th Street crossing will be closed, while the sidewalk portion will remain open. Flashing lights and gates, as well as pedestrian fencing, will be installed to warn pedestrians on the sidewalk approaching the crossing.

The advantages of this approach are as follows:

- Maintains pedestrian access to Mill Race Park at 5th Street.
- Pedestrian hybrid beacon across Lindsey Street remains.
- Lower cost due to no railroad upgrade for roadway at 5th Street (only needed on sidewalk).
- No lifetime maintenance cost for a four-quadrant gate system.

The disadvantages of this approach are as follows:

- 5th Street crossing is completely closed for vehicles, eliminating one of three access points into Mill Race Park.
- Requires re-authorization of quiet zone every 2 ½ years.

Approach 4 – Enough SSMs to reduce the QZRI below RIWH with One-Way Street at 5th Street:

This option includes installation of SSM compliant quiet zone treatments at every crossing in the quiet zone without closing 5th Street. This includes the installation of SSM-compliant channelization at SR-46, one-way street with gates at 5th Street, and SSM-compliant concrete median at 11th Street.

The advantages of this option are as follows:

- Maintains vehicle and pedestrian access to Mill Race Park at 5th Street.
- Pedestrian hybrid beacon across Lindsey Street remains.
- No four-quadrant gate system installation or maintenance.

The disadvantages of this option are as follows:

- Restricted directionality of 5th Street across tracks to west-bound only (though it can be reversed with traffic control).
- No Railroad contribution available for closure of 5th Street.
- Requires re-authorization of quiet zone every 2 ½ years instead of 4 ½ years when every crossing is treated with SSM compliant improvements.

Approach 5 – SSMs at every crossing w/ no closures:

This option includes installation of SSM compliant quiet zone treatments at every crossing in the quiet zone without closing 5th Street. This includes the installation of SSM-compliant channelization at SR-46, four-quadrant gate systems at 5th Street and 8th Street, and SSM-compliant concrete median at 11th Street.

The advantages of this option are as follows:

- Requires re-authorization of quiet zone every 4 ½ years.
- Establishment of QZ not based on risk calculations for each crossing.

The disadvantages of this option are as follows:

- Higher cost due to four-quadrant gate system installation at 5th Street and 8th Street.

Higher annual maintenance cost due to four-quadrant gate systems. (approximately $10,000 per year per system).

Construction Cost

The following tables provide break downs of the estimated construction cost for each quiet zone option. The cost is separated into work to be completed by the City and work completed by the Railroad. However, the total estimated cost is funded by the City to create the quiet zone.

Table 5a. Summary of Quiet Zone Construction Approaches 1 & 2

Street	Approach 1		Approach 2	
	City	Railroad	City	Railroad
SR 46	$19,680	$0	$19,680	$0
Columbus Peoples Trail	$14,792	$0	$14,792	$0
5th Street	$58,617	$500,000	$75,360	$0
8th Street	$101,990	$300,000	$101,990	$300,000
11th Street	$67,517	$350,000	$67,117	$350,000
Sub-Total Construction Cost	**$262,596**	**$1,150,000**	**$278,939**	**$650,000**
Traffic Control/Protection (3%)	$7,878	N/A	$8,368	N/A
Design Engineering (25%)	$65,649	N/A	$69,735	N/A
Quiet Zone Design Engineering	$20,000	N/A	$40,000	N/A
Contingency (20%)	$52,519	$230,000	$55,788	$130,000
Sub-Total Additional Cost	**$146,046**	**$230,000**	**$173,891**	**$130,000**
Sub-Total	**$408,642**	**$1,380,000**	**$452,830**	**$780,000**
TOTAL ESTIMATED COST	**$1,788,642**		**$1,232,830**	

Table 5b. Summary of Quiet Zone Construction Approaches 3 & 4

Street	Approach 3		Approach 4	
	City	Railroad	City	Railroad
SR 46	$19,680	$0	$19,680	$0
Columbus Peoples Trail	$14,792	$0	$14,792	$0
5th Street	$63,525	$250,000	$58,825	$225,000
8th Street	$101,990	$300,000	$101,990	$300,000
11th Street	$67,117	$350,000	$67,117	$350,000
Sub-Total Construction Cost	**$267,104**	**$900,000**	**$262,404**	**$875,000**
Traffic Control/Protection (3%)	$8,013	N/A	$7,872	N/A
Design Engineering (25%)	$66,776	N/A	$65,601	N/A
Quiet Zone Design Engineering	$20,000	N/A	$40,000	N/A
Contingency (20%)	$53,421	$180,000	$52,481	$175,000
Sub-Total Additional Cost	**$148,210**	**$180,000**	**$165,954**	**$175,000**
Sub-Total	**$415,314**	**$1,080,000**	**$428,358**	**$1,050,000**
TOTAL ESTIMATED COST	**$1,495,314**		**$1,478,358**	

Table 5c. Summary of Quiet Zone Construction Approach 5

Street	Approach 5	
	City	Railroad
SR 46	$19,680	$0
Columbus Peoples Trail	$14,792	$0
5th Street	$58,617	$500,000
8th Street	$68,240	$500,000
11th Street	$67,117	$350,000
Sub-Total Construction Cost	**$228,446**	**$1,350,000**
Traffic Control/Protection (3%)	$6,853	N/A
Design Engineering (25%)	$57,112	N/A
Quiet Zone Design Engineering	$40,000	N/A
Contingency (20%)	$45,689	$270,000
Sub-Total Additional Cost	**$149,654**	**$270,000**
Sub-Total	**$378,100**	**$1,620,000**
TOTAL ESTIMATED COST	**$1,998,100**	

Maintenance Cost

Signs and Pavement Markings – (Minimal Maintenance Cost)

Many of the signs and pavement markings recommended by the diagnostic team are already in place and being maintained by the City. The additional signs and pavement marking will have a minimal impact in additional cost to the City. The maintenance cost should be included in the annual budget cost for maintaining signs and pavement markings throughout the City.

Concrete Sidewalks and Medians – (Minimal Maintenance Cost)

The proposed concrete sidewalks and medians will require minimal additional maintenance cost for the City. These new sidewalks and medians, once installed, should be included in the annual maintenance budget of the City for routine concrete repair.

Four-Quadrant Gate Systems – (High Maintenance Cost)

The Louisville and Indiana Railroad (LIRC) does not charge cities for maintenance cost of railroad flashing lights and gates and/or cantilevers with flashing lights. However, they may require cities to pay maintenance cost for four quadrant gate systems. This is typically $6,000 to $10,000 per year for the life of the crossing. The City may also be responsible for future replacement cost if needed. Final determination of maintenance cost will be made prior to construction.

V. Quiet Zone Implementation Process

Once the City has made the determination to proceed with implementation of the quiet zone, there is a sequence of events that must occur. Those events are described below.

USDOT Grade Crossing Inventory Updates – Existing Conditions

The City along with the assistance of the Railroad will be required to update USDOT Grade Crossing Inventory Forms for each of the highway-rail grade crossings within the limits of the proposed quiet zone to reflect the existing conditions. An average daily traffic count for each affected roadway will be required. Once the City has collected traffic data for all crossings located in the quiet zone, the grade crossing inventory can be updated.

Notice of Intent to Create a New Quiet Zone

The purpose of the Notice of Intent (NOI) is to provide notice to the Railroads operating over the public highway-rail grade crossings within the quiet zone, the highway or traffic control authority or law enforcement authority having jurisdiction over vehicular traffic at grade crossings within the quiet zone, the State agency responsible for highway and road safety that the City is planning on creating a new quiet zone. The NOI provides an opportunity for the Railroads and the agencies to give input to the City during the quiet zone development process. The agencies and railroads will be given 60 days to provide information and comments to the public City.

The NOI must contain the following information:

1. A list of each public highway-rail grade crossing, private highway-rail grade crossing, and pedestrian crossing within the proposed quiet zone. The crossings are to be identified by both the U.S. DOT Crossing Inventory Number and the street or highway name.
2. A statement of the time period within which the restrictions would be in effect on the routine sounding of train horns (i.e., 24 hours or from 10 p.m. to 7 a.m.).
3. A brief explanation of the City's tentative plans for implementing improvements within the proposed quiet zone.
4. The name and title of the person who will act as the point of contact during the quiet zone development process and how that person can be contacted.
5. A list of the names and addresses of each party that will receive a copy of the NOI.

The City must provide the written NOI, by certified mail, return receipt requested to the Railroad(s). Although it is not required by the rule, it is recommended to also send a copy of the NOI to the Associate Administrator of the Federal Railroad Administration. If the City receives comments within the sixty-day period, assistance from the FRA may be required to resolve any of the issues raised. Since we will include the Railroad and the FRA in the planning process, it is not anticipated that there will be any issues raised during the NOI process.

Diagnostic Team Review

The diagnostic team review, conducted on December 18, 2018, provided the information necessary to develop a plan and budgetary costs for proposed improvements throughout the quiet zone. Although a diagnostic team inspection is not required, it is highly recommended to allow the Railroad, and FRA, the opportunity to be involved from the beginning and provide recommendations during the design process and prevent issues from occurring late in the process. This is also the time when project details can be finalized with all stakeholders involved in the decision-making process. The diagnostic team must, at a minimum, consist of representatives from the Railroad, and the City. It is also recommended to include a representative from the FRA to ensure that the proposed quiet zone meets all the necessary requirements.

Implementation of Improvements

Upon conclusion of the diagnostic team review, specific recommendations will be developed and responsibility for work to be done will be defined. The following steps are required for implementation of the improvement plan.

1. The City may be requested to enter into a preliminary engineering agreement with the Railroad authorizing preparation of plans and estimates for the proposed improvements to be performed by the Railroad. Railroads typically require a deposit of $10,000 to $25,000 per crossing signal location when executing the preliminary engineering agreement. This will allow the Railroad to complete necessary field work to provide the city with engineered estimates for the proposed quiet zone improvements.
2. The Railroad will prepare project agreements, plans, and estimates for approval and execution by the City.
3. Once the agreements have been fully executed, the Railroad will begin assembling the material and schedule proposed improvements.
4. Upon completion of improvements by the Railroad, the City will place all the appropriate signing as required in the implementation plan.

USDOT Grade Crossing Inventory Updates – After Improvements

The City will also be required to update USDOT Grade Crossing Inventory Forms for each of the highway-rail grade crossing within the limits of the proposed quiet zone to reflect the conditions after the proposed improvements. The Grade Crossing Inventory Forms will be included as part of the Notice of Quiet Zone Establishment to be filed.

Notice of Quiet Zone Establishment

The purpose of the Notice of Quiet Zone Establishment (NOE) is to provide a means for the City to formally advise affected parties that a new quiet zone is being established. All quiet zone improvements need to be in place and confirmed by the City and/or its consultant that the proposed improvement have been installed per the quiet zone design and meets FRA requirements. Once that is confirmed, the City must provide written notice, by certified mail, return receipt requested, to the following:

1. Louisville and Indiana Railroad (LIRC)
2. CSX Transportation (CSX)
3. City of Columbus Police Department
4. Indiana DOT – Rail Programs Division
5. Associate Administrator for the Federal Railroad Administration (FRA)

The NOE must contain the following information:

1. The date upon which the quiet zone will be established, but in no event, shall the date be earlier than 21 days after the date of the mailing.

2. A list of each public highway-rail grade crossing and private highway-rail grade crossing within the quiet zone, identified by both U.S. DOT National Highway-Rail Grade Crossing Inventory Number and street or highway name.

3. A specific reference to the regulatory provision that provides the basis for quiet zone establishment. For example, if the improvements are completed as proposed, the appropriate regulatory provision is § 222.39(a)(1). This indicates that the quiet zone is established by Public Authority Designation utilizing an SSM treatment the only public highway-rail grade crossing in the corridor.

4. A statement affirming that the State agency responsible for grade crossing safety and all affected railroads were provided an opportunity to participate in the Diagnostic Team review as required under § 222.25 (private crossings). The Notice of Quiet Establishment shall also include a list of recommendations by the Diagnostic Team.

5. A statement of the time period within which restrictions on the routine sounding of the locomotive horn will be imposed (i.e., 24 hours or from 10 p.m. until 7 a.m.)

6. An accurate and complete Grade Crossing Inventory Form for each public highway-rail grade crossing and private highway-rail grade crossing within the quiet zone that reflects the conditions existing at the crossing before any new SSMs or ASMs were implemented.

7. An accurate, complete and current Grade Crossing Inventory Form for each public highway-rail grade crossing and private highway-rail grade crossing within the quiet zone that reflects SSMs and ASMs in place upon establishment of the quiet zone. SSMs and ASMs that cannot be fully described on the Inventory Form shall be separately described.

8. A statement affirming that the Notice of Intent was provided in accordance with the rule. This statement shall also state the date on which the Notice of Intent was mailed.

9. The name and title of the person responsible for monitoring compliance with the requirements of this part and the way that person can be contacted.

10. A list of the name and address of each party that is receiving a copy of the Notice of Quiet Establishment.

11. A statement signed by the chief executive officer of each public authority participating in the establishment of the quiet zone, in which the chief executive officer shall certify that the information submitted by the public authority is accurate and complete to the best of his/her knowledge and belief.

Quiet Zone Creation and Continuation

Once the NOE has been filed properly, the quiet zone will be created on the establishment date described in the notice. It will then be the City's responsibility to maintain all the appropriate signs, pavement markings, and medians as well as the sight distance improvements for the crossings. The Railroad will maintain the flashing lights and gates at the affected crossings. The project agreement will define cost responsibility associated with the Railroad's maintenance.

The City is responsible for periodically submitting a Notice of Continuation for the Quiet Zone. Timing for these notices are as follows:

> **For quiet zones established using SSMs at every crossing:** Every 4 ½ to 5 years after the date of the quiet zone establishment notice and thereafter each Notice of Continuation.
>
> **For quiet zones established *NOT* using SSMs at every crossing:** Every 2 ½ to 3 years after the date of the quiet zone establishment notice, and thereafter each Notice of Continuation.

The Notice of Continuation must perform the following functions:

1. Affirm in writing to the Associate Administrator that the SSMs implemented within the quiet zone continue to conform to the requirements of appendix A of this part. Copies of such affirmation must be provided by certified mail, return receipt requested, to the parties identified in § 222.43(a)(3) of this part; and
2. Provide to the Associate Administrator an up-to-date, accurate, and complete Grade Crossing Inventory Form for each public highway-rail grade crossing and private highway-rail grade crossing within the quiet zone. This will include up-to-date traffic counts at the affected roadways.

VI. Liability

During the development of the federal rule for use of locomotive horns, several agencies and railroads provided comments related to the lack of guidance concerning liability when a crash occurs at a highway-rail grade crossing within a quiet zone established in accordance with the rule. The comments ranged from those who felt the rule should include language that local communities should not be liable for crashes occurring at crossing within the quiet zone to those who felt the communities implementing the quiet zones should assume all risk associated with the quiet zones. In Part II Department of Transportation Federal Railroad Administration 49 CFR Parts 222 and 229 Use of Locomotive Horns at Highway-Rail Grade Crossings; Interim Final Rule issued on December 18, 2003, (See Appendix D) the FRA concluded that the rule is intended to remove failure to sound the horn as a cause of action in a lawsuit involving crossings within a quiet zone. After reviewing the nature of this rule and its federal requirements, the FRA added that they expect the courts will determine liability issues based on facts of each case. As a result, the existing final rules issued in 2005 does not include guidance for or requirement of an agency to accept liability for crashes at crossings located in a quiet zone they establish under this rule. Additional detail on this subject is provided in Appendix D

APPENDIX A: City of Columbus Sign-In Sheet

Columbus, IN - Quiet Zone
Diagnostic Team Sign-In
12/18/18

Name	Organization	Phone Number	Email
Rooke Jackson	CTC	817-886-8208	rjackson@ctcinc.com
Tim Oster	CTC	817-713-5899	toster@ctcinc.com
Andrew Beckort	City	812-376-2540	abeckort@columbus.in.gov
James Connolly	LIRC	502 297 7320	Jconnolly@anacostia.com
Robert Crawford	FRA	817.235.5397	robert.d.crawford@dot.gov
Kelly Geckler	City	812-376-2547	kgeckler@columbus.in.gov
Tammy Wagner		815-715-6034	tammy.wagner@dot.gov

APPENDIX B: Final Diagnostic Notes

DRAFT Diagnostic Team Inspection Notes

Agency: City of Columbus, IN (City)

Railroad: Louisville & Indiana Railroad (Railroad)

Location: SR-46 through 11th Street

Date: December 18, 2018

Attendees:

Tim Oster – CTC
Rooke Jackson – CTC
Andrew Beckort – City of Columbus
Kelly Geckler – City of Columbus
James Connolly – Railroad
Tammy Wagner – FRA
Robert Crawford – FRA

(See sign-in sheet in Attachment A)

General Information:

The City plans to establish a quiet zone at four public at-grade crossings by using enough Supplemental Safety Measures (SSMs) at crossings to reduce the corridor's Quiet Zone Risk Index below the Risk Index With Horns (49 CFR 222.39(a)(3)). All crossings not treated with an SSM will be treated with a Modified SSM. Modified SSMs will not be considered in the quiet zone calculations. Crossing layout sketches for proposed improvements are included in Attachment B.

The following general notes apply to the quiet zone:

- Maximum allowable train speed is 49 MPH at SR-46 and 20 MPH at 5th Street, 8th Street, and 11th Street.
- The corridor has an average of 13 trains per day.
- CSX Transportation has operating rights through all crossings in the corridor.
- MUTCD-compliant signs and pavement markings will be installed at each crossing including the "No Train Horn" signs required under the train horn rule.
- All sidewalk and pathway crossings are to have detectable warning installed on each approach, 15 feet from the centerline of track.
- The City will install pedestrian escape paths with one-way swing gates adjacent to the automatic gate on each pathway or sidewalk approach. This allows for an exit path for pedestrians between the gates while railroad gates are lowered as well as prevent access between the lowered gates during signal system activation.
- All channelization and median lengths are measured from the railroad gate.
- All non-traversable concrete median must be a minimum of 6 inches in height.

Proposed Safety Improvements:

SR-46 – DOT# 535495H (MP QSL 41.64) – SSM Mountable Medians w/ Channelization

SR-46 is a six-lane roadway with an adjacent pedestrian pathway (Columbus People Trail) crossing one main track. The existing warning devices include flashing lights, automatic gates, and two bells. Constant warning time circuitry and a power out indicators are present. This roadway will undergo a two-year-long grade separation project beginning Fall 2019.

The FRA recommended to the diagnostic team that, prior to the start of the project, the pedestrian crossing be designated as a separate crossing with a new DOT number assigned. The new DOT number is required by the FRA because the pedestrian pathway is greater than 25 feet from the edge of the travel way of SR-46. This also allows the pathway to remain within the designated quiet zone boundary following the grade separation of SR-46.

The City plans to install a minimum of 100 feet of channelization (measured from the railroad gate) on top of the existing traversable concrete median each roadway approach. Alternatively, the City will discuss raising the existing median to 6 inches or greater for a minimum length of 100 feet on each roadway approach. Raising median is not preferred, as the roadway will be removed within 3 years and the installation of channelization will be more cost-efficient. Regardless of the City's decision, both improvement options will qualify as a SSM.

The diagnostic team recommends the installation of pedestrian escape paths and one-way swing gates on pathway approaches adjacent to existing railroad gates. The team also recommends the placement of edge lines along the pathway approaching the crossing to help guide pedestrians and cyclists through the crossing.

The diagnostic team also recommends the installation of barrier fencing north of the crossing along Railroad right-of-way (30 feet from the centerline of track) on each side of the tracks to prevent trespassing. The fencing length is recommended to span 40 feet in length on the east side of the tracks and 100 feet in length on the west side of the track. Fencing will be installed starting from the north edge of the pathway. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work:

- Assign a new DOT number for Columbus People Trail.

Proposed City Work:

- Install channelization or concrete median on each roadway approach.
- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install edge lines on pathway for each approach to the crossing.
- Install barricade fencing along railroad right-of-way.
- Install all required signs and pavement markings.

5th Street – DOT# 535496D – MP QSL 41.20 – *Various Options*

Fifth Street is a two-lane roadway crossing one main track and one industrial track. The existing warning devices include flashing lights and one bell. Constant warning time circuitry and a power out indicator are present. The intersection of 5th Street and Lindsey Street is not signalized but does include a pedestrian hybrid beacon across Lindsey Street along the north edge of 5th Street. The beacon is not interconnected to the railroad warning system.

The FRA Train Horn Rule (49 CFR 222) defines the minimum length of a new quiet zone as one-half mile along the length of the railroad and requires that all crossings within one-half mile of the new quiet zone where locomotive horns are routinely sounded be included in the quiet zone. Third Street, which crosses the Columbus Industrial Lead track, is less than one-half mile south of the 5th Street crossing. The FRA stated during the diagnostic meeting that they would not require the City to include the crossings on the Columbus Industrial Lead in the new quiet zone because it is designated as a different railroad subdivision. The City understands that trains will still sound their horns on the Industrial Lead.

The diagnostic team agreed on the following crossing improvement options at the 5th Street crossing. Final determination of improvement will be made by the City.

Option A – Four-Quadrant Gate Control System:
This improvement includes the installation of a four-quadrant gate control system with vehicle presences detection loops. This improvement will qualify as a SSM. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells for each sidewalk approach with pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 1,250 feet to the north from the north edge of the crossing and 100 feet to the south from the south edge of the crossing. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work:

- Remove existing warning devices and crossing equipment.
- Install four-quadrant gate system w/ vehicle detection.
- Install pedestrian warning devices on sidewalk approaches.

Proposed City Work:

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install barrier fencing.

Option B – SSM Closure:
This improvement includes complete roadway and sidewalk closure at the crossing. The Railroad will remove all warning devices, crossing equipment, and crossing surface. The City will remove all asphalt approaches and sidewalk material within 30 feet of nearest track centerline. The City will install Type III barricade and concrete curb and gutter on both approaches to the crossing to prevent vehicle access.

The diagnostic team recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 100 feet south and 1,250 feet north of the centerline of the existing roadway. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work:

- Remove crossing surface, warning devices, and crossing equipment.

Proposed City Work:

- Remove asphalt approaches and sidewalks.
- Remove all railroad-related signs and pavement markings.
- Remove existing pedestrian hybrid beacon.
- Install curb and gutter on each approach.
- Install Type III barricades.
- Install barrier fencing.

Option C – Roadway Closure w/ Pedestrian-Only Crossing:
This improvement includes complete roadway closure at the crossing. The existing sidewalk will remain open as a pedestrian crossing. The Railroad will remove all roadway warning devices and roadway crossing surface. The City will install Type III barricade and concrete curb and gutter at both roadway approaches to the crossing to prevent vehicle access to the crossing. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells for each sidewalk approach and pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 1,250 feet to the north from the north edge of the crossing and 125 to the south from the south edge of the existing sidewalk. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work:

- Remove crossing surface and warning devices on roadway.
- Install pedestrian warning devices on sidewalk approaches.

Proposed City Work:

- Remove asphalt approaches on roadway.
- Remove all railroad-related signs and pavement markings on roadway.

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install curb and gutter on each approach.
- Install Type III barricades.
- Install barrier fencing.

8th Street – DOT# 535497W – MP QSL 40.98 – Modified SSM Concrete Median

Eighth Street is a two-lane roadway crossing one main track. The existing warning devices include flashing lights and bells. Constant warning time circuitry and a power out indicator are present. The intersection of 8th Street and Lindsey Street is signalized and interconnected to the railroad warning system.

The City plans to install non-traversable concrete median approximately 25 feet in length on the east approach and a minimum of 100 feet in length on the west approach. Final width of the median will be determined by the City. The Railroad will upgrade the existing roadway warning devices to include flashing lights, automatic gates, and bells. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells on both sidewalk approaches with pedestrian escape paths and one-way swing gates adjacent to each railroad gate. This treatment will not qualify as a SSM due to the intersection of 8th Street and Lindsey Street within 60 feet of the proposed railroad gate east of the crossing.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 450 feet to the north from the north edge of the sidewalk and 1,250 feet to the south from the south edge of the roadway. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work:

- Remove existing warning devices.
- Install new warning devices with flashing lights, automatic gates, and bells.
- Install pedestrian warning devices with flashing lights, automatic gates, and bells on sidewalk approaches.

Proposed City Work:

- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install concrete median on each roadway approach.
- Install barrier fencing.

11th Street – DOT# 535498D – MP QSL 40.84 – SSM Concrete Median

Eleventh Street is a two-lane roadway crossing one main track. The existing warning devices include flashing lights and bells. Constant warning time circuitry and a power out indicator are present. The circular intersection north of the crossing is currently signalized for entering northbound traffic on Brown Street. The existing traffic signal is interconnected to the railroad warning system.

The City plans to install non-traversable concrete median a minimum of 100 feet in length on the east approach and approximately 70 feet in length on the west approach. The Railroad will upgrade the existing warning devices to include flashing lights, automatic gates, and bells. This improvement will qualify as a SSM. The diagnostic team recommends the installation of flashing lights, automatic gates, and bells on all sidewalk and pathway approaches with pedestrian escape paths and one-way swing gates adjacent to each railroad gate.

The diagnostic team also recommends the installation of barrier fencing along Railroad right-of-way (30 feet from the centerline of track) on the west side of the tracks to deter trespassers. Fencing will span approximately 450 feet to the south from the south edge of the crossing. Final determination of the span length and location of the fence will be determined by the City.

Proposed Railroad Work:

- Remove existing warning devices.
- Install new warning devices with flashing lights, automatic gates, and bells.
- Install pedestrian warning devices with flashing lights, automatic gates, and bells on sidewalk approaches.

Proposed City Work:

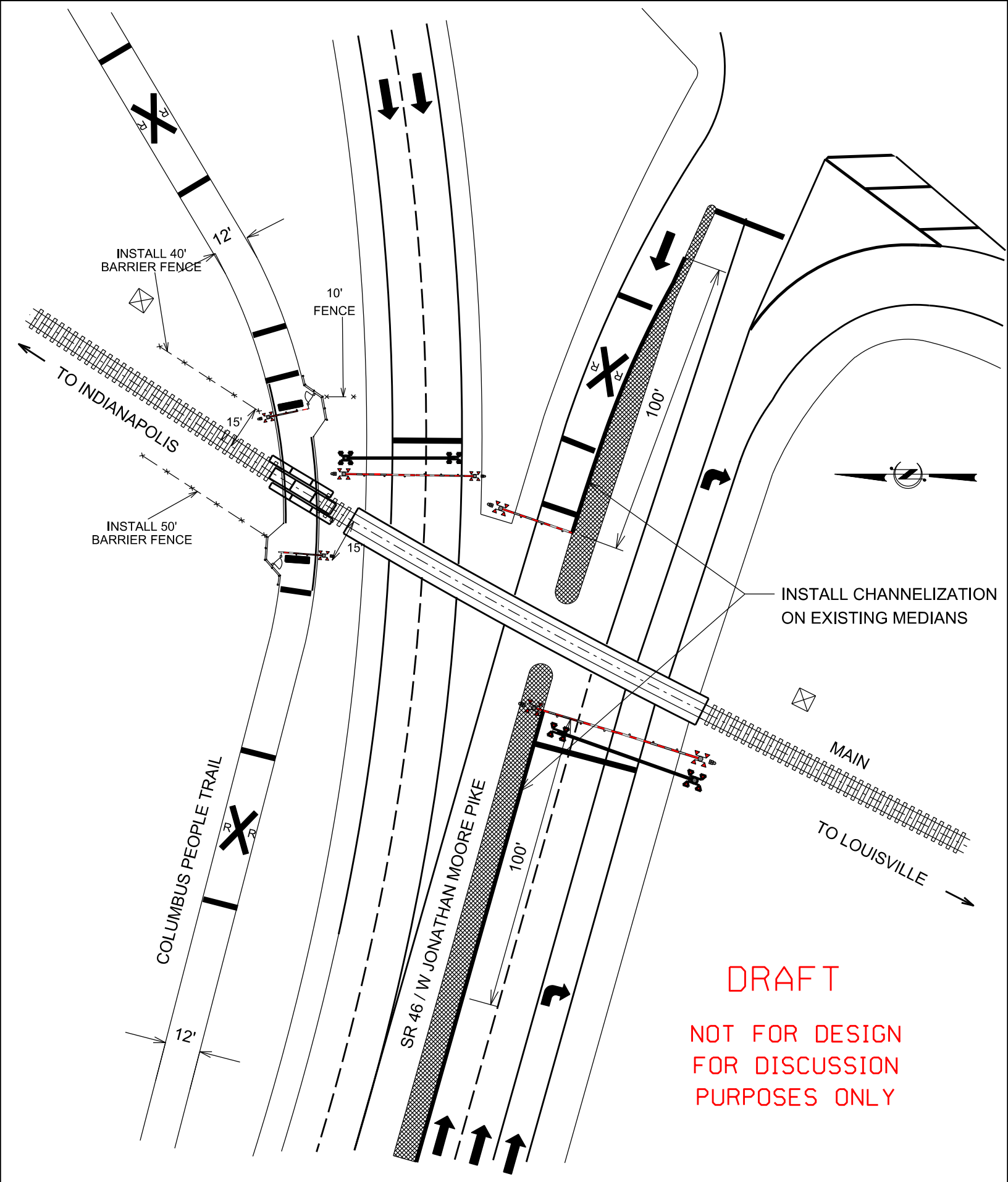
- Install pedestrian escape path w/ escape gates on each approach to the pathway crossing.
- Install concrete median on each roadway approach.
- Install barrier fencing.

ATTACHMENT A:
Diagnostic Sign-In Sheet

Columbus, IN - Quiet Zone
Diagnostic Team Sign-In
12/18/18

Name	Organization	Phone Number	Email
Rooke Jackson	CTC	817-886-8208	rjackson@ctcinc.com
Tim Oster	CTC	817-713-5899	toster@ctcinc.com
Andrew Beckort	City	812-376-2540	abeckort@columbus.in.gov
James Connolly	LIRC	502 297 7320	Jconnolly@anacostia.com
Robert Crawford	FRA	817.235.5397	robert.d.crawford@dot.gov
Kelly Geckler	City	812-376-2547	kgeckler@columbus.in.gov
Tammy Wagner		815-715-6034	tammy.wagner@dot.gov

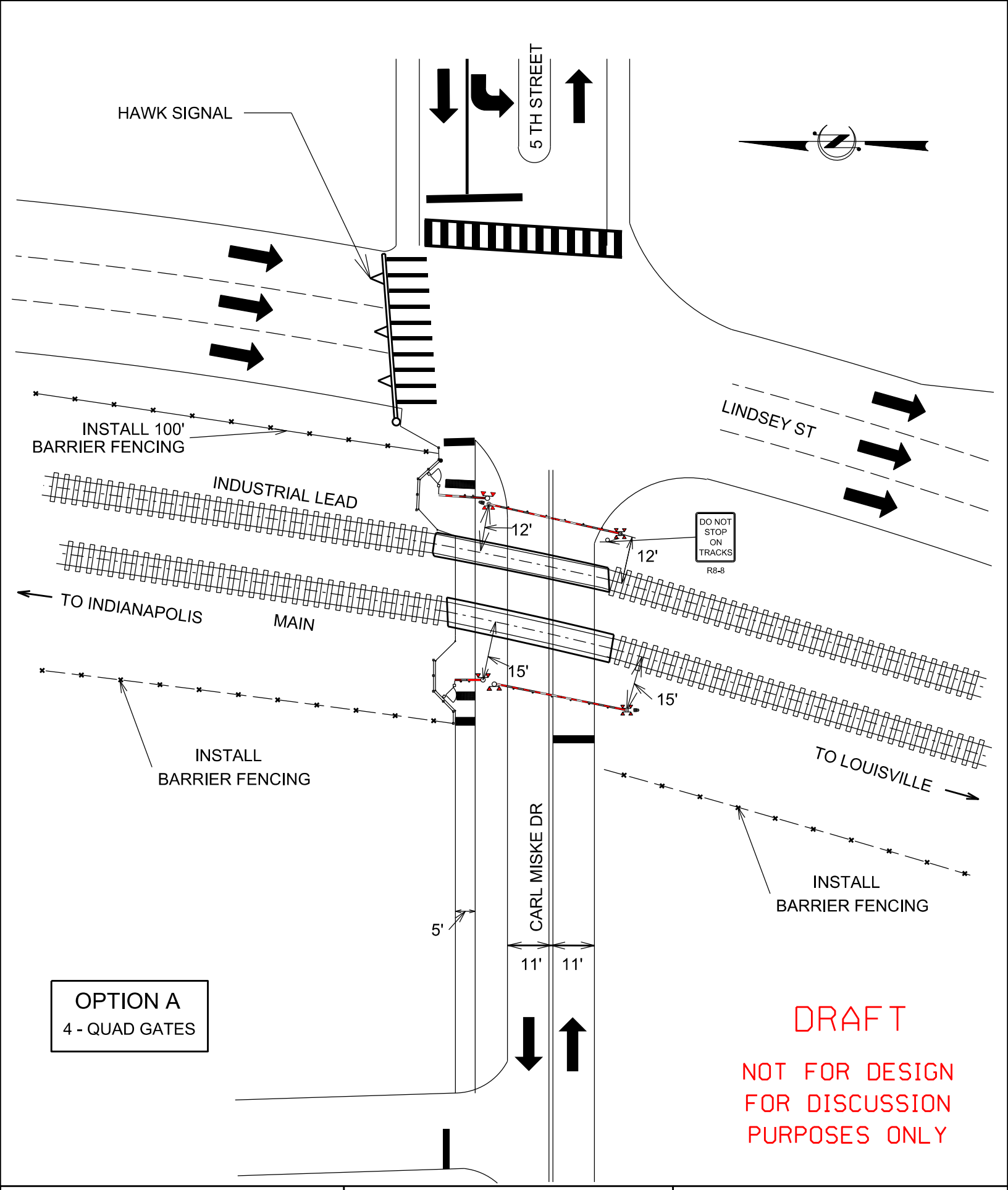
ATTACHMENT B:
Crossing Layout Sketches



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
SR 46
ADT 34,854

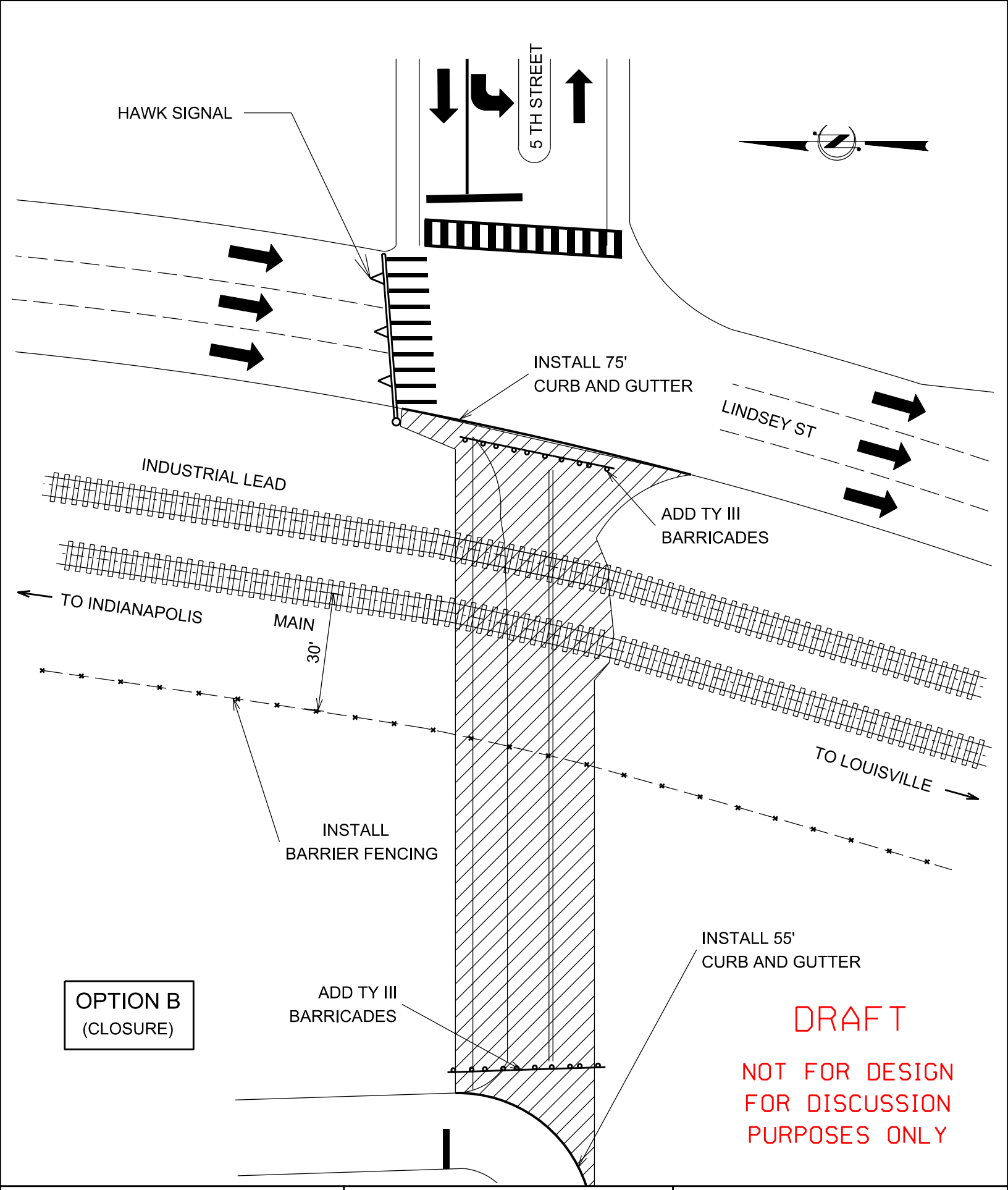
Louisville & Indiana RR
DOT 535495H
RRMP 41.64
SCALE: 1' = 40'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

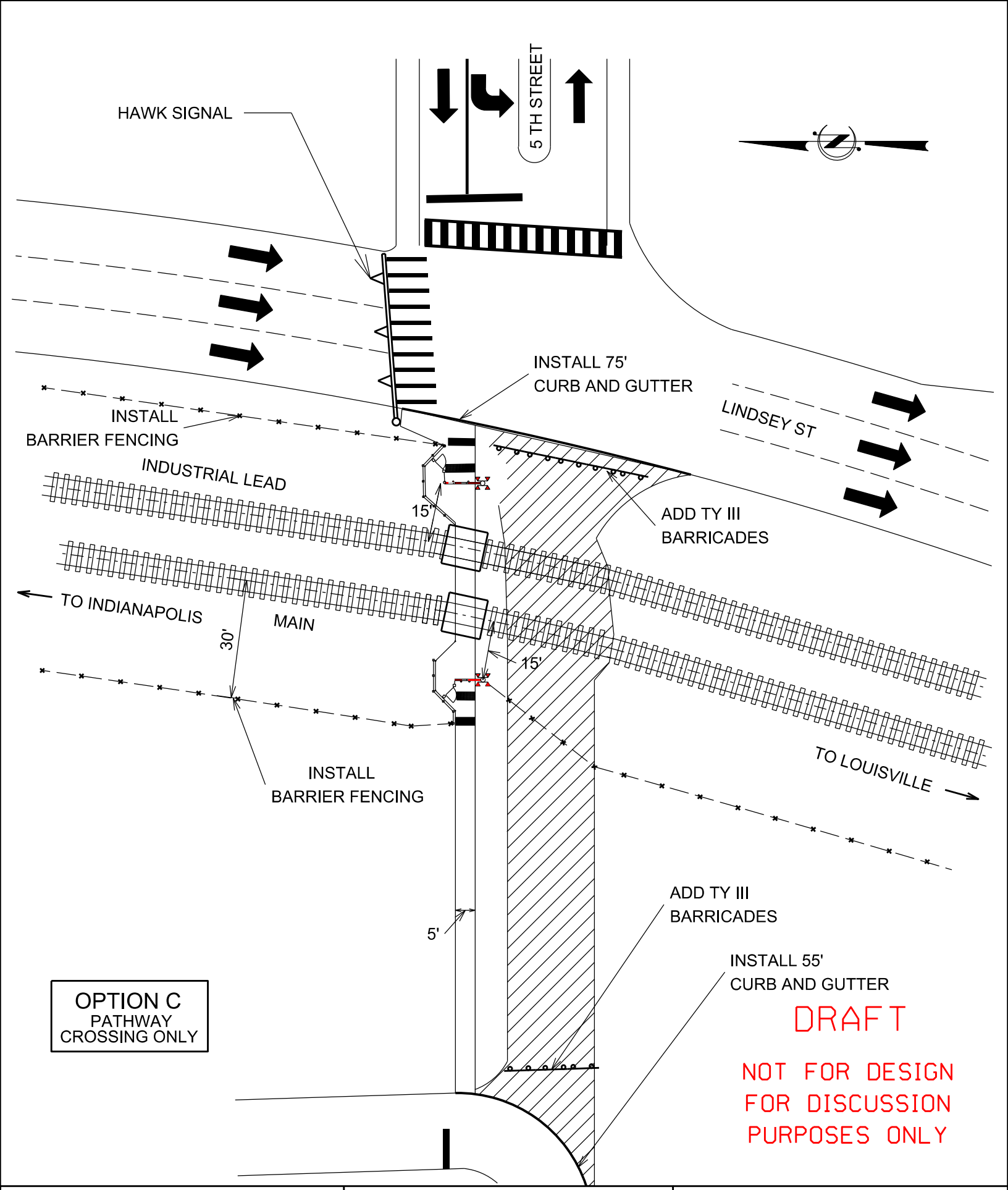
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

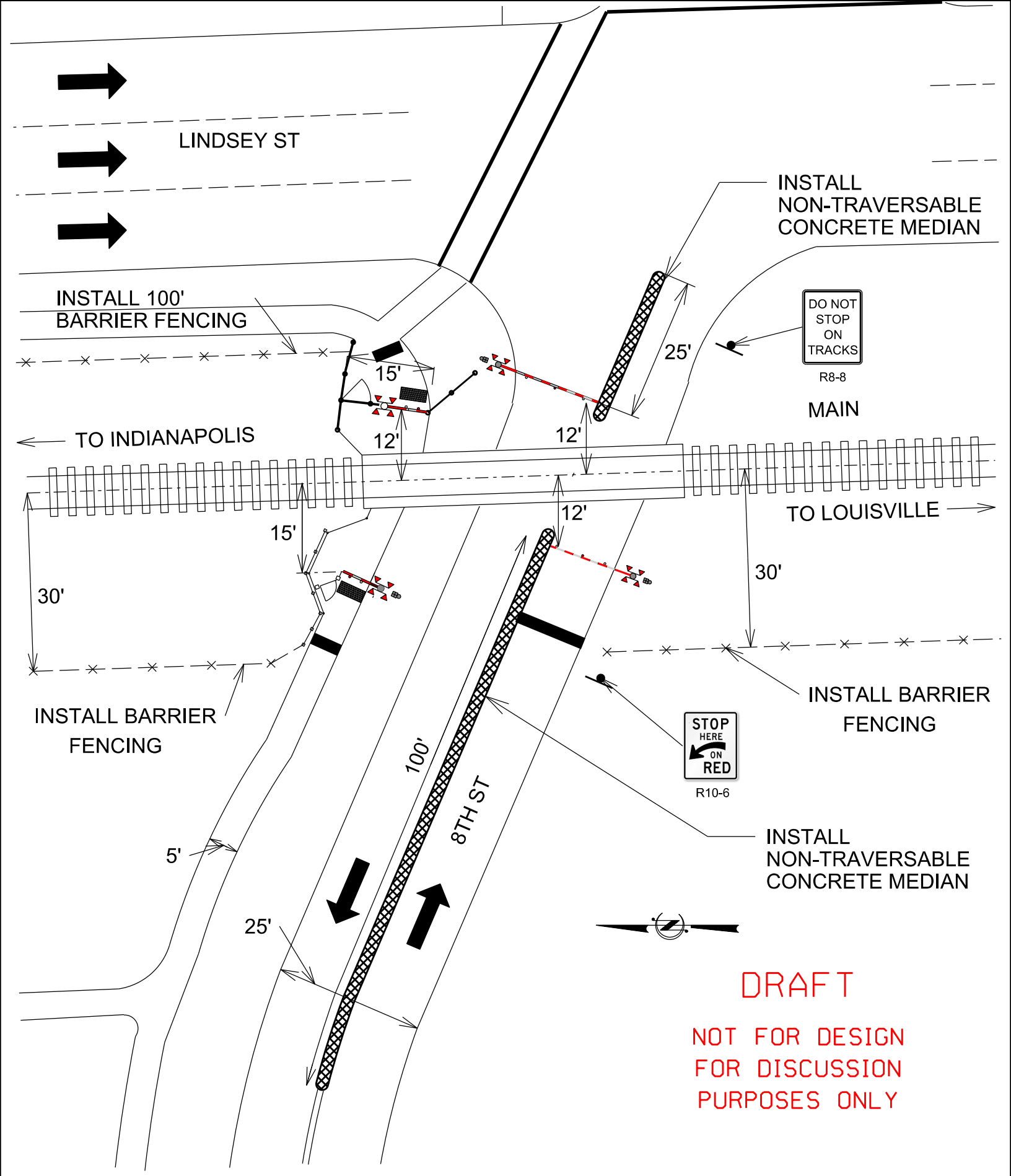
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

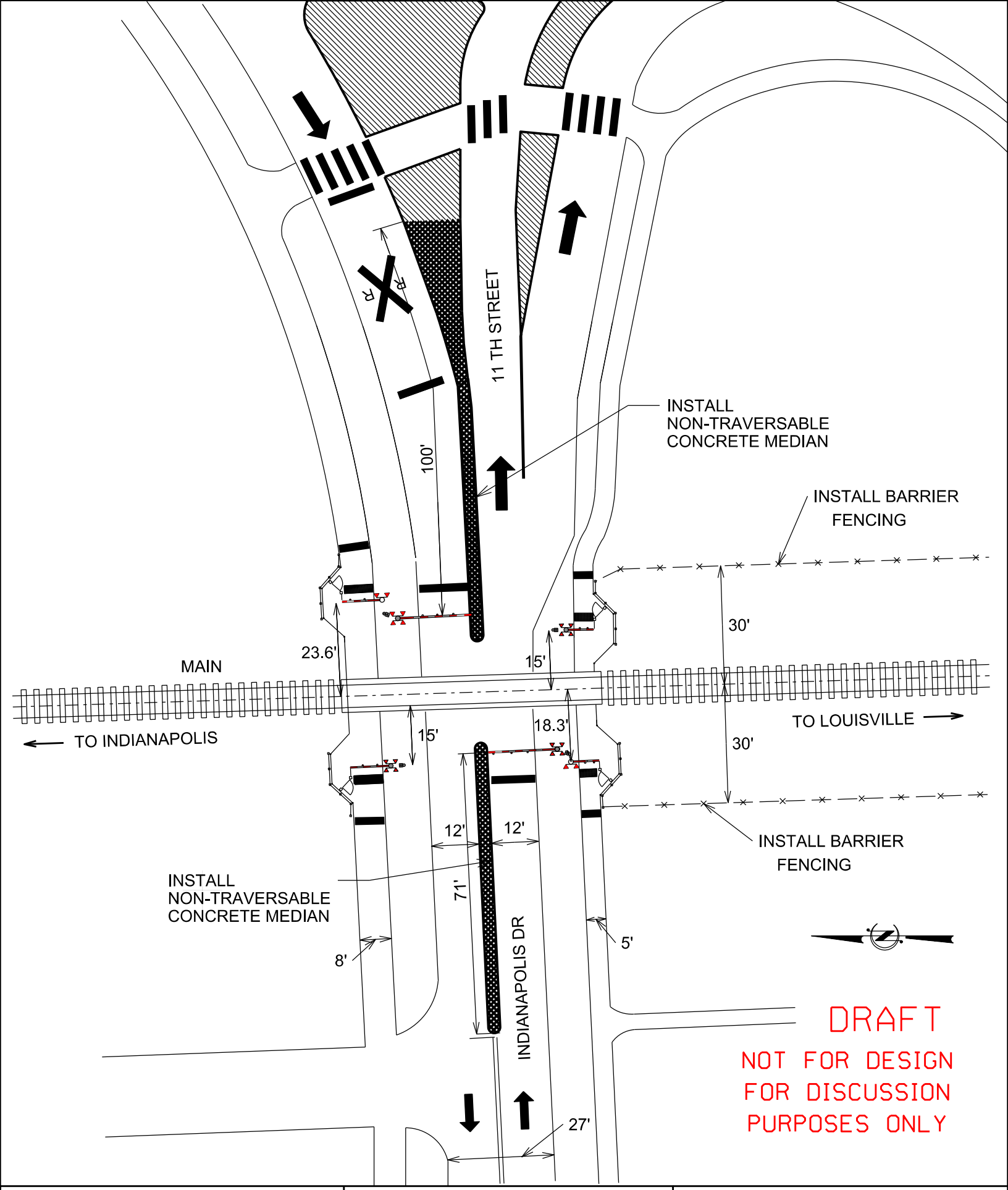
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
8th Street
ADT 1,052

Louisville & Indiana RR
DOT 535496W
RRMP 40.98
SCALE: 1' = 20'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
11th St-Indianapolis Dr
ADT 9,625

Louisville & Indiana RR
DOT 535498D
RRMP 40.84
SCALE: 1' = 30'

APPENDIX C: Quiet Zone Option Costs

Street	Approach 1		Approach 2	
	City	Railroad	City	Railroad
SR 46	$19,680	$0	$19,680	$0
Columbus Peoples Trail	$14,792	$0	$14,792	$0
5th Street	$58,617	$500,000	$75,360	$0
8th Street	$101,990	$300,000	$101,990	$300,000
11th Street	$67,517	$350,000	$67,117	$350,000
Sub-Total Construction Cost	**$262,596**	**$1,150,000**	**$278,939**	**$650,000**
Traffic Control/Protection (3%)	$7,878	N/A	$8,368	N/A
Design Engineering (25%)	$65,649	N/A	$69,735	N/A
Quiet Zone Design Engineering	$20,000	N/A	$40,000	N/A
Contingency (20%)	$52,519	$230,000	$55,788	$130,000
Sub-Total Additional Cost	**$146,046**	**$230,000**	**$173,891**	**$130,000**
Sub-Total	**$408,642**	**$1,380,000**	**$452,830**	**$780,000**
TOTAL ESTIMATED COST	**$1,788,642**		**$1,232,830**	

Street	Approach 3		Approach 4	
	City	Railroad	City	Railroad
SR 46	$19,680	$0	$19,680	$0
Columbus Peoples Trail	$14,792	$0	$14,792	$0
5th Street	$63,525	$250,000	$58,825	$225,000
8th Street	$101,990	$300,000	$101,990	$300,000
11th Street	$67,117	$350,000	$67,117	$350,000
Sub-Total Construction Cost	**$267,104**	**$900,000**	**$262,404**	**$875,000**
Traffic Control/Protection (3%)	$8,013	N/A	$7,872	N/A
Design Engineering (25%)	$66,776	N/A	$65,601	N/A
Quiet Zone Design Engineering	$20,000	N/A	$40,000	N/A
Contingency (20%)	$53,421	$180,000	$52,481	$175,000
Sub-Total Additional Cost	**$148,210**	**$180,000**	**$165,954**	**$175,000**
Sub-Total	**$415,314**	**$1,080,000**	**$428,358**	**$1,050,000**
TOTAL ESTIMATED COST	**$1,495,314**		**$1,478,358**	

Street	Approach 5	
	City	Railroad
SR 46	$19,680	$0
Columbus Peoples Trail	$14,792	$0
5th Street	$58,617	$500,000
8th Street	$68,240	$500,000
11th Street	$67,117	$350,000
Sub-Total Construction Cost	**$228,446**	**$1,350,000**
Traffic Control/Protection (3%)	$6,853	N/A
Design Engineering (25%)	$57,112	N/A
Quiet Zone Design Engineering	$40,000	N/A
Contingency (20%)	$45,689	$270,000
Sub-Total Additional Cost	**$149,654**	**$270,000**
Sub-Total	**$378,100**	**$1,620,000**
TOTAL ESTIMATED COST	**$1,998,100**	

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QUIET ZONE APPROACH 1
DETAILED COST ESTIMATE

SR 46

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
60	LF	24" Stop Line Pavement Markings	$8	$480	
6	EA	Lane Legend (RR)	$750	$4,500	
4	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$1,800	
4	EA	W10-9P Plaque furnish and install	$50	$200	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$6,980**	
210	LF	Channelization	$50	$10,500	
1	EA	Traffic Control	$1,000	$1,000	
1	EA	Railroad Flagging Cost for median construction	$1,200	$1,200	for channelization within RR ROW
		SUB-TOTAL CONSTRUCTION		**$12,700**	
		TOTAL CITY WORK		**$19,680**	
		RAILROAD WORK			
		none			
		TOTAL RAILROAD WORK		**$0**	
		Total SR 46		**$19,680**	

Columbus People Trail

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
2	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$900	
2	EA	W10-9P Plaque furnish and install	$50	$100	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,692**	
200	SF	Asphalt for escape gate path	$15	$3,000	2- 20 x 5' pads - 200 SF
100	FT	Fencing (Right of way trespass prevention)	$45	$4,500	
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
2	EA	Detectable warning	$650	$1,300	
5	EA	Railroad Flagging Cost	$1,200	$6,000	for pavement and fencing installation
		SUB-TOTAL CONSTRUCTION		**$12,100**	
		TOTAL CITY WORK		**$14,792**	
		RAILROAD WORK			
		none			
		TOTAL RAILROAD WORK		**$0**	
		Total Columbus People Trail		**$14,792**	

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QUIET ZONE APPROACH 1
DETAILED COST ESTIMATE

5th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
1	EA	Lane Legend (RR)	$750	$750	
4	EA	Sign	$450	$1,800	2 W10-1; 1W10-2; 1- R8-8
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,892**	
200	SF	Concrete sidewalk	$30	$6,000	20' x 5' = 100 x 2 = 200 SF
725	FT	Fencing (Right of way trespass prevention)	$45	$32,625	100' south; 625' north
30	FT	Fencing for escape gate	$30	$900	20 feet each gate
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,500	$2,500	
2	EA	Detectable warning	$650	$1,300	
10	EA	Railroad Flagging Cost	$1,200	$12,000	Concrete at ped gates and fencing
		SUB-TOTAL CONSTRUCTION		**$55,725**	
		TOTAL CITY WORK		**$58,617**	
		RAILROAD WORK			
1	EA	Installation of 4-quadrant gate system with 2-pedestrian gates	$500,000	$500,000	
		TOTAL RAILROAD WORK		**$500,000**	
		Total 5th Street		**$558,617**	

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QUIET ZONE APPROACH 1
DETAILED COST ESTIMATE

8th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
30	LF	24" Stop Line Pavement Markings	$8	$240	Stop lines on sidewalk = 10ft
1	EA	Lane Legend (RR)	$750	$750	
5	EA	Furnish and install Alum Sign Pole Mount/with	$450	$2,250	2 W10-1; 1-W10-2; 1- R8-8; 1-R10-6
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,390**	
270	LF	Curb and gutter for median	$100	$27,000	135' median x 2'= 270 LF
270	SF	Concrete for median	$25	$6,750	135' median x 2'= 270 SF
200	SF	Concrete sidewalk	$30	$6,000	20'*5' = 100 FT x 2 = 200 SF
2	EA	Detectable warning	$400	$800	
100	LF	Fencing NE Quadrant	$45	$4,500	
850	LF	Fencing (Right of way trespass prevention)	$45	$38,250	625' south; 225' north
30	LF	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	Concrete at ped gates & fence
		SUB-TOTAL CONSTRUCTION		**$98,600**	
		TOTAL CITY WORK		**$101,990**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 2-pedestrian gates	$300,000	$300,000	
		TOTAL RAILROAD WORK		**$300,000**	
		Total 8th Street		**$401,990**	

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QUIET ZONE APPROACH 1
DETAILED COST ESTIMATE

11th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
3	EA	Furnish and install Alum Sign Pole Mount/with	$450	$1,350	
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,192**	
360	LF	Curb and gutter for median	$100	$36,000	180' x 2 = 360'
360	SF	Concrete for median	$25	$9,000	180 x 2' wide = 360 SF
4	EA	Detectable warning	$400	$1,600	
225	FT	Fencing (Right of way trespass prevention)	$45	$10,125	225' south
60	FT	Fencing for escape gate	$30	$1,800	
4	EA	Pedestrian Escape Gates	$200	$800	
1	EA	Site prep/mobilization	$5,000	$5,000	
5	EA	Railroad Flagging Cost	$1,200	$6,000	medians, ped gate sidewalk, fencing
		SUB-TOTAL CONSTRUCTION		**$64,325**	
		TOTAL CITY WORK		**$67,517**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 4 pedestrian gates	$350,000	$350,000	
		TOTAL RAILROAD WORK		**$350,000**	
		Total 11th Street		**$417,517**	

APPROACH 1 - CORRIDOR SUB-TOTAL

Sub-Total City Construction Cost	$262,596
Sub-Total Railroad Construction Cost	$1,150,000
Sub-Total Construction Cost	**$1,412,596**

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QUIET ZONE APPROACH 2
DETAILED COST ESTIMATE

SR 46

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
60	LF	24" Stop Line Pavement Markings	$8	$480	
6	EA	Lane Legend (RR)	$750	$4,500	
4	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$1,800	
4	EA	W10-9P Plaque furnish and install	$50	$200	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$6,980**	
210	LF	Channelization	$50	$10,500	
1	EA	Traffic Control	$1,000	$1,000	
1	EA	Railroad Flagging Cost for street construction	$1,200	$1,200	for channelization within RR ROW
		SUB-TOTAL CONSTRUCTION		**$12,700**	
		TOTAL CITY WORK		**$19,680**	
		RAILROAD WORK			
		none			
		TOTAL RAILROAD WORK		**$0**	
		Total SR 46		**$19,680**	

Columbus People Trail

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" SLD PVMNT MARKING HAE (W)	$8	$192	
2	EA	LANE LEGEND RR	$750	$1,500	
2	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$900	
2	EA	W10-9P Plaque furnish and install	$50	$100	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,692**	
200	SF	Asphalt for escape gate path	$15	$3,000	2- 20 x 5' pads - 200 SF
100	FT	Fencing (Right of way trespass prevention)	$45	$4,500	
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
2	EA	Detectable warning	$650	$1,300	
5	EA	Railroad Flagging Cost	$1,200	$6,000	for pavement and fencing installation
		SUB-TOTAL CONSTRUCTION		**$12,100**	
		TOTAL CITY WORK		**$14,792**	
		RAILROAD WORK			
		none		$0	
		TOTAL RAILROAD WORK		**$0**	
		Total Columbus People Trail		**$14,792**	

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QUIET ZONE APPROACH 2
DETAILED COST ESTIMATE

5th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
50	LF	Install Type III Barricade - end of street	$80	$4,000	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$4,000**	
105	SY	Remove Concrete sidewalk	$10	$1,050	185*5 = 925 SF = 102 SY
370	SY	Remove Asphalt Road Approaches	$5	$1,850	165*20=3300 SF = 367
130	LF	Install curb and gutter to block roadway	$100	$13,000	
1	LS	Remove Hawk Signal	$4,000	$4,000	
120	LF	Remove crosswalk pavement markings	$8	$960	2' wide markings for cross walk
75	LF	Fencing for closure	$45	$3,375	
725	LF	Fencing (Right of way trespass prevention)	$45	$32,625	100' south; 625' north
1	EA	Site prep/mobilization	$2,500	$2,500	
10	EA	Railroad Flagging Cost for street construction	$1,200	$12,000	road closure
		SUB-TOTAL CONSTRUCTION		**$71,360**	
		TOTAL CITY WORK		**$75,360**	
		RAILROAD WORK			
1	EA	Remove Signal Equipment and crossing surface		$0	No Charges to City
		TOTAL RAILROAD WORK		**$0**	
		Total 5th Street		**$75,360**	

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QUIET ZONE APPROACH 2
DETAILED COST ESTIMATE

8th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
30	LF	24" Stop Line Pavement Markings	$8	$240	Stop lines on sidewalk = 10ft
1	EA	Lane Legend (RR)	$750	$750	
5	EA	Furnish and install Alum Sign Pole Mount/with	$450	$2,250	2 W10-1; 1-W10-2; 1- R8-8; 1-R10-6
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,390**	
270	LF	Curb and gutter for median	$100	$27,000	135' median x 2'= 270 LF
270	SF	Concrete for median	$25	$6,750	135' median x 2'= 270 SF
200	SF	Concrete sidewalk	$30	$6,000	20'*5' = 100 FT x 2 = 200 SF
2	EA	Detectable warning	$400	$800	
100	LF	Fencing NE Quadrant	$45	$4,500	
850	FT	Fencing (Right of way trespass prevention)	$45	$38,250	625' south; 225' north
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	for concrete at ped gates and fencing
		SUB-TOTAL CONSTRUCTION		**$98,600**	
		TOTAL CITY WORK		**$101,990**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 2-pedestrian gates	$300,000	$300,000	
		TOTAL RAILROAD WORK		**$300,000**	
		Total 8th Street		**$401,990**	

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QUIET ZONE APPROACH 2
DETAILED COST ESTIMATE

11th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
3	EA	Furnish and install Alum Sign Pole Mount/with	$450	$1,350	
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,192**	
360	LF	Curb and gutter for median	$100	$36,000	180' x 2 = 360'
360	SF	Concrete for median	$25	$9,000	180 x 2' wide = 360 SF
4	EA	Detectable warning	$400	$1,600	
225	FT	Fencing (Right of way trepass prevention)	$45	$10,125	225' south
60	FT	Fencing for escape gate	$30	$1,800	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$5,000	$5,000	
5	EA	Railroad Flagging Cost	$1,200	$6,000	medians, sidewalks, fencing
		SUB-TOTAL CONSTRUCTION		**$63,925**	
		TOTAL CITY WORK		**$67,117**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 4-pedestrian gates	$350,000	$350,000	
		TOTAL RAILROAD WORK		**$350,000**	
		Total 11th Street		**$417,117**	

APPROACH 2 - CORRIDOR SUB-TOTAL

Sub-Total City Construction Cost	$278,939
Sub-Total Railroad Construction Cost	$650,000
Sub-Total Construction Cost	**$928,939**

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QUIET ZONE APPROACH 3
DETAILED COST ESTIMATE

SR 46

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
60	LF	24" Stop Line Pavement Markings	$8	$480	
6	EA	Lane Legend (RR)	$750	$4,500	
4	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$1,800	
4	EA	W10-9P Plaque furnish and install	$50	$200	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$6,980**	
210	LF	Channelization	$50	$10,500	
1	EA	Traffic Control	$1,000	$1,000	
1	EA	Railroad Flagging Cost	$1,200	$1,200	channelization in RR ROW
		SUB-TOTAL CONSTRUCTION		**$12,700**	
		TOTAL CITY WORK		**$19,680**	
		RAILROAD WORK			
		none			
		TOTAL RAILROAD WORK		**$0**	
		Total SR 46		**$19,680**	

Columbus People Trail

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
2	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$900	
2	EA	W10-9P Plaque furnish and install	$50	$100	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,692**	
200	SF	Asphalt for escape gate path	$15	$3,000	2- 20 x 5' pads - 200 SF
100	FT	Fencing (Right of way trespass prevention)	$45	$4,500	
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
2	EA	Detectable warning	$650	$1,300	
5	EA	Railroad Flagging Cost	$1,200	$6,000	for pavement and fencing installation
		SUB-TOTAL CONSTRUCTION		**$12,100**	
		TOTAL CITY WORK		**$14,792**	
		RAILROAD WORK			
		none		$0	
		TOTAL RAILROAD WORK		**$0**	
		Total Columbus People Trail		**$14,792**	

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QUIET ZONE APPROACH 3
DETAILED COST ESTIMATE

5th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
50	LF	Install Type III Barricade - end of street	$80	$4,000	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$4,000**	
370	SY	Remove Asphalt Road Approaches	$5	$1,850	165*20=3300 SF = 367
130	LF	Install curb and gutter along	$100	$13,000	
50	LF	Fencing for closure	$45	$2,250	
725	LF	Fencing (Right of way trespass prevention)	$45	$32,625	100' south; 625' north
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,500	$2,500	
5	EA	Railroad Flagging Cost	$1,200	$6,000	sidewalk and fencing
		SUB-TOTAL CONSTRUCTION		**$59,525**	
		TOTAL CITY WORK		**$63,525**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, constant warning and 2-pedestrian gates	$250,000	$250,000	
		TOTAL RAILROAD WORK		**$250,000**	
		Total 5th Street		**$313,525**	

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QUIET ZONE APPROACH 3
DETAILED COST ESTIMATE

8th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
30	LF	24" Stop Line Pavement Markings	$8	$240	Stop lines on sidewalk = 10ft
1	EA	Lane Legend (RR)	$750	$750	
5	EA	Furnish and install Alum Sign Pole Mount/with	$450	$2,250	2 W10-1; 1-W10-2; 1- R8-8; 1-R10-6
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,390**	
270	LF	Curb and gutter for median	$100	$27,000	135' median x 2'= 270 LF
270	SF	Concrete for median	$25	$6,750	135' median x 2'= 270 SF
200	SF	Concrete sidewalk	$30	$6,000	20'*5' = 100 FT x 2 = 200 SF
2	EA	Detectable warning	$400	$800	
100	LF	Fencing NE Quadrant	$45	$4,500	
850	FT	Fencing (Right of way trespass prevention)	$45	$38,250	625' south; 225' north
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	sidewalk and fencing
		SUB-TOTAL CONSTRUCTION		**$98,600**	
		TOTAL CITY WORK		**$101,990**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 2-pedestrian gates	$300,000	$300,000	
		TOTAL RAILROAD WORK		**$300,000**	
		Total 8th Street		**$401,990**	

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QUIET ZONE APPROACH 3
DETAILED COST ESTIMATE

11th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
3	EA	Furnish and install Alum Sign Pole Mount/with	$450	$1,350	
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,192**	
360	LF	Curb and gutter for median	$100	$36,000	180' x 2 = 360'
360	SF	Concrete for median	$25	$9,000	180 x 2' wide = 360 SF
4	EA	Detectable warning	$400	$1,600	
225	FT	Fencing (Right of way trespass prevention)	$45	$10,125	225' south
60	FT	Fencing for escape gate	$30	$1,800	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$5,000	$5,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	sidewalks, fencing, medians
		SUB-TOTAL CONSTRUCTION		**$63,925**	
		TOTAL CITY WORK		**$67,117**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 4-pedestrian gates	$350,000	$350,000	
		TOTAL RAILROAD WORK		**$350,000**	
		Total 11th Street		**$417,117**	

APPROACH 3 - CORRIDOR SUB-TOTAL

Sub-Total City Construction Cost	$267,104
Sub-Total Railroad Construction Cost	$900,000
Sub-Total Construction Cost	**$1,167,104**

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QUIET ZONE APPROACH 4
DETAILED COST ESTIMATE

SR 46

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
60	LF	24" Stop Line Pavement Markings	$8	$480	
6	EA	Lane Legend (RR)	$750	$4,500	
4	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$1,800	
4	EA	W10-9P Plaque furnish and install	$50	$200	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$6,980**	
210	LF	Channelization	$50	$10,500	
1	EA	Traffic Control	$1,000	$1,000	
1	EA	Railroad Flagging Cost	$1,200	$1,200	channelization in RR ROW
		SUB-TOTAL CONSTRUCTION		**$12,700**	
		TOTAL CITY WORK		**$19,680**	
		RAILROAD WORK			
		none			
		TOTAL RAILROAD WORK		**$0**	
		Total SR 46		**$19,680**	

Columbus People Trail

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
2	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$900	
2	EA	W10-9P Plaque furnish and install	$50	$100	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,692**	
200	SF	Asphalt for escape gate path	$15	$3,000	2- 20 x 5' pads - 200 SF
100	FT	Fencing (Right of way trespass prevention)	$45	$4,500	
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
2	EA	Detectable warning	$650	$1,300	
5	EA	Railroad Flagging Cost	$1,200	$6,000	for pavement and fencing installation
		SUB-TOTAL CONSTRUCTION		**$12,100**	
		TOTAL CITY WORK		**$14,792**	
		RAILROAD WORK			
		none		$0	
		TOTAL RAILROAD WORK		**$0**	
		Total Columbus People Trail		**$14,792**	

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QUIET ZONE APPROACH 4
DETAILED COST ESTIMATE

5th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
0	LF	24" Stop Line Pavement Markings	$8	$0	
1	EA	Lane Legend (RR)	$750	$750	
5	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$2,250	1 W10-1; 1W10-2; 1 R3-2 (no left turn); 2 R5-1 (do not enter)
2	EA	W10-9P Plaque furnish and install	$50	$100	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,100**	
200	SF	Concrete sidewalk	$30	$6,000	20' x 5' = 100 x 2 = 200 SF
725	FT	Fencing (Right of way trespass prevention)	$45	$32,625	100' south; 625' north
30	FT	Fencing for escape gate	$30	$900	20 feet each gate
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,500	$2,500	
2	EA	Detectable warning	$650	$1,300	
10	EA	Railroad Flagging Cost	$1,200	$12,000	Concrete at ped gates and fencing
		SUB-TOTAL CONSTRUCTION		**$55,725**	
		TOTAL CITY WORK		**$58,825**	
		RAILROAD WORK			
1	EA	Installation of 1-quadrant gate system with 2-pedestrian gates	$225,000	$225,000	for one-way street option
		TOTAL RAILROAD WORK		**$225,000**	
		Total 5th Street		**$283,825**	

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QUIET ZONE APPROACH 4
DETAILED COST ESTIMATE

8th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
30	LF	24" Stop Line Pavement Markings	$8	$240	Stop lines on sidewalk = 10ft
1	EA	Lane Legend (RR)	$750	$750	
5	EA	Furnish and install Alum Sign Pole Mount/with	$450	$2,250	2 W10-1; 1-W10-2; 1- R8-8; 1-R10-6
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,390**	
270	LF	Curb and gutter for median	$100	$27,000	135' median x 2'= 270 LF
270	SF	Concrete for median	$25	$6,750	135' median x 2'= 270 SF
200	SF	Concrete sidewalk	$30	$6,000	20'*5' = 100 FT x 2 = 200 SF
2	EA	Detectable warning	$400	$800	
100	LF	Fencing NE Quadrant	$45	$4,500	
850	FT	Fencing (Right of way trespass prevention)	$45	$38,250	625' south; 225' north
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	sidewalk and fencing
		SUB-TOTAL CONSTRUCTION		**$98,600**	
		TOTAL CITY WORK		**$101,990**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 2-pedestrian gates	$300,000	$300,000	
		TOTAL RAILROAD WORK		**$300,000**	
		Total 8th Street		**$401,990**	

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QUIET ZONE APPROACH 4
DETAILED COST ESTIMATE

11th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
3	EA	Furnish and install Alum Sign Pole Mount/with	$450	$1,350	
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,192**	
360	LF	Curb and gutter for median	$100	$36,000	180' x 2 = 360'
360	SF	Concrete for median	$25	$9,000	180 x 2' wide = 360 SF
4	EA	Detectable warning	$400	$1,600	
225	FT	Fencing (Right of way trespass prevention)	$45	$10,125	225' south
60	FT	Fencing for escape gate	$30	$1,800	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$5,000	$5,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	sidewalks, fencing, medians
		SUB-TOTAL CONSTRUCTION		**$63,925**	
		TOTAL CITY WORK		**$67,117**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 4-pedestrian gates	$350,000	$350,000	
		TOTAL RAILROAD WORK		**$350,000**	
		Total 11th Street		**$417,117**	

APPROACH 3 - CORRIDOR SUB-TOTAL

Sub-Total City Construction Cost	$262,404
Sub-Total Railroad Construction Cost	$875,000
Sub-Total Construction Cost	**$1,137,404**

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QUIET ZONE APPROACH 5
DETAILED COST ESTIMATE

SR 46

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
60	LF	24" Stop Line Pavement Markings	$8	$480	
6	EA	Lane Legend (RR)	$750	$4,500	
4	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$1,800	
4	EA	W10-9P Plaque furnish and install	$50	$200	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$6,980**	
210	LF	Channelization	$50	$10,500	
1	EA	Traffic Control	$1,000	$1,000	
1	EA	Railroad Flagging Cost	$1,200	$1,200	for channelization in RR ROW
		SUB-TOTAL CONSTRUCTION		**$12,700**	
		TOTAL CITY WORK		**$19,680**	
		RAILROAD WORK			
		none		$0	
		TOTAL RAILROAD WORK		**$0**	
		Total SR 46		**$19,680**	

Columbus People Trail

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
2	EA	Furnish and install Alum Sign Pole Mount/with Sign	$450	$900	
2	EA	W10-9P Plaque furnish and install	$50	$100	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,692**	
200	SF	Asphalt for escape gate path	$15	$3,000	2- 20 x 5' pads - 200 SF
100	FT	Fencing (Right of way trespass prevention)	$45	$4,500	
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
2	EA	Detectable warning	$650	$1,300	
5	EA	Railroad Flagging Cost	$1,200	$6,000	asphalt and fencing
		SUB-TOTAL CONSTRUCTION		**$12,100**	
		TOTAL CITY WORK		**$14,792**	
		RAILROAD WORK			
		none		$0	
		TOTAL RAILROAD WORK		**$0**	
		Total Columbus People Trail		**$14,792**	

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QUIET ZONE APPROACH 5
DETAILED COST ESTIMATE

5th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
1	EA	Lane Legend (RR)	$750	$750	
4	EA	Sign	$450	$1,800	2 W10-1; 1W10-2; 1- R8-8
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$2,892**	
200	SF	Concrete sidewalk	$30	$6,000	20' x 5' = 100 x 2 = 200 SF
725	FT	Fencing (Right of way trespass prevention)	$45	$32,625	100' south; 625' north
30	FT	Fencing for escape gate	$30	$900	20 feet each gate
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,500	$2,500	
2	EA	Detectable warning	$650	$1,300	
10	EA	Railroad Flagging Cost	$1,200	$12,000	sidewalks, fencing
		SUB-TOTAL CONSTRUCTION		**$55,725**	
		TOTAL CITY WORK		**$58,617**	
		RAILROAD WORK			
1	EA	Installation of 4-quadrant gate system with 2-pedestrian gates	$500,000	$500,000	
		TOTAL RAILROAD WORK		**$500,000**	
		Total 5th Street		**$558,617**	

8th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
30	LF	24" Stop Line Pavement Markings	$8	$240	Stop lines on sidewalk = 10ft
1	EA	Lane Legend (RR)	$750	$750	
5	EA	Furnish and install Alum Sign Pole Mount/with	$450	$2,250	2 W10-1; 1-W10-2; 1- R8-8; 1-R10-6
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,390**	
200	SF	Concrete sidewalk	$30	$6,000	20'*5' = 100 FT x 2 = 200 SF
2	EA	Detectable warning	$400	$800	
100	LF	Fencing NE Quadrant	$45	$4,500	
850	FT	Fencing (Right of way trespass prevention)	$45	$38,250	625' south; 225' north
30	FT	Fencing for escape gate	$30	$900	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$2,000	$2,000	
10	EA	Railroad Flagging Cost	$1,200	$12,000	sidewalks, fencing
		SUB-TOTAL CONSTRUCTION		**$64,850**	
		TOTAL CITY WORK		**$68,240**	
		RAILROAD WORK			
1	EA	Installation of 4-quadrant gate system with 2-pedestrian gates	$500,000	$500,000	
		TOTAL RAILROAD WORK		**$500,000**	
		Total 8th Street		**$568,240**	

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QUIET ZONE APPROACH 5
DETAILED COST ESTIMATE

11th Street

Qty.	Unit	Description	Unit Price	Amount	
		CITY WORK			
24	LF	24" Stop Line Pavement Markings	$8	$192	
2	EA	Lane Legend (RR)	$750	$1,500	
3	EA	Furnish and install Alum Sign Pole Mount/with	$450	$1,350	
3	EA	W10-9P Plaque furnish and install	$50	$150	
		SUB-TOTAL SIGNS/PVMT MKINGS		**$3,192**	
360	LF	Curb and gutter for median	$100	$36,000	180' x 2 = 360'
360	SF	Concrete for median	$25	$9,000	180 x 2' wide = 360 SF
4	EA	Detectable warning	$400	$1,600	
225	FT	Fencing (Right of way trespass prevention)	$45	$10,125	225' south
60	FT	Fencing for escape gate	$30	$1,800	
2	EA	Pedestrian Escape Gates	$200	$400	
1	EA	Site prep/mobilization	$5,000	$5,000	
5	EA	Railroad Flagging Cost	$1,200	$6,000	medians, sidewalks, fencing
		SUB-TOTAL CONSTRUCTION		**$63,925**	
		TOTAL CITY WORK		**$67,117**	
		RAILROAD WORK			
1	EA	Installation of flashing lights, 2-quadrant gates, constant warning and 4-pedestrian gates	$350,000	$350,000	
		TOTAL RAILROAD WORK		**$350,000**	
		Total 11th Street		**$417,117**	

Sub-Total City Construction Cost	$228,446
Sub-Total Railroad Construction Cost	$1,350,000
Sub-Total Construction Cost	**$1,578,446**

APPENDIX D: FRA 49 CFR Parts 222 and 229

Federal Register

Thursday,
December 18, 2003

Part II

Department of Transportation

Federal Railroad Administration

49 CFR Parts 222 and 229

Use of Locomotive Horns at Highway-Rail Grade Crossings; Interim Final Rule

for whistle bans-—and which are required in this rule for New Quiet Zones—were in most cases installed with primarily Federal funds. Thus prior Federal funding has already assisted local governments to some extent in preserving Pre-Rule Quiet Zones and creating New Quiet Zones.

''Section 152 funds'' (23 U.S.C. 152 (Hazard Elimination Program) are intended to implement safety improvement projects to reduce the number and severity of crashes at hazardous highway locations, sections, and elements on any public road. Typical projects include intersection improvements (channelization, traffic signals, and sight distance); pavement and shoulder widening; guardrail and barrier improvements; installation of crash cushions; modification of roadway alignment; signing, pavement marking, and delineation; breakaway utility poles and sign supports; pavement grooving and skid resistant overlays; shoulder rumble strips; and minor structure replacements or modifications. It is important to note that grade crossing improvements can be funded under section 152 if they are identified in a State's hazardous location survey.

The difference between the sum of the funding levels for sections 130 and 152 and the overall 10 percent safety set-aside in STP is in a category called ''Optional Safety Funds'' and is eligible for use in either section 130 or section 152. In FY 2000, there was a total of $368 million available in Optional Safety Funds, but only $21 million (or 6 percent) was used on section 130 grade crossing safety enhancement. Clearly this is an area where States can be encouraged to change the mix of safety projects advanced using this funding to accommodate more grade crossing safety improvements.

It should be noted that 90 percent of the STP funds are available for general use. Local Metropolitan Planning Organizations, working with the State departments of transportation, help determine how those funds should be allocated. As FRA was advised by commenters in this proceeding, community transportation needs differ. Without question, engineering improvements under this rule would constitute eligible projects deserving of consideration for use of this 90 percent share.

Under section 1103(c) of TEA 21, an amount of $5,250,000 per year was set aside from STP funds, and this funding is to be used for projects on designated high speed passenger rail corridors. Should a quiet zone be desired on a portion of such a designated high speed corridor, such funds could be used as a part of the overall high speed corridor improvement project. Given the relatively small amount of funding available under section 1103(c), it is perhaps unlikely that any quiet zone improvements would rise to the top of the list on any such corridor. However, note that there is a strong compatibility between the kind of safety improvements desired for high-speed rail corridors (''sealed corridor'' treatments) and the supplementary safety measures identified in this rule.

Transfers of funds from other categories into the STP are permitted, and any such transfers are not subject to STP set-asides or suballocations.

- Up to 50 percent of National Highway System (NHS) apportionments may be transferred to the STP; indeed, up to 100 percent of NHS funds may be transferred to STP if approved by the Secretary of Transportation, and if sufficient notice and opportunity for public comment is given.
- Up to 50 percent of Interstate Maintenance apportionments may be transferred to STP.
- Up to 50 percent of Bridge Replacement funds may be transferred to STP.
- Funds apportioned to the Congestion Mitigation and Air Quality (CMAQ) Program may also be transferred to STP, subject to the following conditions. Up to 50 percent of the amount by which the CMAQ apportionment for the fiscal year exceeds the amount that would have been apportioned to CMAQ for that fiscal year if the program had been funded at $1.35 billion annually may be transferred to STP. Transferred CMAQ funds may only be used in air quality non-attainment and maintenance areas.

Finally, please note that, with respect to roadways on the National Highway System, improvements would be eligible for funding out of the NHS.

The subject matter of this regulatory proceeding is the use of the train horn at highway-rail crossings, not the development of appropriations requests. Accordingly, FRA neither endorses nor argues against earmarked Federal funding for this purpose. FRA does note that, in general, State and local governments have argued against categorical transportation programs and in favor of broad block grants over which recipients could exercise full control. As reflected above, to a large extent that has become Federal policy. Whether any deviation from that policy is warranted by the fiscal impacts claimed to be associated with this rule is a matter for review in other forums. Accordingly, FRA's principal response to those arguing for Federal funding has been to ensure, to the extent practicable, that any expenses attributed to establishing Quiet Zones are no greater than necessary to maintain safety.

As this interim final rule was being drafted, the Congress and the Administration were preparing to address the reauthorization of surface transportation programs (extending or replacing TEA–21). That process was being complicated by reduced revenues, confirming FRA's conviction that this interim final rule should allow additional time for implementation of the rule. Although it is possible that the program structure outlined above may be reorganized significantly in new legislation, FRA does not expect any resulting reduction in the flexibility afforded to the States (working with local Metropolitan Planning Organizations) to affect the utilization of Federal transportation funds.

11. Liability

Several commenters noted that the NPRM was silent as to the issue of liability when an accident occurs at a highway-rail grade crossing within a quiet zone established in accordance with the rule. The New Jersey Department of Transportation (''DOT'') explained that consideration should be given to how liability issues presented by the rulemaking will affect public safety. Several commenters suggested that legislation was necessary to prohibit lawsuits by anyone injured while circumventing highway-rail grade crossing safety devices within quiet zones. The Massachusetts town of Manchester-by-the-Sea commented that the NPRM appeared to be a paternalistic effort directed towards those who willfully violate traffic laws and illegally proceed around grade crossing safety devices. This commenter also expressed concern that railroads may be reluctant to agree to implementation of quiet zones under the rule for fear that it would increase their risk of liability if an accident did occur at a crossing within a quiet zone where the railroads did not routinely sound their locomotive horns. Manchester-by-the-Sea suggested that when there is willful conduct by a motorist or pedestrian that jeopardizes his life or those of others, *e.g.*, proceeding through activated gate crossing devices, railroads and local communities should not be subject to liability if an accident occurs. Accordingly, the Town recommended that FRA work with Congress to codify limits to the liability of railroads and communities when those who willfully violate traffic or trespassing laws are injured at rail crossings within a quiet zone. Similarly, a Wisconsin State

legislative representative suggested that local communities should not be liable for accidents occurring at grade crossings within quiet zones established under the rule.

The North Carolina DOT suggested that communities pursuing quiet zones in their jurisdictions should enter into agreements with the relevant State and operating railroads agreeing to hold harmless the State and railroads for any accidents or injuries that occur as a direct result of these quiet zones. This same commenter emphasized that the communities implementing quiet zones should assume all of the risk associated with the quiet zones.

Commenters from the railroad industry strongly advocated that municipalities seeking the establishment of quiet zones under the rule should assume liability for all accidents that occur at crossings within the quiet zones. Citing the historical sounding of locomotive horns as a safety feature of railroads for the past century, the Florida East Coast Railway argued that if a community insists that it cease the sounding of the locomotive horns when traveling through its jurisdiction, then that community should be willing to accept the liability associated with the decision. The American Public Transportation Association projected that passage of a rule permitting quiet zones as proposed in the NPRM would probably lead to increased insurance premiums for railroads.

Another concern raised by several railroad industry participants, as well as an individual locomotive engineer, was the fact that State law often imposes liability on individual members of train crews and their employers when a train does not sound its horn at a highway-rail crossing and an accident occurs. These commenters contended that nothing in the NPRM would remove liability from individual train crew members or their employers for failure to sound the locomotive horn in the event of an accident in a quiet zone established pursuant to the rule. A representative of the Wisconsin Central System suggested that the rule should clearly state that failure to sound the locomotive horn in a FRA approved quiet zone could not serve as a basis for imposing civil liability on either the train crew or the employing railroad.

FRA appreciates the legitimate concern of the commenters regarding liability issues surrounding creation of quiet zones under this rule. We note that the proposed rule would have had the effect of relieving individual train crew members and their employers from liability for failure to sound the locomotive horn. The proposed rule clearly provides that establishment of a quiet zone created no legal duty to sound the horn in emergency situations. Because the rule clearly covered the subject matter of such a duty, it would have prevented State laws imposing such a duty. FRA does not expect that lawsuits will never arise over collisions which may occur at crossings within quiet zones, nor should FRA attempt to prohibit such suits since the cause of such collision may in fact be due to factors other than the lack of an audible warning. However, this rule is intended to remove failure to sound the horn as a cause of action in such lawsuits involving crossings within a quiet zone. We expect that the courts will determine liability issues based on the facts of each case and after reviewing the nature of this rule and its Federal requirements.

We expect that courts, following *Norfolk Southern* v. *Shanklin,* 529 U.S. 344 (2000) and *CSX* v. *Easterwood,* 507 U.S. 658 (1993), will conclude that this regulation substantially subsumes the subject matter of whether trains must sound warning devices at highway-rail grade crossings and, therefore, preempts state law on that subject.

FRA perceives no reason why establishment of quiet zones under this rule should result in higher insurance premium costs for railroads. In fact, a quiet zone under this rule should be evaluated as much less of an underwriting risk than a current whistle ban.

12. Wayside Horn

During FRA's initial outreach process prior to issuing the NPRM, several commenters asked whether placement of a wayside horn (a horn at the crossing and directed at oncoming motorists) might be entertained as a supplementary safety measure. FRA also received comments in the docket and at the public hearings on this subject. It is apparent that there is interest in using such a device as an alternative means of providing an audible warning to the motorist of an approaching train.

A wayside horn system would typically consist of horns mounted on poles that are placed at the crossing. A horn would be directed towards each direction of oncoming vehicular traffic. The system would be activated by the same track circuits used to detect the train's approach for purposes of other automated warning devices at the crossing (flashing lights and gates) and would produce a sound similar to the horn signal given by an approaching train.

At FRA's direction, the Volpe National Transportation Systems Center conducted an initial evaluation of two wayside horn installations at Gering, Nebraska in 1995 (*Field Evaluation of a Wayside Horn at a Highway-Railroad Grade Crossing*, Final Report, June 1998). This evaluation noted that use of the wayside horn in lieu of the train horn reduced net community noise impacts. The evaluation also showed a 52 percent reduction in the number of incidents in which motorists continued to drive over the crossing after the warning device's gate arms had started to descend as compared to the baseline data collected with the train horn sounding. There was no significant difference between train horns and wayside horns for motorists that drove around lowered gates. While the report indicated improved driver behavior with the wayside horn, the report also contains analysis that suggests questions regarding the effectiveness of that particular installation in alerting motorists that should be answered before implementing wayside horns as a substitute for train-borne horns. Further, this evaluation did not contain adequate data or analysis to permit a determination of whether a wayside horn could fully substitute for a train-borne audible warning and additional evaluations at other sites should be performed. The NPRM suggested three questions related to the effectiveness of the wayside horn:

1. Does the particular system provide the same quality of warning, determined by loudness at appropriate frequencies, within the motor vehicle while it is approaching the motorist's decision point?

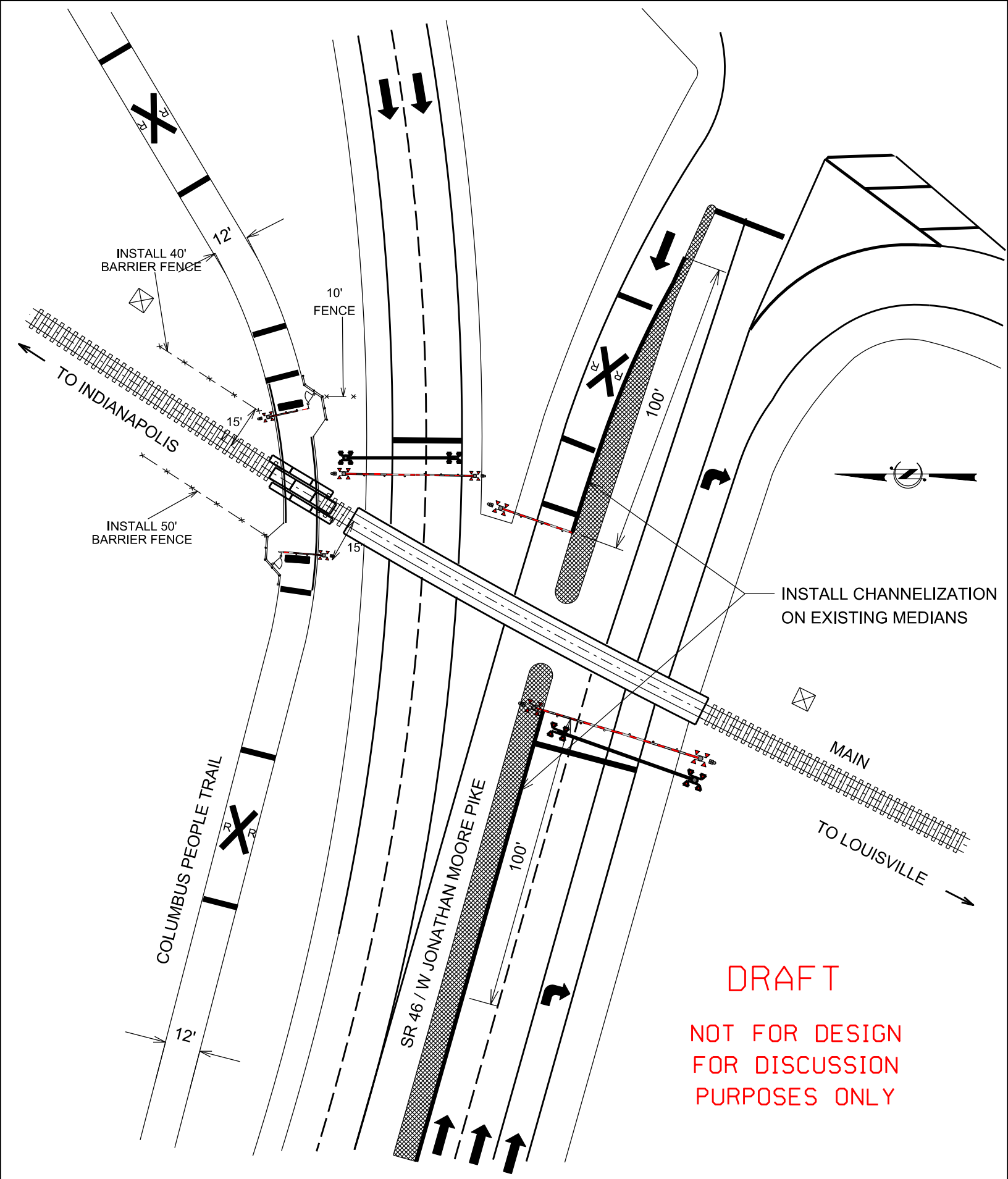
2. As currently conceived, a single stationary horn cannot give the motorist a cue as to the direction of approach of the train or trains. To what extent does this lack of directionality detract from the effectiveness of the warning? Can wayside installation design be altered to compensate?

3. To what extent will the stationary horn suffer from the lack of credibility sometimes associated with automated warning devices, due to the fact that it is activated by the same means? Over what period of time may this problem arise, if at all?

Since the installation of the original wayside horn system in Gering, NE, several other communities have installed wayside horns. These sites include: Ames, Iowa, Parsons, Kansas, Wichita, Kansas and Richardson, Texas. Additionally, other communities have had temporary test installations of the wayside horns.

This topic generated a number of comments from various parties. Additionally, the departments of

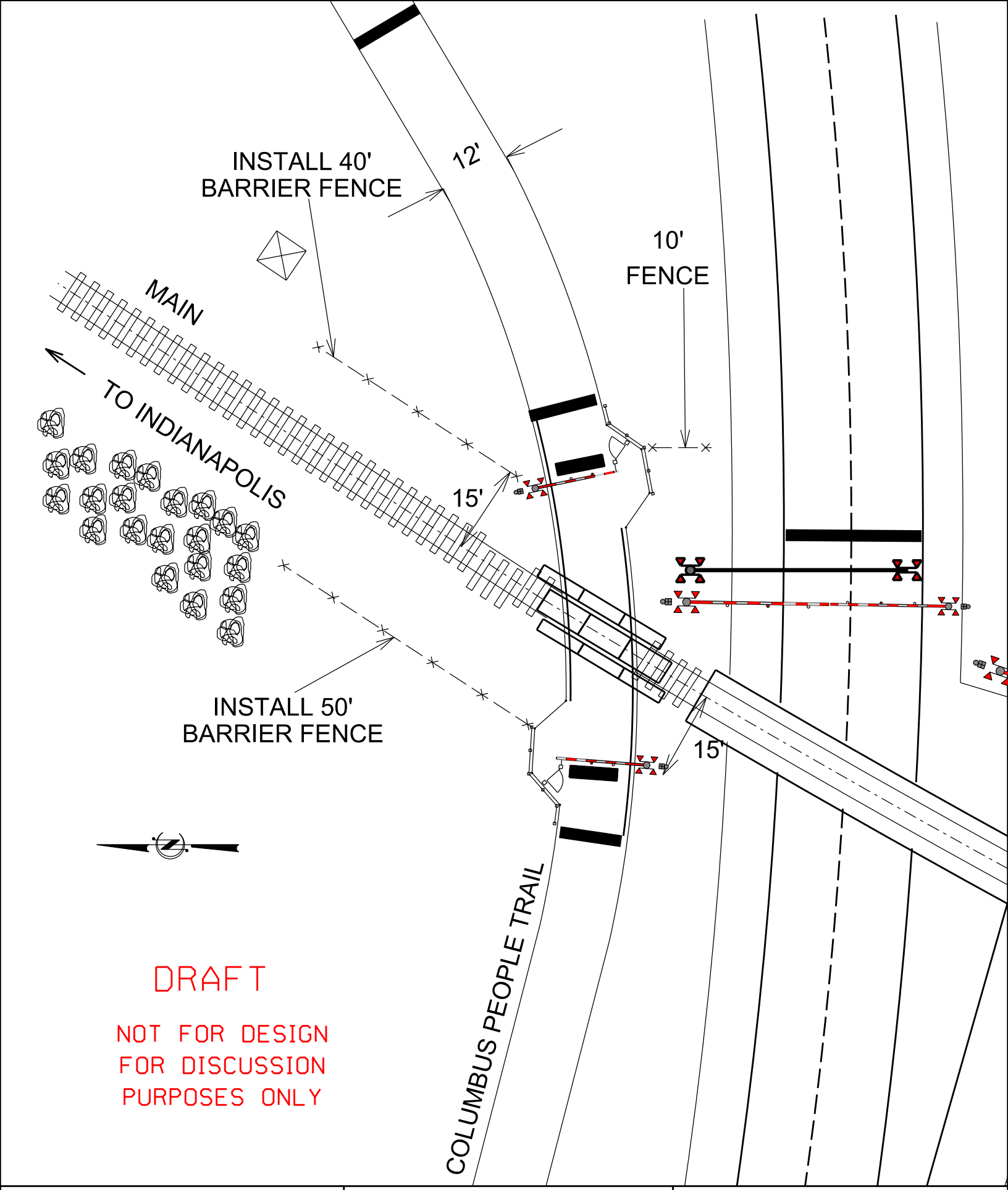
APPENDIX E: Crossing Layouts



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
SR 46
ADT 39,406

Louisville & Indiana RR
DOT 535495H
RRMP 41.64
SCALE: 1' = 40'



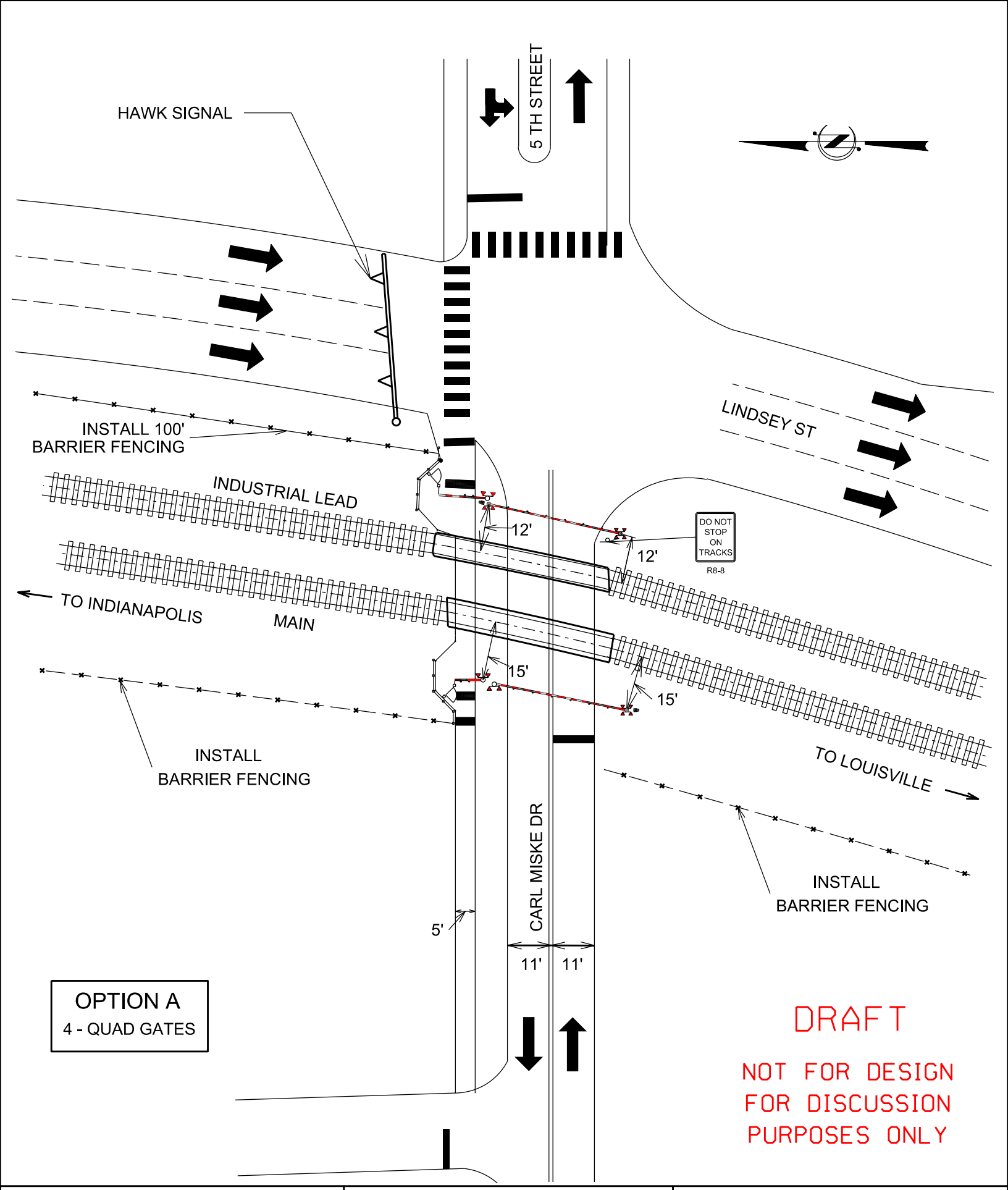
DRAFT

NOT FOR DESIGN
FOR DISCUSSION
PURPOSES ONLY

CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
COLUMBUS PEOPLE TRAIL

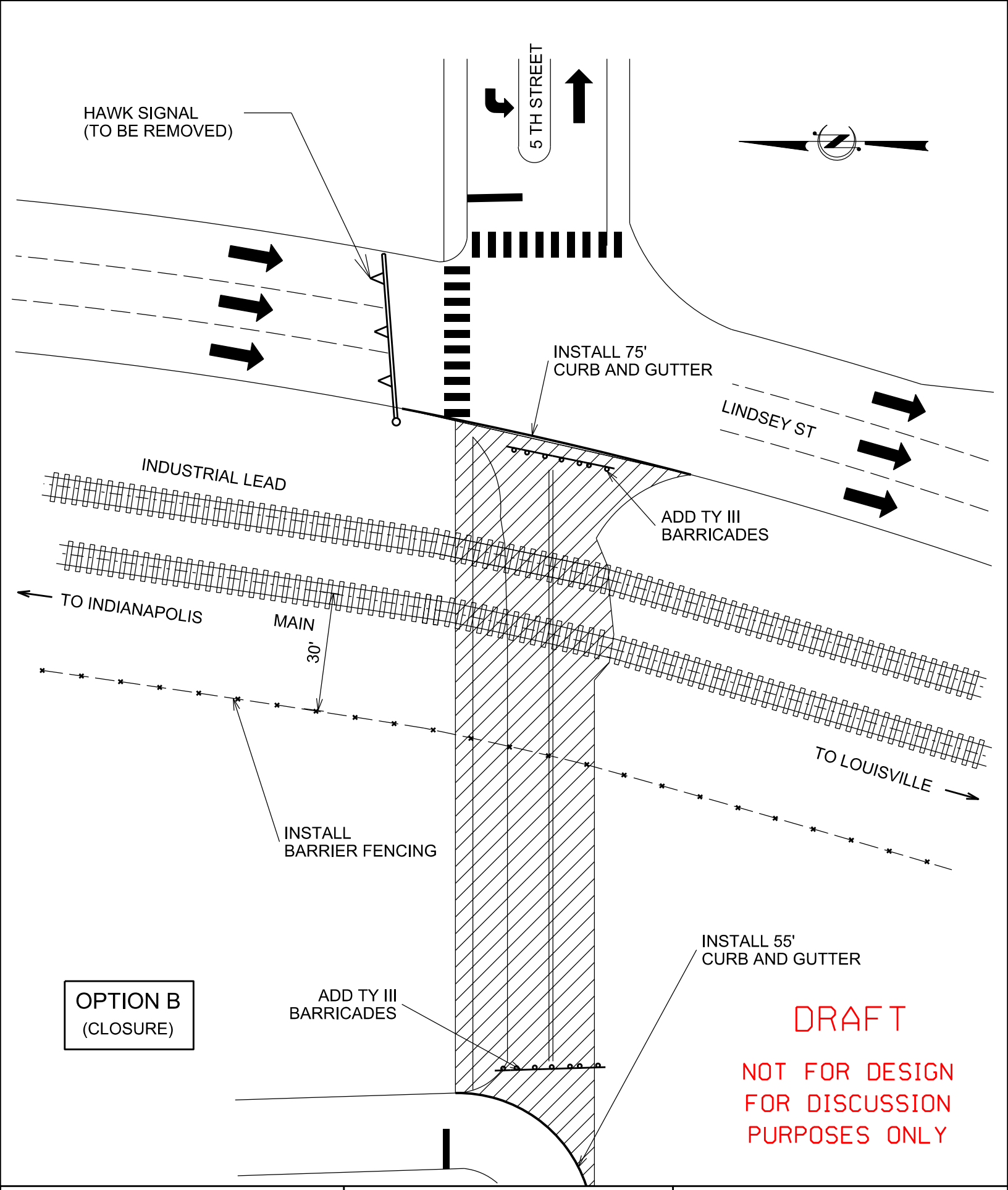
Louisville & Indiana RR
DOT TBD
RRMP TBD
SCALE: 1' = 20'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

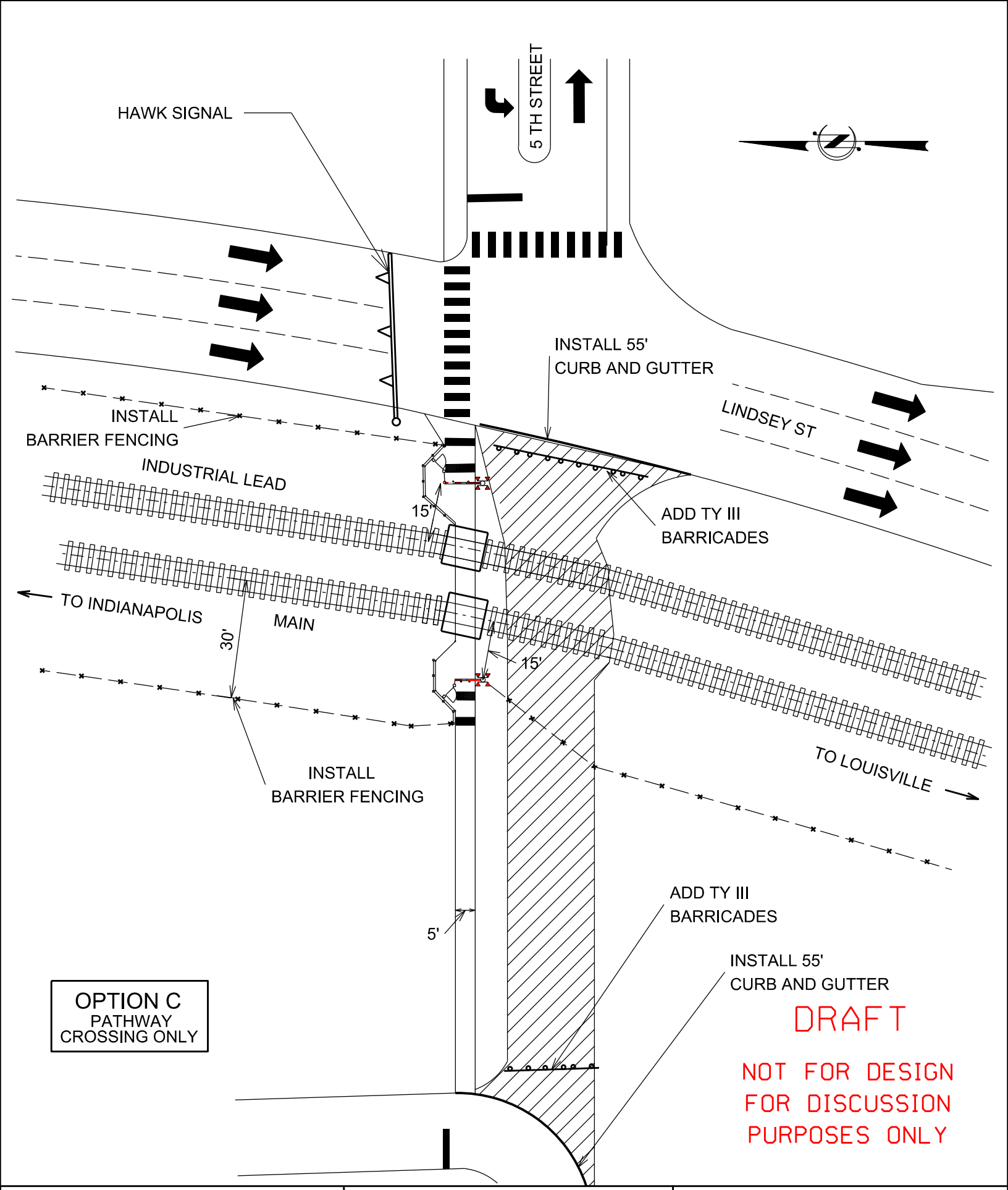
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

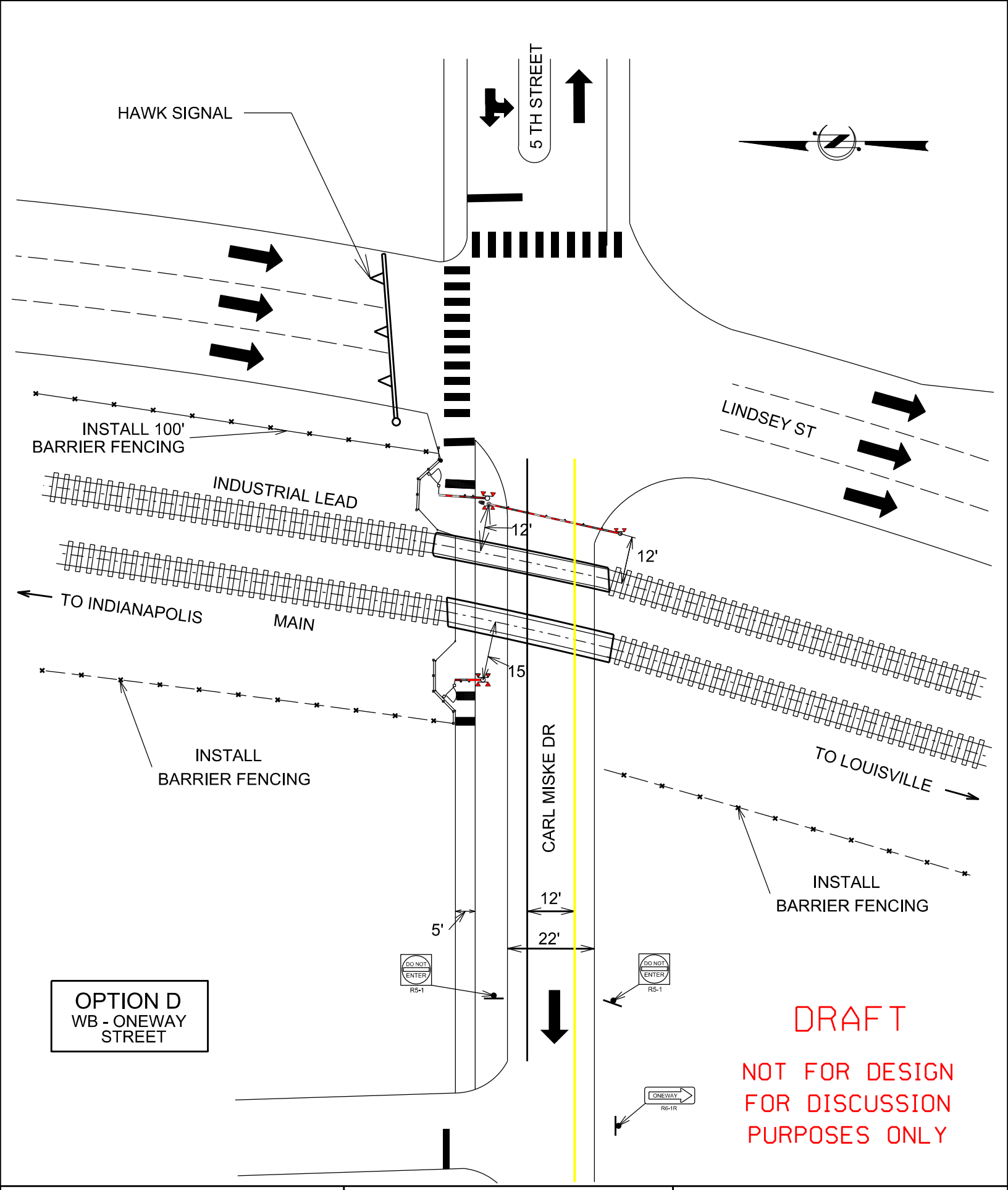
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

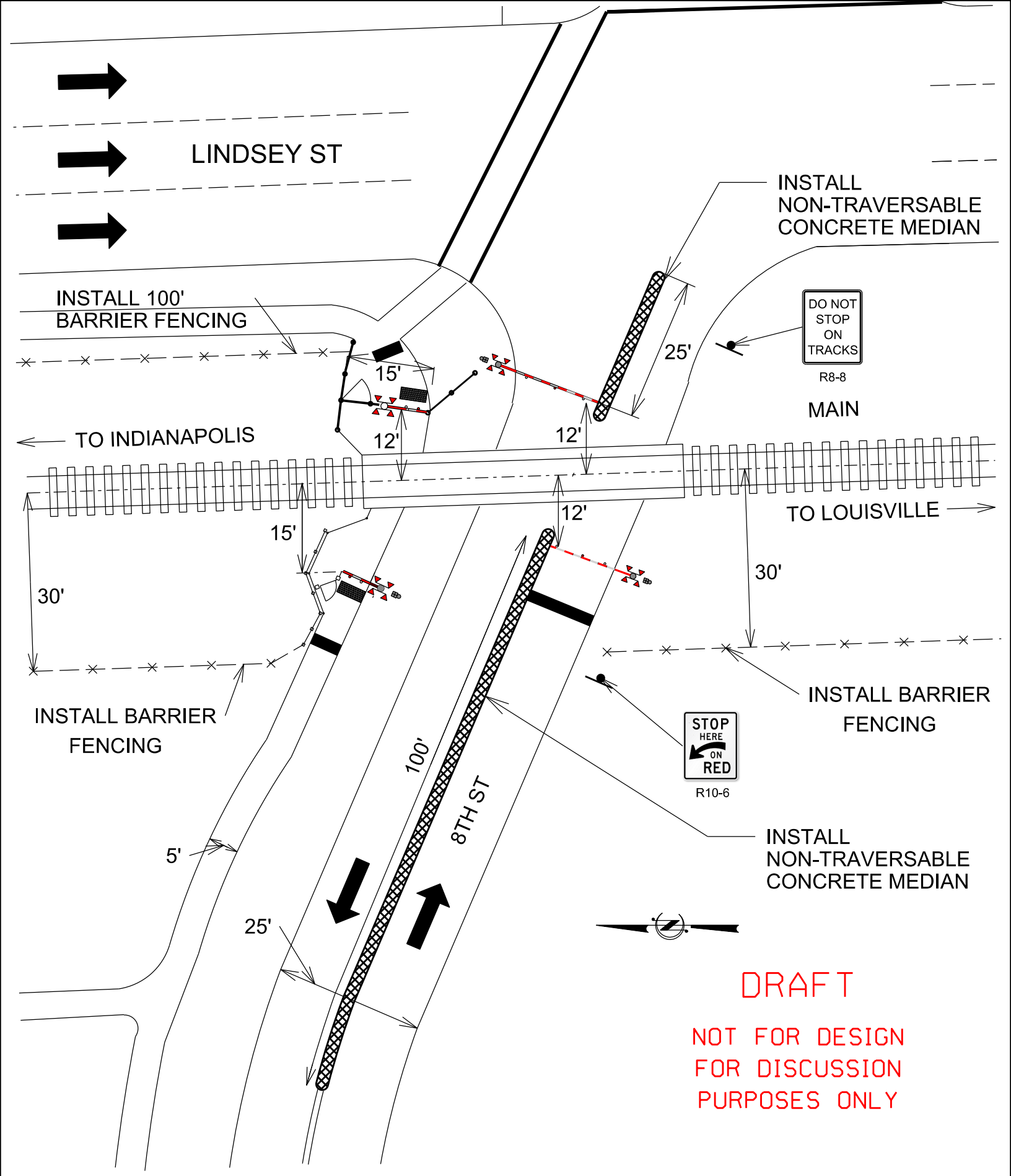
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
5 th ST/ CARL MISKE DR
ADT 474

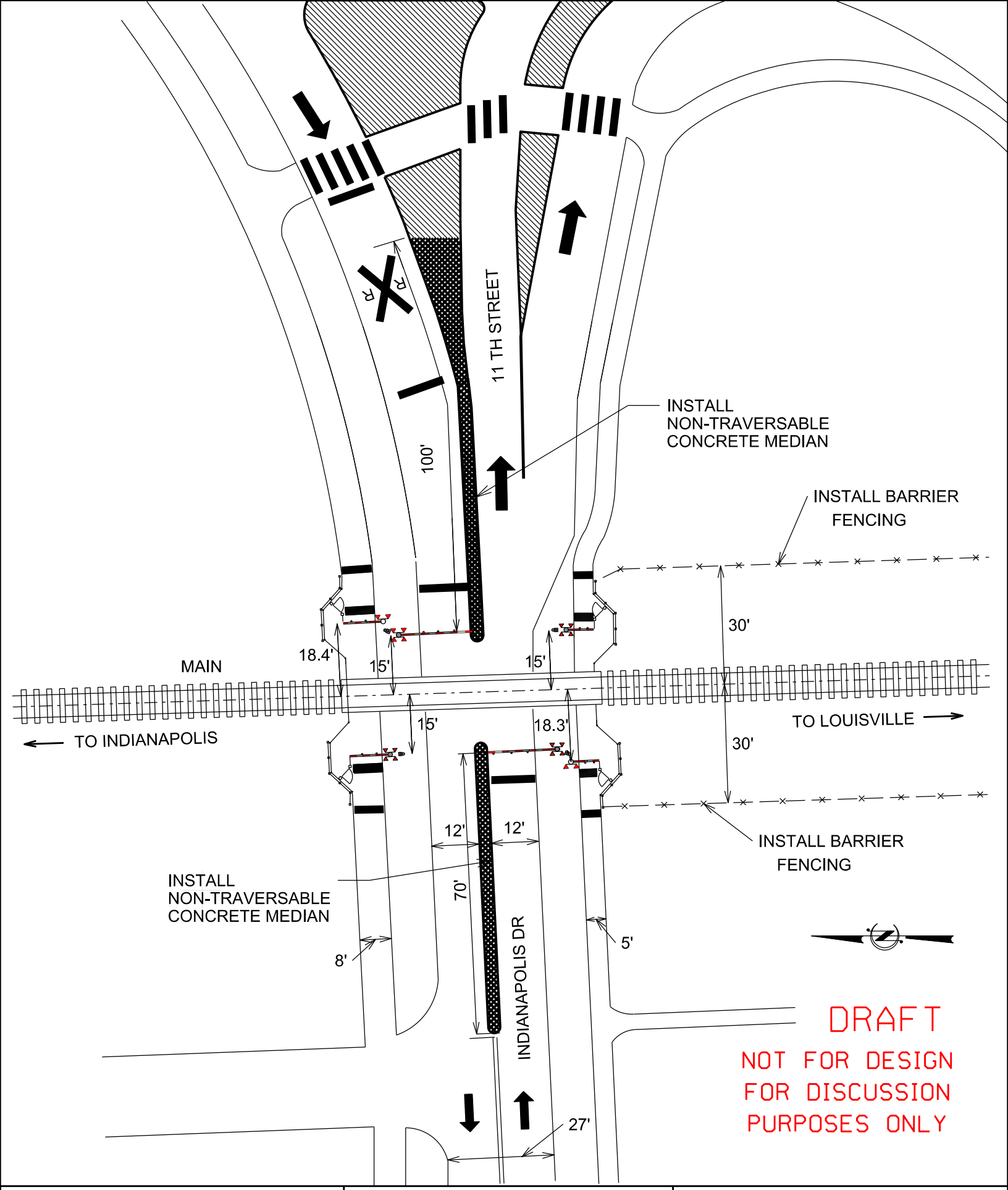
Louisville & Indiana RR
DOT 535496P
RRMP 41.20
SCALE: 1' = 30'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
8th Street
ADT 1,052

Louisville & Indiana RR
DOT 535496W
RRMP 40.98
SCALE: 1' = 20'



CTC inc

CONCEPTUAL LAYOUT
COLUMBUS, INDIANA
11th St-Indianapolis Dr
ADT 9,625

Louisville & Indiana RR
DOT 535498D
RRMP 40.84
SCALE: 1' = 30'

APPENDIX F: Quiet Zone Calculations

Approach 1

Print This Page

Home | **Help** | **Contact** | **logoff** qz@ctcinc.com

Cancel Change Scenario: COLUMBUS (_54322 ▼ **Continue**

Create New Zone

Manage Existing Zones

Log Off

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
535495H	**SR 46/W Jonathon Moore Pike**	**39406**	**Gates**	0	12	23,857.48	MODIFY
535496P	**5th Street/Carl Miske Drive**	**474**	**Gates**	0	6	1,374.57	MODIFY
535497W	**8th Street**	**1052**	**Gates**	0	0	8,925.10	MODIFY
535498D	**Indianapolis Road**	**9625**	**Gates**	0	13	4,429.80	MODIFY

Step by Step Instructions:

Step 1: To specify New Warning Device (For Pre-Rule Quiet Zone Only) and/or SSM, click the MODIFY Button

Step 2: Select proposed warning device or SSM. Then click the UPDATE button.To generate a spreadsheet of the values on this page, click on ASM button—This spreadsheet can then be used for ASM calculations.

Step 3: Repeat Step (2) until the SELECT button is shown at the bottom right side of this page. Note that the SELECT button is shown ONLY when the Quiet Zone Risk Index falls below the NSRT or the Risk Index with Horn.

Step 4: To save the scenario and continue, click the SELECT button

* Only Public At Grade Crossings are listed.

Click for Supplementary Safety Measures [SSM]

Click for ASM spreadsheet: **ASM** * Note:The use of ASMs requires an application to and approval from the FRA.

Summary	
Proposed Quiet Zone:	COLUMBUS (W/ ALL COUNTS)
Type:	New 24-hour QZ
Scenario:	COLUMBUS (_54322
Estimated Total Cost:	$156,000.00
Nationwide Significant Risk Threshold:	14723 .00
Risk Index with Horns:	19856.18
Quiet Zone Risk Index:	**9646.74**

Select

Approach 2 & 3

Print This Page

Cancel Change Scenario: COLUMBUS (_54322 ▼ **Continue**

Create New Zone

Manage Existing Zones

Log Off

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
535495H	**SR 46/W Jonathon Moore Pike**	**39406**	**Gates**	0	12	23,857.48	MODIFY
535496P	**5th Street/Carl Miske Drive**	**0**	**CLOSED(SSM 2)**	0	2	0	Closed
535497W	**8th Street**	**1526**	**Gates**	0	0	10,397.76	MODIFY
535498D	**Indianapolis Road**	**9625**	**Gates**	0	13	4,429.80	MODIFY

Step by Step Instructions:

Step 1: To specify New Warning Device (For Pre-Rule Quiet Zone Only) and/or SSM, click the MODIFY Button

Step 2: Select proposed warning device or SSM. Then click the UPDATE button.To generate a spreadsheet of the values on this page, click on ASM button—This spreadsheet can then be used for ASM calculations.

Step 3: Repeat Step (2) until the SELECT button is shown at the bottom right side of this page. Note that the SELECT button is shown ONLY when the Quiet Zone Risk Index falls below the NSRT or the Risk Index with Horn.

Step 4: To save the scenario and continue, click the SELECT button

* Only Public At Grade Crossings are listed.

Click for Supplementary Safety Measures [SSM]

Click for ASM spreadsheet: **ASM** * Note:The use of ASMs requires an application to and approval from the FRA.

Summary	
Proposed Quiet Zone:	COLUMBUS (W/ ALL COUNTS)
Type:	New 24-hour QZ
Scenario:	COLUMBUS (_54322
Estimated Total Cost:	$33,000.00
Nationwide Significant Risk Threshold:	14723 .00
Risk Index with Horns:	19856.18
Quiet Zone Risk Index:	**9671.26**

Select

Print This Page

Approach 4

Home | **Help** | **Contact** | **logoff** qz@ctcinc.com

Cancel Change Scenario: COLUMBUS (_54323 ▼ **Continue**

Create New Zone

Manage Existing Zones

Log Off

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
535495H	**SR 46/W Jonathon Moore Pike**	**39406**	**Gates**	0	12	23,857.48	MODIFY
535496P	**5th Street/Carl Miske Drive**	**474**	**Gates**	0	14	1,075.75	MODIFY
535497W	**8th Street**	**1052**	**Gates**	0	0	8,925.10	MODIFY
535498D	**Indianapolis Road**	**9625**	**Gates**	0	13	4,429.80	MODIFY

Step by Step Instructions:

Step 1: To specify New Warning Device (For Pre-Rule Quiet Zone Only) and/or SSM, click the MODIFY Button

Step 2: Select proposed warning device or SSM. Then click the UPDATE button.To generate a spreadsheet of the values on this page, click on ASM button—This spreadsheet can then be used for ASM calculations.

Step 3: Repeat Step (2) until the SELECT button is shown at the bottom right side of this page. Note that the SELECT button is shown ONLY when the Quiet Zone Risk Index falls below the NSRT or the Risk Index with Horn.

Step 4: To save the scenario and continue, click the SELECT button

* Only Public At Grade Crossings are listed.

Click for Supplementary Safety Measures [SSM]

Click for ASM spreadsheet: **ASM** * Note:The use of ASMs requires an application to and approval from the FRA.

Summary	
Proposed Quiet Zone:	Columbus (w/ all counts)2
Type:	New 24-hour QZ
Scenario:	COLUMBUS (_54323
Estimated Total Cost:	$63,000.00
Nationwide Significant Risk Threshold:	14723 .00
Risk Index with Horns:	19856.18
Quiet Zone Risk Index:	**9572.03**

Select

Approach 5

Print This Page

Cancel Change Scenario: COLUMBUS (_54322 ▼ **Continue**

Create New Zone

Manage Existing Zones

Log Off

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
535495H	**SR 46/W Jonathon Moore Pike**	**39406**	**Gates**	0	12	23,857.48	MODIFY
535496P	**5th Street/Carl Miske Drive**	**474**	**Gates**	0	6	1,374.57	MODIFY
535497W	**8th Street**	**1052**	**Gates**	0	6	2,052.77	MODIFY
535498D	**Indianapolis Road**	**9625**	**Gates**	0	13	4,429.80	MODIFY

Step by Step Instructions:

Step 1: To specify New Warning Device (For Pre-Rule Quiet Zone Only) and/or SSM, click the MODIFY Button

Step 2: Select proposed warning device or SSM. Then click the UPDATE button.To generate a spreadsheet of the values on this page, click on ASM button—This spreadsheet can then be used for ASM calculations.

Step 3: Repeat Step (2) until the SELECT button is shown at the bottom right side of this page. Note that the SELECT button is shown ONLY when the Quiet Zone Risk Index falls below the NSRT or the Risk Index with Horn.

Step 4: To save the scenario and continue, click the SELECT button

* Only Public At Grade Crossings are listed.

ALERT: Quiet Zone qualifies because SSM has been applied in each crossing.

Click for Supplementary Safety Measures [SSM]

Click for ASM spreadsheet: **ASM** * Note:The use of ASMs requires an application to and approval from the FRA.

Summary	
Proposed Quiet Zone:	COLUMBUS (W/ ALL COUNTS)
Type:	New 24-hour QZ
Scenario:	COLUMBUS (_54322
Estimated Total Cost:	$284,000.00
Nationwide Significant Risk Threshold:	14723 .00
Risk Index with Horns:	19856.18
Quiet Zone Risk Index:	**7928.66**

Select