

Traffic Noise Study

A Traffic Noise Study was completed according to Federal Highway Administration (FHWA) and ODOT policies and procedures using FHWA Traffic Noise Model version 2.5. For purposes of validating the noise model, a precision sound level meter was utilized in conducting field measurements and traffic counts collected simultaneously three (3) locations along existing I-40 within the project limits. The model validation proved satisfactorily with all measured versus predicted levels being within ± 3 dB(A) range; thus, the TNM 2.5 model developed for the study area would provide an acceptably accurate estimate of noise levels for the existing and future conditions. Fifty-five model receiver sites were analyzed, which represented fifty-one single family residences, one hotel, and one cemetery. Based on the proposed project and the 2050 design year traffic volumes, twenty-nine (29) residential receivers and portions of the cemetery would equal or exceed the 66 decibel threshold defined as a noise impact. Noise abatement in the form of free-standing noise barrier walls were considered for those impacted receivers. Results of the TNM barrier analyses indicated that noise barrier walls ranging up to the maximum of 22 feet could not meet the feasible and/or reasonable criteria in accordance with ODOT noise policy. Therefore, noise barrier walls are not required as part of the proposed project.

Below are frequently asked questions (FAQs) specific to Traffic Noise Studies

What are the Federal standards for highway traffic noise?

The Federal noise regulation at 23 CFR 772 constitutes the official Federal noise standards. The standards include the Noise Abatement Criteria along with all other requirements of 23 CFR 772, such as prediction of noise levels, abatement, information for local officials and construction noise. The entire Part 772 is the Noise Standard. FHWA has given highway agencies flexibility in implementing the 23 CFR 772 standards which done per current ODOT Noise Policy dated July 13, 2010 to be applied uniformly and consistently to all federal aid projects throughout the state.

What is the focus of the FHWA Noise Abatement Criteria (NAC)?

The FHWA NAC focuses on levels where highway traffic noise could potentially interfere with speech communication in exterior areas. 23 CFR 772's primary focus is on determining traffic noise impacts and considering noise abatement for exterior areas of frequent human use.

How are existing noise levels determined?

Existing noise levels are determined by using one of the following methods:

1. Perform sound level measurements at representative receivers taken during the worst noise hour;
2. Predict noise levels using the FHWA Traffic Noise Model (TNM v2.5); or,
3. Use a combination of sound level measurements and prediction with a validated Traffic Noise Model. Measurements should occur during free flow traffic conditions and do not need to occur during the worst noise hour.

How are future noise levels determined?

As with all ODOT highway projects requiring a noise study, future noise levels are determined by using the FHWA TNM v2.5 being consistent with the methodology of TNM per 23 CFR 772.9(a).

What is TNM v2.5?

The FHWA's TNM v2.5 is a computer software that calculates existing and future noise levels based on project design plans consisting of roadway geometry, traffic data, terrain lines, ground zones and receiver site locations. For the I-40 project, existing and future levels were determined using TNM v2.5.

How are noise impacts determined?

A traffic noise impact occurs when: (1) future predicted exterior LEQ(h) traffic noise levels approach by one decibel, meet or exceed any of the FHWA Noise Abatement Criteria; or, (2) Impacts which occur when there is a substantial noise increase defined as when future levels exceed existing levels by 15 dB or greater even though the predicted levels may not exceed the NAC. For the I-40 project, the primary receivers of concern are the residential dwellings and cemetery in which impacts occur when noise levels equal or exceed 66 dBA LEQ (h).

What is dB(A) LEQ(h)?

The decibel (dB) is a logarithmic unit, which expresses the ratio of the measured sound pressure level to a standard reference level. Sound is composed of various frequencies, but the human ear does not respond to all frequencies. Frequencies to which the human ear does not respond are filtered out when measuring highway traffic noise levels. Sound level meters are usually equipped with weighting circuits, which filter out selected frequencies. The A-scale on a sound level meter best approximates the frequency response of the human ear. The term LEQ (h) refers to an equivalent of an

average sound level over an hour's time period that contains the same acoustic energy as the time-varying sound level during the same period. All traffic noise levels are typically expressed in dB(A) LEQ (h).

What is "feasible" highway traffic noise abatement?

Feasibility deals primarily with objective engineering considerations (e.g., can a barrier be built given the topography of the location typically within highway right-of-way; can a substantial noise reduction be achieved given certain access, drainage, safety, or maintenance requirements; are other noise sources present in the area, etc.). In addition, noise barriers must be acoustically feasible. Per ODOT Noise Policy, a noise barrier needs to achieve at least a 5 dB(A) highway traffic noise reduction to be considered feasible.

What is "reasonable" highway traffic noise abatement?

Reasonableness refers to the many factors to be considered to determine if mitigation is fair and affordable. The following are the reasonableness criteria that are specified in the ODOT Noise Policy:

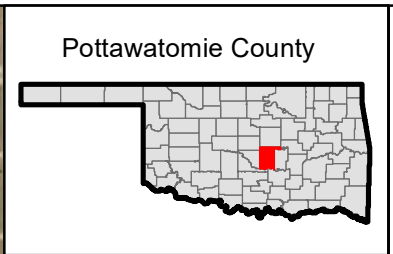
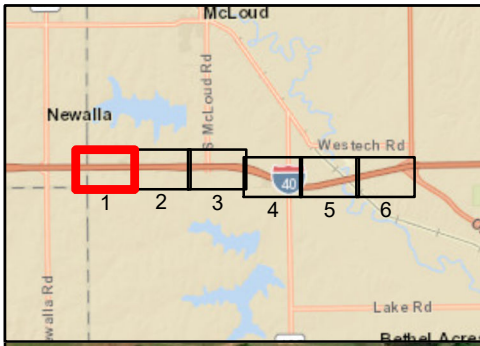
1. The property owners' and residents' desire for mitigation.
2. The ODOT noise reduction design goal of 7 dB(A) must be achieved for at least 75 percent of the benefitted receivers identified within the first row of receivers.
3. The cost not to exceed \$30,000.00 per benefitted residential receiver. A benefitted residential receiver receives at least a 5 dB(A) reduction when compared to no mitigation and includes all residential receivers (not only first row receivers). Benefit cost is based on historical unit cost of \$25 per square foot of wall height required to achieve a feasible reduction. As increased barrier height requires disproportionate increase in foundation costs (up to two times the "standard" wall), a maximum wall height considered for noise abatement is 22 feet.

Are payments allowed for noise damages?

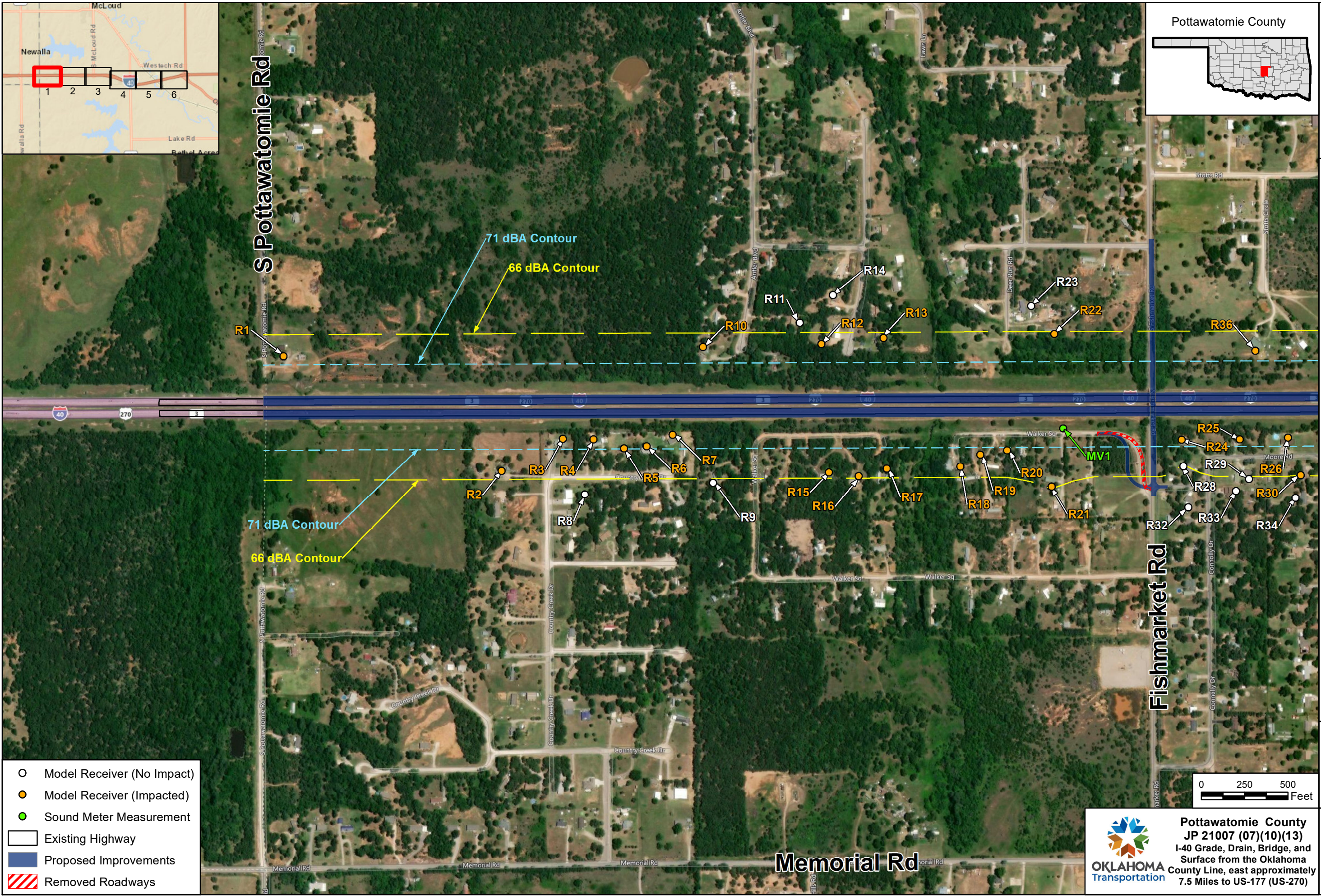
Per FHWA, State DOTs cannot use Federal-aid funds to compensate property owners for noise damages but can use Federal-aid funds for noise abatement consisting primarily in the form of noise barrier walls placed within the highway right-of-way. In addition, per ODOT Noise Policy, the Department will not consider insulation of residences as noise mitigation.

Does vegetation reduce noise levels?

Studies have shown that vegetation must be a minimum of 100 feet thick, a minimum of 20 feet high and sufficiently dense (100% opacity) to provide at least a 5-dB(A) noise reduction. Since a substantial noise reduction does not occur until vegetation matures, the FHWA does not consider the planting of vegetation to be a highway traffic noise abatement measure for projects subject to the provisions of 23 CFR 772.

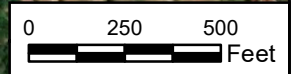



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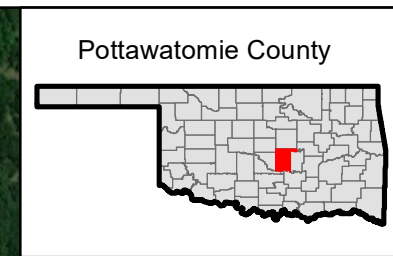
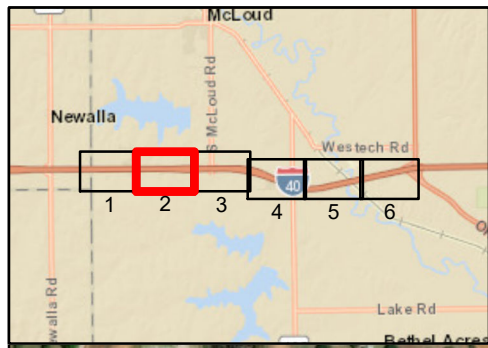
OKLAHOMA DEPARTMENT OF TRANSPORTATION
I-40 Widening Project Pottawatomie County
 Noise Model Receiver Locations

- Model Receiver (No Impact)
- Model Receiver (Impacted)
- Sound Meter Measurement
- ▭ Existing Highway
- ▭ Proposed Improvements
- ▨ Removed Roadways

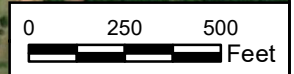




Pottawatomie County
 JP 21007 (07)(10)(13)
 I-40 Grade, Drain, Bridge, and Surface from the Oklahoma County Line, east approximately 7.5 Miles to US-177 (US-270)

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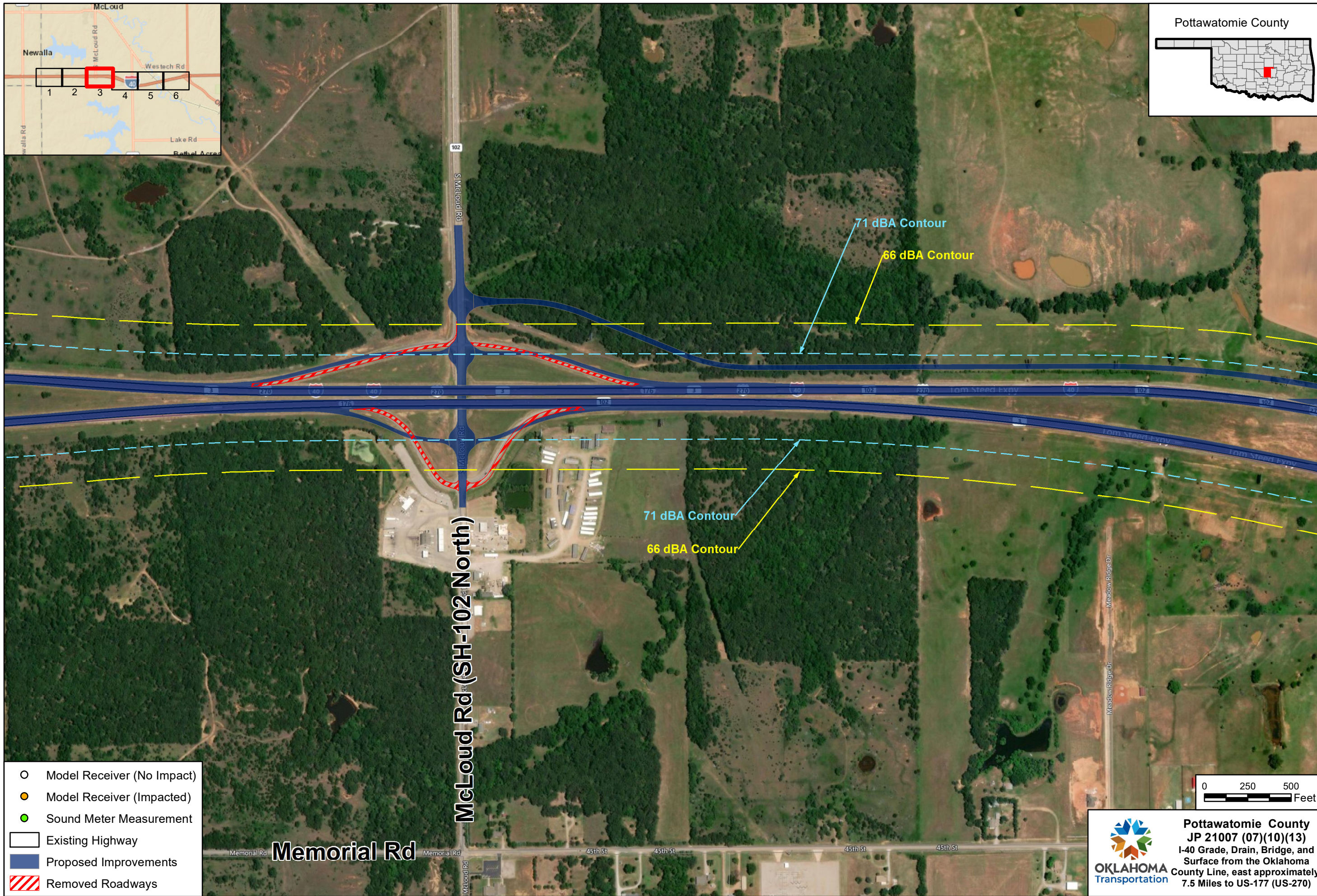
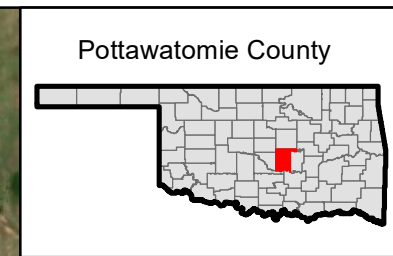
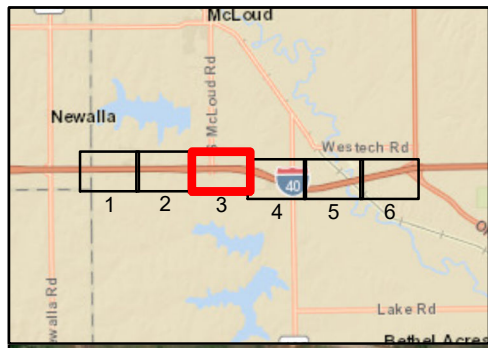
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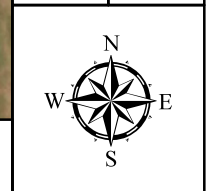
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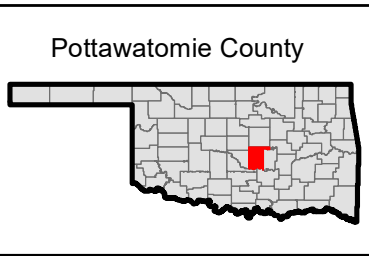
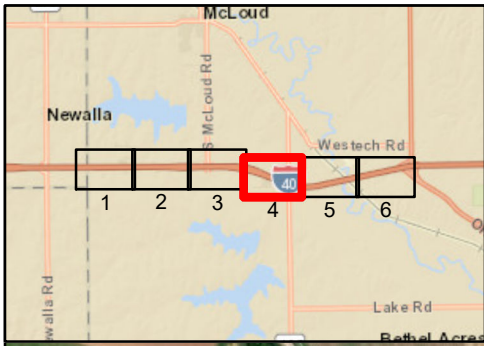
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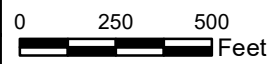

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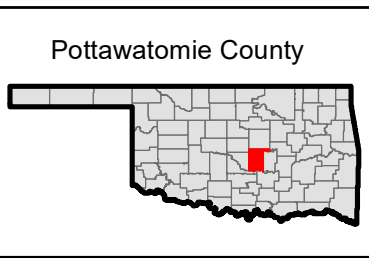
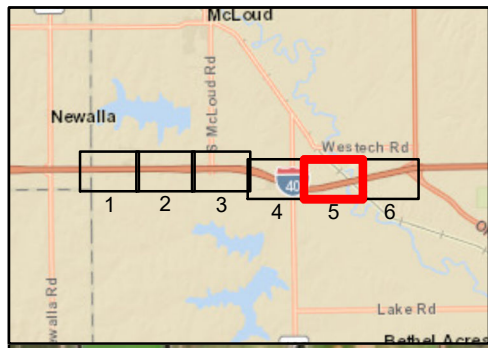
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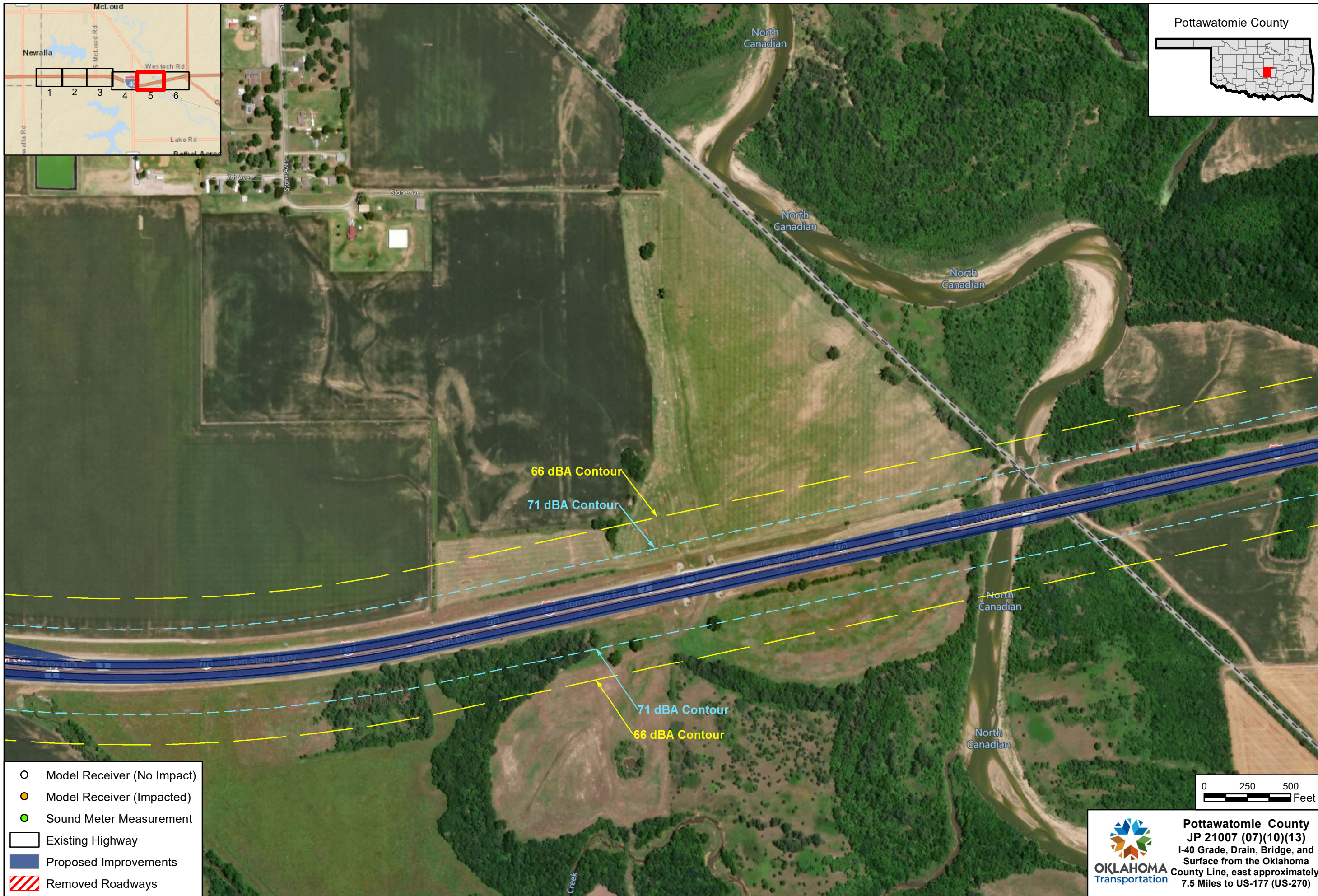

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I-40 Widening Project Pottawatomie County
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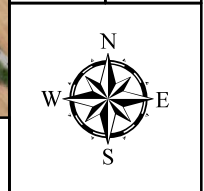



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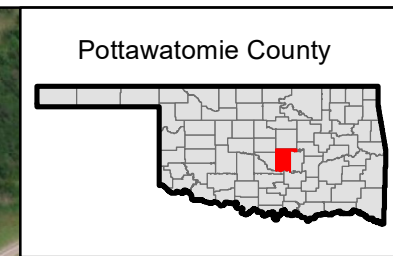
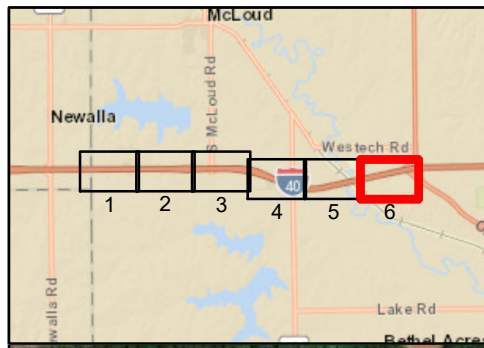
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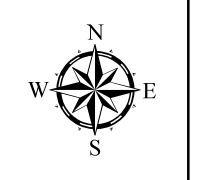


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