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Trenchless Technology: A Key Component in Railroad Expansion

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1. ABSTRACT

The railroad system continues to be a major component in the transportation of raw materials used in construction projects nationwide, and of both imported and exported products. As the current rail lines age, and demand grows, widening and improvement projects on existing tracks has created a major market for construction companies. These projects are often in remote locations and present challenges to contractors in complying with railroad protocol for working around active rail tracks.

SSC was contracted by Skanska in August 2014 to perform horizontal auger bores underneath the existing railroad tracks to install steel casing that would be incorporated into new drainage culverts that required reconstruction to span the new second main line track. The project called for 18 bores, installing steel casing ranging from 36" – 60" in diameter for 40' – 60' depending on the location. The bores were to be completed in flowing sand conditions, which created the potential for massive voids. This reality presented even greater challenge given that the voids would be under active rail lines. Timing of the bores with the train schedule, and ensuring everything was in place to complete the track crossing without being stopped, were crucial factors.

"Trenchless Technology: A Key Component in Railroad Expansion" will explore the lessons learned on this project and how they can be transferred to the succesful design and construction for railroad widening. The ideas and discussions shared in this session will benefit all stakeholders looking to participate in future railroad projects.

2. INTRODUCTION (main body of paper should begin immediately after the Abstract)

At the time of this project, railroads in the US were transporting 580,000 carloads of freight each week over the 140,000 miles of track in the US. This equates to 1.8 billion tons of commodities hauled by rail in the year of 2014. The recent steady increase of rail traffic can be directly tied to positive economic indicators including industrial output, consumer confidence, retail and vehicle sales and housing. An uptick in construction is also reflected in the additional transport of raw construction materials such as crushed stone, industrial sand, metal products, metallic ore, lumber and wood – showing that not only does a strengthening economy drive railroad traffic, but that railroad traffic enables construction growth.

The economic importance of the US railroad infrastructure is not only in its ties to current conditions, but in the role it plays in economic growth. Transporting goods by railroad is 4 times more efficient than by truck, and it also alleviates the challenge of truck driving shortages that could hamper some industry's ability to grow. The 560 railroad operating companies in the US will invest approximately $29 billion dollars in railroad maintenance and expansion in 2015, creating construction opportunities for contractors nationwide.

With all of the economic impact that a healthy rail system has, the importance of investing in its upkeep and expansion is apparent. Currently the rail system is operating at 79% of capacity utilization, meaning that there is not

a large margin for issues that could put tracks out of use. This fact, combined with the US Federal Highway Association's estimate of a 45% increase in freight shipments via rail by the year 2040, only enhances the need to continue to preserve and expand the US rail system.

3. PAGE NUMBERS

Each paper will be assigned a number in the electronic conference proceedings. To facilitate printing and further referencing, local page numbering is used in each paper, starting from page 1. The page number should appear centered as a footer.

Sample: Paper ### - 1
(where ### is the paper number assigned to you and "1" is the first page (for example MM-T4-03 – 1)

4. EQUATIONS, FORMULAS, SYMBOLS AND UNITS

Type all equations and formulas from the left margin (do not centre in the page) and number them consecutively. Equation numbers should be placed flush at the right margin in square brackets. Refer to equations in the body of text by these numbers (e.g. "Eq.1" or "Equation 1 shows…"). Use imperial or metric units and Arabic numerals. **Use of units must be consistent through out the paper.**

$$\sigma = \frac{P}{A} \qquad [1]$$

5. ILLUSTRATIONS

Number illustrations (whether drawings or photographs) consecutively in the order of appearance and refer to them as Figure 1, Figure 2 to 4, etc. Avoid placing illustrations sideways on a page; however, if this is not possible, no other text should appear on that page. Photographs should be of good quality contrast. Figure lettering should be approximately the same size as the text with a minimum of 10 point font. Make sure that illustrations borrowed or adapted from another source are properly acknowledged.

Captions should be placed immediately **below** the illustration.

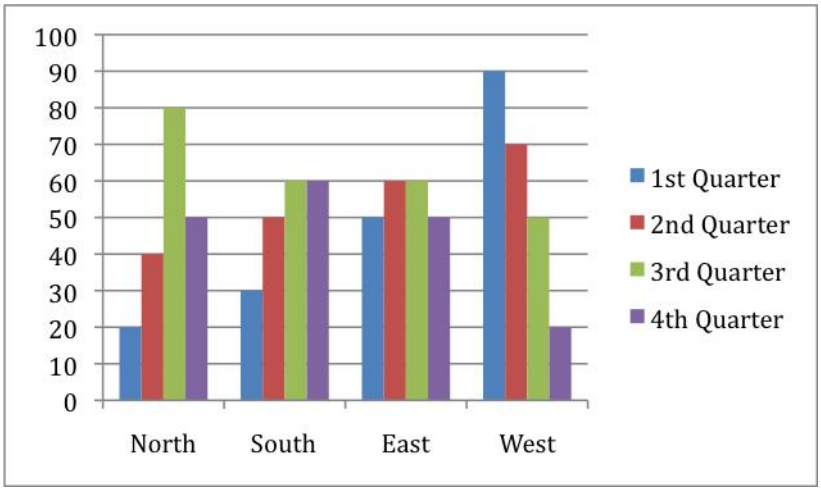

Figure 1. Guidelines for NASTT's 2013 No-Dig Show: sample figure and positioning of the legend.

6. TABLES

Number tables consecutively in order of appearance and place them as close as possible to where they are first referenced in the text. Refer to tables as Table 1, or Tables 1 and 2, in the body of text. Avoid abbreviations in column headings (other than units). Indicate units in the line immediately below the heading. Type the caption above the table to the same width as the table, and do not leave a line space between the table caption and the table.

Table 1. Sample table for the as explained in the requirements for papers.

Title	Sub-title (units)	Sub-title (units)
Line 1	1234	4321
Line 2	1321	8765

7. REFERENCES

All references should be listed and in the standard format.

Bennett, D., and Ariaratnam, S. (2008) – Horizontal Directional Drilling Good Practices Guidelines, North American Society for Trenchless Technology (NASTT), Third Edition, USA

Bennett, D., Ariaratnam, S. and Wallin, K. (2011) – Pipe Bursting Good Practices Guidelines, North American Society for Trenchless Technology (NASTT), Second Edition, USA