2.0 INTRODUCTION
This chapter provides a listing of definitions, acronyms and abbreviations that are used in this manual and associated special provisions.
2.1 DEFINITIONS

Unless another intention clearly appears, words and phrases (including technical words and phrases and such others as have acquired a special meaning) shall be construed according to rules of grammar and according to general usage.

Wherever the following terms, or pronouns in place of them, are used in this manual and in contract documents, the intent and meaning shall be interpreted as follows:

ADVANCED MATERIALS AND TECHNOLOGY MANUAL. A Department manual that contains requirements, best practices and examples related to the use of technologies such as the paver mounted thermal profile method, intelligent compaction method and 3D production monitoring for excavation. References to the Advanced Materials and Technology Manual from the contract are to the edition in effect on the letting date.

ATTRIBUTES. Are extra pieces of descriptive information about a survey point that are contained within a Feature Code Library (e.g., centerline offset, material type, lift, etc.).

AUTOMATED MACHINE GUIDANCE (AMG) – EXCAVATION. A grade control system attached to excavation equipment that uses either a 3D GNSS or Universal Total Station System to document and record excavation depths. The system is integrated with an onboard documentation system that displays a real-time color-coded maps of the excavation depths, current excavator location, depth above or below design and more.

AUTOMATIC FEEDBACK CONTROL. Automatically adjusts roller Operating Settings, such as vibration frequency and amplitude, based upon real-time feedback from the drum vibration measurement system.

AUXILIARY LANE. (See MnDOT 1103 “Definitions”). The intelligent compacting method and paver mounted thermal profile method are required only on continuous left turn lanes and passing lanes. Exclude auxiliary lane tapers, ramps, shoulders, cross-overs, non-continuous turn lanes, loops, bypass lanes, acceleration/deceleration lanes and intersecting streets.

CLOUD. A web-based user interface.

CLOUD COMPUTING. The use of computing resources (hardware and software) that are delivered as a service over a network to enable near, real-time visualization (maps) and manipulation of geo-spatial data.

CLOUD STORAGE. A network storage (typically the internet) where the geo-spatial data is stored in virtualized pools of storage.

COMPLEX SHAPE. Is a single element comprised of multiple segments. Complex shapes, present within the design file, are created to assist with trimming of Geo-Spatial Data within Veta.
For instance, four lines are drawn to form a polygon for trimming of the data within a given Traffic Lane. The complex shape, much like a shape, treats the four lines as if they are a single element.

**CONTROL POINT.** (Sometimes referred to as survey markers, monuments, hubs, control markers)—are temporary or permanent objects placed to mark key survey points on the earth's surface. These markers are used to indicate elevation and/or horizontal position.

**COORDINATE SYSTEM.** A system that uses one or more numbers, or coordinates, to uniquely determine the position of a point or other geometric element on a manifold such as Euclidean space.

**CUMULATIVE MEASUREMENT PASS COUNT.** The Gridded Final Coverage Data for pass count (the number of passes). The pass count reflects the number of roller passes in one area of the mat (e.g., 0.3 m by 0.3 m [1 ft by 1 ft area]), not the total number of passes across the width of the mat for a given roller.

**DATA.** Measurements recorded by a data acquisition system, or information generated/processed from these measurements (e.g., GNSS coordinates, stiffness, temperature, pass count, speed, frequency, amplitude).

**DRIVING LANE.** (See Traffic Lane.)

**FEATURE CODE LIBRARY.** Is a library used, with a rover, to describe each survey point using an alphanumeric code. These codes are later processed to assist with generation of plans and other documentation. Some Feature Codes also contain Attributes.

**FINISHING ROLLER.** The final roller used in the compaction process for the given Lift.

**GEO-SPATIAL DATA.** Data that has explicit geographic positioning information included with it, such as a road network from GIS, or a geo-referenced satellite image. Geospatial data may include attribute data that describes the features found in the dataset.

**GRIDDED ALL PASSES DATA.** Includes all Measurement Passes recorded for a given grid (see Figure 2.1). This data is generally used to build compaction curves for establishment of rolling patterns.
FIGURE 2.1 – Schematic of Gridded All Passes Data and Gridded Final Coverage Data.

GRIDDED DATA. Data processed from the raw data using Meshes. For the intelligent compaction method, the raw data is duplicated over the meshes for the entire roller drum width, resulting in multiple data points covering the drum width (see Figure 2.2). This process is used to track partial drum overlaps among passes.
GRIDDED FINAL COVERAGE DATA. Data that summarizes the final (last) Measurement Pass recorded for a given grid (e.g., total pass count, last stiffness, last temperature). Grid sizes are typically at a mesh size of 1 ft (0.3 m) in the X and Y direction for post-processed data. See Figure 2.1.

INSTRUMENTED ROLLER. A self-propelled roller integrated with a global navigation satellite system and onboard documentation system that can display real-time color-coded maps of roller location, number of passes, roller speeds, and amplitude and vibration frequencies of the roller drum. Some systems are also equipped with drum vibration instrumentation, infrared temperature sensors, and/or Automatic Feedback Control. The onboard documentation system on these rollers would also display real-time color-coded maps of stiffness response or pavement surface temperatures, or both.

INTELLIGENT COMPACTION. Compaction efforts completed using an Instrumented Roller.

INTELLIGENT COMPACTION MEASUREMENT VALUE (ICMV). The stiffness of the materials based on the response of the roller drum vibrations and underlying material responses.

INTELLIGENT COMPACTION (IC) ROLLER. (See Instrumented Roller.)

INTELLIGENT COMPACTION SUPERVISOR. The Contractor’s person responsible for performance and compliance with intelligent compaction requirements.

LAYER. The total thickness of each material type; composed of a single or multiple Lifts.

LIFT. A unit of material within a Layer that is placed for compaction.
LOT ROLLER COVERAGE. The percent of Roller Coverage (RC) for the given lot.

MEASUREMENT PASS. A Roller Pass, performed by an Instrumented Roller, where all required information is recorded in a data file.

MESH. A collection of vertices connected to other vertices that defines the shape of the measurement area (e.g., roller drum in two (2) Dimensional (2D) polygons (typically multiple squares)). The defined data mesh size is generally 0.3 m by 0.3 m (1 ft by 1 ft) in horizontal directions (see Figure 2.2).

MINNESOTA CONTINUOUSLY OPERATING REFERENCE STATION / REAL TIME REFERENCE NETWORK GLOBAL NAVIGATION SATELLITE SYSTEM (MNCORS/RTRN GNSS). Consists of over 130 permanent GNSS base stations, communications links, and server computers that together calculate connections and send them to other mobile GNSS receivers in order to acquire real-time survey-quality field positions. Each CORS includes a highly accurate receiver that continuously collects radio signals broadcast by GNSS satellites.

ONSITE IC SUPPORT. The Contractor’s personnel responsible for the onsite execution of the intelligent compaction requirements.

OPERATING SETTINGS. Roller settings, such as: speed, direction, frequency, peak vertical force amplitude).

OPERATOR OF INSTRUMENTED ROLLER. The Contractor’s personnel operating an Instrumented Roller.

PAVER MOUNTED THERMAL PROFILE METHOD. This method uses a system that continually monitors the surface temperature readings of the mat immediately behind the paver screed during placement operations.

QUALITY CONTROL PERSONNEL. The individuals employed by the Contractor to execute the work.

RANGE. The difference between the surface temperature readings at the 98.5 and 1 percentile.

RAW IC DATA. Data recorded during compaction operations prior to the gridding process. Raw Data collected by Instrumented Rollers consists of one data point for a roller drum width, recorded at approximately 10 Hz or 0.3 m (1 ft) intervals. Therefore, the data mesh (data footprint) is about one drum width by 0.3 m (1 ft) (see Figure 210-3).

FIGURE 2.3 – Schematic of Raw IC data.
ROLLER COVERAGE (RC). The percent of required compaction area where the minimum required Cumulative Measurement Pass Count is achieved.

ROLLER PASS. The area covered by one width of the roller in a single direction.

SITE. The Project where the given technology (e.g., IC, PMTP, AMG) is required.

SITE ANALYSIS. The process where the Contractor determines whether the MnCORS network or local ground base stations will be used within the project limits. For cases requiring local ground base stations, the site analysis also considers the number of GNSS repeaters that may be needed to cover the entire working length of the project and to address project staging of GNSS repeaters and base station(s) when used. This process should be completed before or during Site Setup/Calibration.

SITE SETUP/CALIBRATION. The process of setting up the local base station, repeaters, and GNSS receiver. It also includes determining the coordinate information of each Control Point and storing this information within the given technology’s software.

SPOT TEST DATA. Data resulting from Quality Assurance and Quality Control testing (e.g., moisture, density, stiffness). Veta uses the term Spot Test Data for these types of tests.

SURFACE TEMPERATURE READINGS. The temperatures of the mat immediately behind the trailing edge of the screed plate during placement operations.

THERMAL COVERAGE (TC). The percent of the total paving area, for the given lift, where surface temperature readings (meeting the requirements of the PMTP Method) are collected and stored.

THERMAL PROFILES. The surface temperature readings and associated GNSS coordinates and time stamps.

THERMAL PROFILING. (See Paver Mounted Thermal Profile Method.)
THRU LANE. (See Traffic Lane.)

TRAFFIC LANE. (See MnDOT 1103 “Definitions”.) The intelligent compaction and paver mounted thermal profile method are required on all traffic lanes with the exception of traffic lane tapers and roundabouts (including the traffic lane between the roundabout and mainline transition prior to and after the radius point of the roundabout).

VETA. A standardized intelligent construction data management (ICDM) software that stores, maps and analyzes geospatial data resulting from intelligent compaction, thermal profiling and Spot Test Data (e.g., density, moisture). This software can perform standardized data processing, analysis and reporting to provide Project summary results quickly in the field from various intelligent compaction and thermal profiling manufacturers. In particular, the software can provide statistics, histograms, correlations for these measurements, document coverage area and evaluate the uniformity of compaction and surface temperature measurements as part of the Project quality control operations. Veta can be downloaded from the Advanced Materials and Technology Website (http://www.dot.state.mn.us/materials/amt/veta.html).
## 2.2 GLOSSARY OF ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations in this manual and the Contract Documents represent the full text shown in Table 2.1.

<table>
<thead>
<tr>
<th>Acronym or Short Form</th>
<th>Full Name or Meaning</th>
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<tbody>
<tr>
<td>AMG</td>
<td>Automated Machine Guidance</td>
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<td>D</td>
<td>Dimensional</td>
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<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<tr>
<td>IC</td>
<td>Intelligent Compaction</td>
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<td>ICDM</td>
<td>Intelligent Construction Data Management</td>
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<td>ICMV</td>
<td>Intelligent Compaction Measurement Value</td>
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<td>MnCORS/RTRN GNSS</td>
<td>Minnesota Continuously Operating Reference Station/Real Time Reference Network Global Navigation Satellite System</td>
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<td>PMTP</td>
<td>Paver Mounted Thermal Profile System</td>
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<tr>
<td>RC</td>
<td>Roller Coverage</td>
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<td>RTK</td>
<td>Real Time Kinematic</td>
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<tr>
<td>RTRN</td>
<td>Real Time Reference Network</td>
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<tr>
<td>TC</td>
<td>Thermal Coverage</td>
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<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
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<tr>
<td>UTM</td>
<td>Universal Transverse Mercator</td>
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