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Pilot Project Quality Systems Manual

Pennsylvania Asphalt Improvement Network (*PASIN*)

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Revisions Table (History of changes)

Rev. No.	Description of Change	Change to Section	Effective Date
0	Initial Issue of Draft Quality Manual	All	04/04/05
1	Revisions to sections by Jess Dunlap based on additional research	All	05/13/05
2	Revisions by Robert Bowen	All	05/18/05
3	Minor format changes to header and addition of footer section by Bill Gordon	All	05/25/05
4	Reformatting of styles and paragraphs, insertion of auto construction of Table of Contents, editing of text	All	05/31/05
5	Changes to paragraphs as a result of Asphalt team meeting 8/25/05	1.0, 5.1, 5.2, 5.3, 5.4.1	09/1/05
6	Change to Revision Number to initiate ISO 9000-style change control on this Manual	Header	09/8/05
7	Changes to paragraphs resulting from Asphalt team feedback on Rev. 4. Complete re-write to focus on policy issues only in the main document. Annexes added to provide detail on the Quality and Reliability Committee (QRE) and separate Level II documents in the form of process maps.	1.0, 5.1, 5.2, 5.3, 5.4.1	04/05/06
8	Changes to paragraphs resulting from Asphalt team feedback on Rev. 7.3. Added new terms and definitions to Section 3. Rewrote Sections 7.1.3, 7.2.3, 7.5.1.2, 7.5.2, 8.2.1.2, and 8.6.1 for clarity. Added additional column to the table in Annex 9.2. Added Figure 1, <i>PASIN</i> Quality Management System model	7.1.3, 7.2.3, 7.5.1.2, 7.5.2, 8.2.1.2, 8.6.1, 9.2	04/11/06

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SECTION 1 SCOPE

1.1 General:

The Pennsylvania Department of Transportation (PENNDOT) and industry partners formed the Pennsylvania Asphalt Improvement Network (*PASIN*) to improve the quality of asphalt highways throughout the Commonwealth. Through voluntary participation in this public-private network, members collaborate to develop, pilot, and improve a quality management system (QMS) modeled after the principles of the ISO 9001:2000 International Standard. Contractual relationships among *PASIN* members include a mutual commitment to these principles when designing, constructing, and maintaining asphalt paved highways on pilot projects that provide the motoring public exceptional roads through quality workmanship.

The *PASIN* includes private sector companies and government organizations. Employees and executives of commercial enterprises from the Consulting Engineering and Hot Mix Asphalt (HMA) industry have joined with trade associations to collaborate with PENNDOT District Engineering Offices and Central Office Bureaus. These organizations design pavement, produce and deliver materials, place and test roadway surfaces, oversee construction, and maintain asphalt pavements in Pennsylvania. Members from the Federal Highway Administration (FHWA) and American Association of State Highway Transportation Officials Material Testing Laboratory (AMRL) play an oversight role to ensure the QMS conforms to federal requirements and national standards.

This QMS embodies all of the requirements of the ISO 9001:2000 standard and sets forth the requirements for membership in *PASIN*. Contractual relationships provide the means for member organizations to implement policies and procedures grounded in PENNDOT specifications that establish the standards for the design and construction of Pennsylvania roadways. This QMS conforms to the spirit and intent of the "Policy on the Stewardship and Oversight of Federal Highway Programs", 23 CFR 637, the AASHTO "Quality Assurance Guide Specification"; and the AASHTO "Implementation Manual for QA". Member organizations will abide by the principles outlined in this Quality Manual; they may create their own companion manuals.

1.2 Structure & Precedence:

This Quality Manual (QM01) has eight sections aligned with the primary parts of the ISO standard and one additional section for applicable annexes as shown in the table of contents. The individual sections are divided into subsections, paragraphs, and subparagraphs.

X. Section

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X.X. Subsection

X.X.X. Paragraph

X.X.X.X. Subparagraph

The document uses bulleted designations where appropriate. Page numbering begins with one on the title page and continues consecutively. Page numbers within annexes will be numbered separately.

Level II Documents, included in ANNEX B - Key Process Maps, have unique document numbers in the form of QPMXXX.XX as listed in the table of contents. When necessary, Level III documents will be included under the respective process map and have a suffix at the end of the QPM number (e.g. QPMXXX.XX-FXX where the F in the suffix indicates it is a form). Appropriate suffixes will to be determined as needed.

SECTION 2 INTRODUCTION

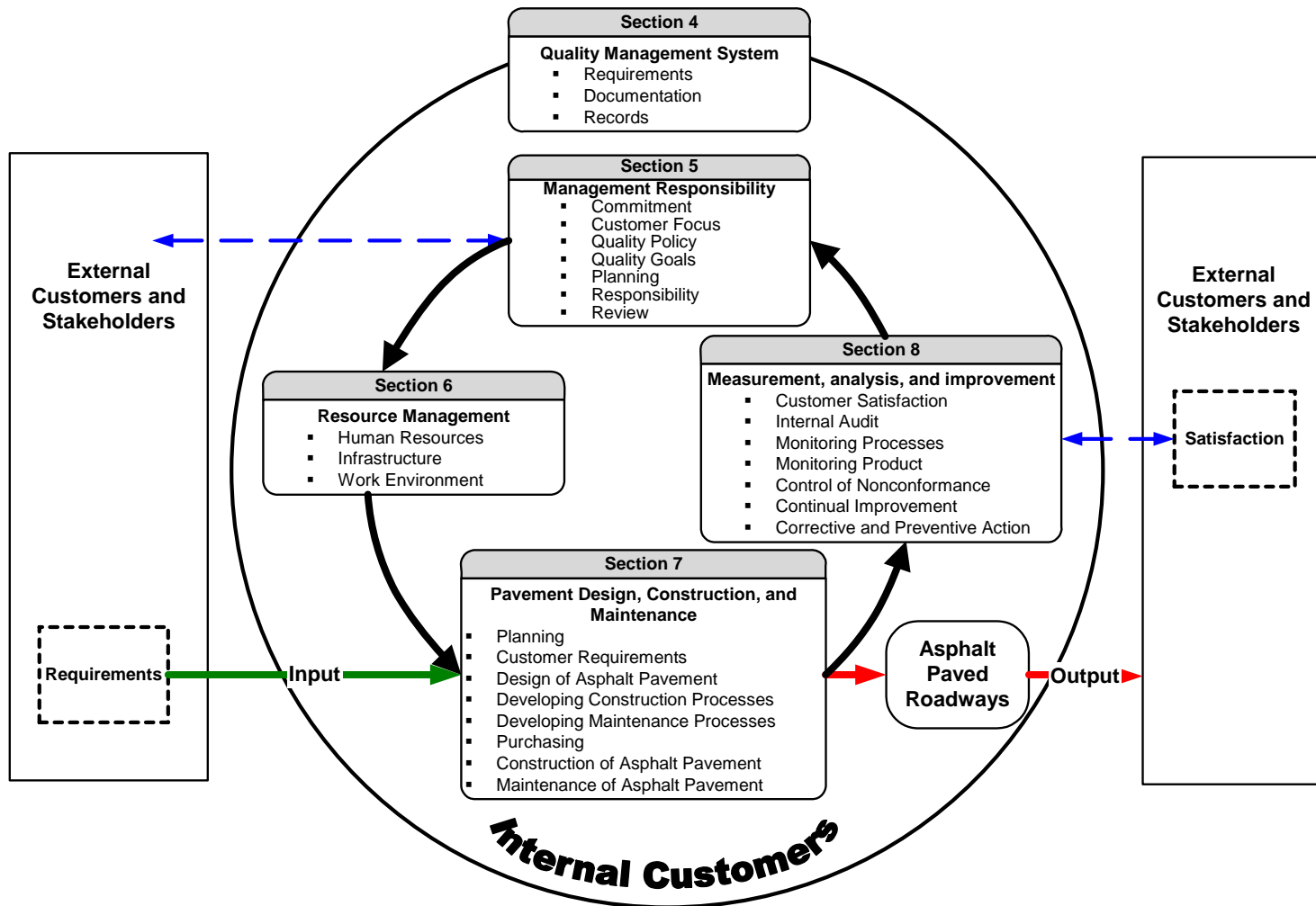
Management with executive authority of each organization that is a member of *PASIN* has authorized the development of this quality management system to ensure that asphalt paving is designed, produced, delivered, tested and constructed and maintained per defined specifications, and to address customer satisfaction and continual improvement by meeting or exceeding all customer, statutory, and regulatory requirements. In addition, internal and external parties use the documented system to assess member organizations' ability to meet these requirements. Measurable goals, materials supplied, personnel qualifications required, processes employed, equipment used, and services delivered influence the quality management system.

PASIN's Quality Management System (QMS) uses a process approach to quality management. External customer and stakeholder requirements provide input into a systemic approach for designing, building, and maintaining asphalt paved roadways that satisfy those who use them. This methodology systematically identifies, monitors, and improves the processes employed and their interactions. Management responsibility; resource management; design, construction and maintenance processes; and measurement, analysis, and improvement make up the four major elements of *PASIN's* QMS as shown in Figure 1 (*PASIN* Quality Management System) on the next page.

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Figure 1

PASIN Quality Management System



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SECTION 3 TERMS AND DEFINITIONS

This section of the Quality Manual provides definitions in order for the user to have a clear understanding of the terms used in the text.

- AASHTO – American Association for State Highway and Transportation Officials - The governing body that issues Standard Specifications for Transportation Materials and Methods of sampling and testing of roadway construction and maintenance materials, it also provides accreditation services to AASHTO standards.
- ACE – Assistant Construction Engineer
- Accuracy – The deviation of the measured or observed value from a true value
- ACEC - American Council of Engineering Companies
- ASTM –American Society for Testing and Materials
- Audit - a systematic, independent, and documented process for obtaining audit evidence and evaluation to objectively determine the extent to which audit criteria are fulfilled
- Audit Criteria - set of policies, procedures, process maps, or requirements used as a reference
- Audit Evidence - records, statements of fact, or other information which are relevant to the audit criteria and verifiable
- Audit Findings - results of the evaluation of the collected audit evidence against audit criteria (audit findings can indicate conformity or nonconformity with audit criteria, observations, points of pride, or best practices)
- Best practices - techniques, methodologies, processes, or procedures that through experience and research, have proven to reliably lead to performance results recognized as exceeding those achieved by most organizations
- BOCM – Bureau of Construction and Materials.
- Calibration – a process that establishes the relationship (traceability) between the results of a measurement instrument, measurement system, or material measure and the corresponding values assigned to a reference standard.
- CAMMS – The Construction and Materials Management System (Laboratory Information Management System - LIMS) that tracks sample flow, receives test input

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data, calculates the results, produces the test report, and provides the repository for the finished test record.

- CDS Next GEN - A computerized method of managing construction project processes using automated documenting and tracking from the field
- Check – a specific type of inspection and/or measurement performed on equipment and materials to indicate compliance or otherwise with stated criteria
- Competence - demonstrated ability to apply knowledge and skills
- Concession - permission to use or release a product that does not conform to specified requirements
- Corrective Action – a closed loop action by an organization that is initiated, carried out, and completed in a timely manner whenever a requirement of the ISO standard or *PASIN*'s quality management system has not been met
- DEP – Pennsylvania Department of Environmental Protection
- Document – Any paper, electronic, or other media instructing any employee at PENNDOT or any employees who work for a member of *PASIN* to perform a task related to the quality of design, production, delivery, placement, testing or maintenance of asphalt paving in Pennsylvania.
- Document Manager – The person designated by the QRE who maintains and controls the master document file and administers the document change process.
- Document master file – The electronic copies of documents maintained on the “N\.” drive of the PENNDOT local area network (LAN).
- ECMS - PENNDOT's web based Engineering and Construction Management System
- EPA – Environmental Protection Agency
- Effectiveness – the extent to which planned activities are realized and planned results are achieved
- Efficiency – the relationship between the result achieved and the resources used
- External Customer – The motoring public, the communities affected by highway construction and maintenance activities, and tax payers as measured by the Pennsylvania Department of Transportation

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- External Audit – An audit performed by customers or third parties
- FDA – Federal Drug Administration
- FHWA – Federal Highway Administration
- Infrastructure – a system of facilities, equipment, and services needed for the operation of an organization
- Internal Customer – Any individual or company that requests and uses the services or products of any member of the supply chain
- Intermodal Customer- Companies or individuals involved in transportation by more than one form of carrier during a single journey
- Internal Audit – An audit performed by employees of *PASIN member organizations*
- ISO – (International Organization for Standardization) A worldwide federation of national standards bodies
- Laboratory – any facility that tests or inspects raw materials, in-process materials, or finished product associated with hot mix asphalt to determine conformance to requirements (includes MTD Testing Laboratory, industry partner laboratories, consultant testing laboratories, and local acceptance and field laboratories)
- Level 1 Documents – High level documents defining policy issues; usually consisting of the quality manual, quality policy and quality objectives
- Level 2 Documents – Process maps or procedures that describe QMS activities affecting all personnel in the organization, such as document control, records control, corrective action, etc.
- Level 3 Documents – Detailed procedures, work instructions, and forms that are targeted for specific tasks required of only a part of the organization
- LIMS - Laboratory Information Management System (e.g. the CAMMS system used tin the MTD testing laboratory)
- Maintainers - organizations or persons involved with maintenance activities
- Major Nonconformance – Evidence indicates that one or more of the following does not meet requirements: (1) systemic failure of the management system, (2) conditions that could result in the delivery of nonconforming product, (3) conditions that could result in the failure or reduced usability of products or services

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- Minor Nonconformance - Evidence indicates that one or more of the following does not meet requirements: (1) a non-systemic failure of the management system, (2) an isolated occurrence, (3) not likely to result in the failure of the management system
 - MTD Testing Laboratory – The Pennsylvania Department of Transportation, Bureau of Construction and Materials, Materials and Testing Division, Laboratory Testing Section
 - MTD – Materials and Testing Division of the PENNDOT Bureau of Construction and Materials
 - Nonconformance - a product, process, or service not meeting the requirements of the ISO standard or *PASIN*'s quality management system
 - Objective Evidence – data supporting the existence or verity of something
 - Observation – requirements of the standard have been met. The observation details opportunities for improvement. In addition, comments may be made highlighting areas of strength
 - PAAMA - Pennsylvania Association of Asphalt Material Applicators
 - PACA - Pennsylvania Aggregate and Concrete Association
 - PAPA - Pennsylvania Asphalt Pavement Association
 - *PASIN* - Pennsylvania Asphalt Improvement Network
 - PENNDOT – Pennsylvania Department of Transportation
 - Points of Pride - methodologies, processes, or procedures used by an organization to produce performance results that are more effective or efficient than those achieved by other organizations
 - Precision – A measurement of consistency or repeatability; the deviation of a group of readings from a mean value
 - Process - set of interrelated or interacting activities that transform inputs into outputs
 - Procedure - a specified way to carry out an activity or a process
 - Product – the output produced by any *PASIN* member process

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- Project - a unique process, consisting of a set of coordinated and controlled activities with start and finish dates undertaken to achieve an objective conforming to specific requirements, including constraints of time, costs, and resources
- PTM – Pennsylvania Test Methods
- Publication 408 – PENNDOT specifications for construction materials and methods
- QRE - Quality and Reliability Committee
- Record – Any paper or electronic media that stores information or data describing the performance or lack thereof of any task related to the quality of design, production, delivery, placement, testing, or maintenance of asphalt paving in Pennsylvania. A record is evidence that an activity took place.
- RMDS – Report Management and Distribution System – The PENNDOT mainframe reporting and distribution system
- RMS- Roadway Management System – PENNDOT’s means for defining and monitoring the State highway network, maintaining an inventory of the roadway features, conditions, and characteristics, and providing decision-makers with the information that is necessary for funding, business planning, project design, and maintenance programming.
- SI units - International System of Units
- Stakeholder – any person or organization that has an interest (or "stake") in what an entity does
- Standardization – a process that determines whether adjustments are needed to a specific piece of equipment when its performance is compared with that of a generally accepted standard
- Subcontractor – The ISO 9001:2000 Standard replaced this term with the term “supplier”. It may be used interchangeably within this Quality Manual.
- Supplier – Any company from which the *PASIN* member organizations purchase equipment, instruments, reagents, raw materials, finished products, or services (including subcontracted testing) related to delivery of its products
- Test record – Consists of the customer order (request) describing the tests required, the original test worksheet, and a copy of the test report sent to the customer

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- TR-447 – (MTD Laboratory Customer Order) a multi-part document that defines the Sample Class, Material Code, Material Class, special testing requirements, special contract provisions, and administrative information related to samples submitted for testing
- Traceability – the property of a result of a measurement whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties
- Uncertainty – a parameter associated with the result of a measurement that defines the range of values that could be attributed to the measured quantity
- Validation - confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled
- Verification – confirmation, through the provision of objective evidence, that specific requirements have been fulfilled; or, a process that establishes whether the results of a previously calibrated measurement instrument, measurement system, or material measure are stable

SECTION 4 QUALITY MANAGEMENT SYSTEM

4.1 General Requirements:

This quality systems manual describes how *PASIN*'s member organizations meet customer, statutory, and regulatory requirements and continually improve their quality management systems in accordance with the requirements of the ISO 9001:2000 standard. It includes or references all applicable policies or procedures that make up the quality management system.

Implementation of the quality management system is accomplished by:

- Listing the processes and their sequencing and interactions needed for the quality management system
- Defining quality acceptance criteria required to ensure the effective operation, monitoring, and improvement of processes
- Providing resources and information necessary to support the operation and monitor key processes
- Measuring, monitoring, analyzing processes, and reporting results during the design, production, delivery, placement, testing, and maintenance of asphalt pavement in Pennsylvania

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- Taking action necessary to achieve planned results and verifying the effectiveness of actions taken

"Auditing" is the verification that member organizations are complying with this manual; "measuring and monitoring" indicates how effectively members are doing it.

4.2 Documentation Requirements:

4.2.1 General Requirements for Quality Documents:

QMS documents include but are not limited to this quality manual, which includes *PASIN* quality policy and measurable goals, standard operating procedures, process maps, detailed work instructions, specifications, forms and quality records in many forms. There are documented procedures for the development and control of documents and records.

4.2.2 Control of documents:

QMS documents are maintained by *PASIN* member organizations, provide evidence of conformance to requirements, and verify the effectiveness of the quality management system. Up-to-date documents are essential to preclude the use of invalid or obsolete information. Documents are prepared, reviewed, approved by authorized personnel, distributed to locations where essential operations are performed, revised when necessary, and disposed of to provide appropriate control. *PASIN* organization members use documents of external origin and these are also appropriately controlled per documented procedures. Ref: (QPM001-02)

4.2.3 Control of quality records:

Quality records are maintained to provide evidence of conformance to requirements and effective operation of the quality management system. Records generated by *PASIN* member organizations are legible and managed by controlling the processes for identification, storage, protection, retrieval, retention, and disposition. Records are protected from tampering. Corrected records show who corrected them and the date they were corrected. Ref: (QPM001-03)

SECTION 5 MANAGEMENT RESPONSIBILITY

5.1 Management Commitment:

PASIN member organizations are committed: (a) to monitoring satisfaction of the motoring public and members of this network; (b) controlling the QMS processes and product; and (c) maintaining and improving the quality management system described in this manual. This commitment is evidenced by:

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- Establishing a quality policy and measurable goals
- Top management of each member organization ensuring the availability of resources
 - Top management of each member organization conducting periodic management reviews of the performance of this network in meeting the quality policy and measurable goals of this network
 - Top management of each member organization communicating to their organizations the importance of meeting contractual, regulatory, and legal requirements as well as communicating the equal importance of understanding and satisfying the needs of the motoring public, and other customers, contractors, suppliers, and vendors as appropriate.

5.2 Customer Focus:

PASIN member organizations are committed to external and internal customer satisfaction including intermodal customers. Processes are in place to identify and correct customer complaints and concerns and gather other information about customer satisfaction. Customer complaints are investigated and resolved as rapidly as practical using corrective action processes. Customers of this organization include but are not limited to the motoring public, the communities affected by highway construction and the taxpayers; and the *PASIN* member organizations. Customer satisfaction information is shared with *PASIN* member organizations through their management and the public through the media.

5.3 Quality Policy:

The network described in this manual has defined and documented its quality policy as:

We will satisfy those we serve by consistently designing, constructing, and maintaining durable, high quality asphalt highways through the use of processes that have minimum adverse effect on surrounding communities and are continuously improved.

This policy provides a focus for all systems, processes, and activities of the quality management system described in this manual. The implementation of this quality policy is intended to provide direction for costing, managing, and scheduling of projects.

Member organizations ensure that the policy is understood, implemented, and effective at all levels of each member organization. The *PASIN* Quality and Reliability Committee (QRE, See ANNEX A) verifies the continuing suitability and effectiveness of this quality policy.

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5.4 Planning:

5.4.1 Quality Goals:

PASIN QRE sets annual measurable quality goals for members of the network that are consistent with the quality policy. The quality goals are established at the beginning of each calendar year and the status of each objective is periodically reviewed. Annual quality goals are developed to improve durability and cause less disruption with improved cost effectiveness. These goals are intended to support recognizable improvements in process capability and effectiveness, product reliability, and customer care.

5.4.2 Quality Management System Planning:

PASIN member organizations provide all needed resources to achieve the quality goals. Planning for this activity is demonstrated by:

- Educating new members on the quality system requirements and using the communications network in each member organization to keep all *PASIN* team members informed
- Achieving the quality policy by identifying and monitoring key processes
- Obtaining the resources needed to maintain the quality management system and promoting improvement using system feedback loops
- Controlling changes to this quality management system to ensure its integrity

5.5 Responsibility, Authority, & Communication:

5.5.1 Responsibility and Authority:

Members of this network share responsibility for quality. Member organization management defines responsibilities and authorities via organization charts, job descriptions, process mapping, and other QMS documents. All employees are required to identify nonconformances when encountered and encouraged to look for ways to continually improve all processes.

5.5.2 Management Representative:

The *PASIN* members will establish an ISO Management Representative for the quality management system who reports quarterly on matters related to this network to the QRE Executive Committee and annually to the Pennsylvania Department of Transportation, Deputy Secretary for Highway Administration. The ISO Representative meets regularly with executive management of member organizations and has full

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authority and responsibility to ensure the quality management system described in this manual is implemented, maintained, and meets all the requirements of ISO 9001:2000.

5.5.3 Organizational Structure:

The QRE is the management body for this network. Its structure is described in ANNEX A. Organization charts are available in each *PASIN* member organization. Unless otherwise defined, qualified supervisors or managers can assume job responsibilities for subordinates.

5.5.4 Internal Communications:

Members of this network communicate with their respective organizations to ensure employees are briefed on the effectiveness of the quality management system. Communications may be one-on-one, at staff meetings, via postings, email messages, or management reviews.

5.6 Management Review:

The QRE conducts a review of the quality management system described in this manual at least twice per calendar year to measure and ensure its continuing suitability, adequacy, and effectiveness. The review evaluates adherence to the quality policy, the achievement of goals, process and product performance, customer satisfaction, and the need for improvements to the system. The agenda for the Management Review is prepared by the Management Representative and includes inputs and outputs as described in the Management Review process map. The Management Representative records, maintains, and publishes the management review minutes. Ref: (QPM001-01)

SECTION 6 RESOURCE MANAGEMENT

6.1 Provision for Resources:

PASIN member organizations identify and list resource requirements prior to beginning each new contract or purchase order, including all resources to implement, maintain, and improve the quality management system. Organizations identify and plan for adequate and appropriate human resources, infrastructure, and work environment.

6.2 Human Resources:

6.2.1 General:

PASIN members assign personnel and responsibilities based on job descriptions and the organization charts. Managers and supervisors select individuals with demonstrated abilities to satisfy the competency level and qualification requirements of each job description. Each organization establishes acceptable competency based on

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applicable education, training, skills, and experience. Subcontract employees must meet the same requirements as employees including evidence of competency

6.2.2 Competence, awareness, and training:

PASIN members ensure that all personnel, including temporary or subcontract employees, entrusted with performing assigned tasks are properly trained and familiarized with all duties described in their job descriptions before working without supervision. Managers, supervisors, and engineers assess training needs, train personnel, and evaluate the effectiveness of the training. Managers routinely assess employees to ensure they have the knowledge and skills to perform their work competently. In addition, management ensures all personnel know the relevance and importance of their activities. All workers understand how they contribute to accomplishing quality objectives and the elements of *PASIN*'s quality policy.

6.2.3 Training and Performance Records:

PASIN member organizations maintain employee training records and performance appraisals to provide on-going evidence of employee competency.

6.3 Infrastructure:

PASIN member organizations use, maintain, and protect equipment, software, hardware, and facilities to fulfill project, customer, statutory, and regulatory requirements. Owners and operators ensure calibration and thorough maintenance of test equipment at defined intervals to ensure accurate test results. All organizations routinely backup electronic data and information to ensure it is not lost or corrupted.

6.4 Work Environment:

PASIN members establish and maintain safe working environments and effective organizational climates to produce quality designs, materials, pavements, and achieve quality goals. They implement appropriate actions to create minimal environmental impact on communities and to comply with legal and statutory requirements.

SECTION 7 PRODUCT DESIGN, CONSTRUCTION, AND MAINTENANCE

7.1 Planning of Product Design and Construction:

7.1.1 Planning:

Quality management objectives, requirements, processes, documents, and resources necessary for effective program delivery are determined, developed, and implemented.

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7.1.2 Execution:

Procedures are established and maintained to manage and control design and construction activities ensuring that design criteria and specifications, customer, and relevant regulatory agency and legal requirements are met.

7.1.3 Evaluation:

PASIN members conduct review processes to determine if the product design, construction, and maintenance processes and procedures are effective. In order to determine if acceptance requirements are met, *PASIN* members conduct management review meetings, document construction testing and inspection activities, and submit design review minutes, progress reports, and maintenance reports to monitor, verify, and validate the Asphalt Pavement Delivery processes.

7.1.4 Records:

Records are maintained to provide evidence that the asphalt pavement delivery process and resulting projects meet requirements.

7.2 Customer Related Processes:

7.2.1 Determination of Requirements:

In addition to the motoring public, internal customers of the asphalt pavement delivery process include all parties involved in contract development, asphalt production and mix design, in-field material development, pavement lay-down and construction management, maintenance and operation of asphalt paved highways. Customer and stakeholder requirements, both specified and unspecified but necessary for intended use, will be determined with consideration of statutory and regulatory constraints. *PASIN* may determine additional requirements as appropriate.

7.2.2 Review of Requirements:

Customer requirements related to the asphalt pavement delivery processes are identified and reviewed to ensure that they can be satisfied.

7.2.3 Customer Communication:

Effective methods for communicating with all customers and stakeholders are determined and implemented in relation to project size and scope. All parties will provide timely and accurate program information, response to inquiries, contract amendments and supplements, and customer feedback, including customer complaints.

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7.3 Design of Product and Development of Construction and Maintenance Processes:

7.3.1 Planning, Inputs, and Outputs:

7.3.1.1 Product Design: *PASIN* members design asphalt roadways using documented procedures for planning and control. Product requirements (inputs) are determined completely and unambiguously and are approved prior to project acceptance. Outputs of the design contain acceptance criteria, meet the input requirements, and provide information for purchasing, construction, and maintenance.

7.3.1.2 Construction Process Development: *PASIN* members develop the construction processes to ensure they are effectively controlled during the placement of the asphalt on the roadways. The availability and use of calibrated and properly maintained devices for verifying that outputs meet input requirements are the responsibility of the *PASIN* members. Trained and competent operators are provided to operate these devices.

7.3.1.3 Maintenance Process Development: *PASIN* members ensure the asphalt roadway maintenance requirements are considered in the roadway design.

7.3.1.4 *PASIN* members maintain records that confirm the fulfillment of the design and development requirements.

7.3.2 Process Review, Verification, and Validation:

7.3.2.1 Product Design: At suitable design stages, design reviews are performed to check progress of the design process. Action plans are formulated to address problems. Verification that product design outputs have met product design inputs are evidenced in records maintained in hard copy and electronic project files. Product Design validation is performed to confirm that the completed asphalt roadway can service the driving public per its intended use.

7.3.2.2 Construction Process Development: At appropriate construction process development stages, reviews are held to ensure the construction process development activities are being completed in accordance with the constructability review process. Remedial action is documented to correct any deficiencies. Development outputs are verified to ensure the process specifications defined as inputs are met. Construction process validation is performed to ensure that the construction process can produce an asphalt road surface that meets its intended use.

7.3.2.3 Maintenance Process Development: *PASIN* members include in the review, verification and validation processes, considerations for maintenance of the completed asphalt roadway so that the intended life of the roadway will be achieved or exceeded.

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7.3.3 Control of Product and Process Changes:

7.3.3.1 Control of Design Changes: Any changes to the asphalt roadway designs are reviewed and approved by authorized personnel before implementation and distribution to appropriate personnel. The review includes consideration of the effect of these changes on any part of the contract already completed. They are communicated to all parties who have a need to know. Records of design and development changes are maintained in project files.

7.3.3.2 Control of Construction Process Changes: Changes to construction processes are reviewed and approved by authorized personnel, who may need to re-validate the processes as part of the change process. The validation process must consider the impact of the changes on related construction processes. The changes are communicated to all impacted parties. Records of the changes are maintained by the owners of the construction processes.

7.3.3.3 Control of Maintenance Process Changes: Changes to maintenance processes are reviewed and approved by authorized personnel responsible for maintenance. The changes should not negatively impact the effectiveness of maintenance performed on the asphalt roadways. The changes are communicated to those parties affected by the maintenance processes. The owners of the maintenance processes maintain the maintenance change records.

7.4 Purchasing:

7.4.1 Purchasing process:

PENNDOT has exclusive approval authority for suppliers of all construction materials procured for the asphalt delivery process. *PASIN* has limited responsibility for oversight of the procurement process utilized by its members. *PASIN* members have documented procedures to control the procurement of products and services to ensure they conform to specified requirements. Purchasing requirements apply to all suppliers, design and engineering consultants, construction management and inspection consultants, contractors, and maintainers.

7.4.2 Evaluation of vendors:

All *PASIN* members evaluate their suppliers, design and engineering consultants, construction management and inspection consultants, contractors, and maintainers based on their performance, including the general requirements of the QMS and any specific quality assurance requirements. *PASIN* members maintain records of the evaluations.

7.4.3 Purchasing Information:

PASIN members have responsibility for the procurement activities of their organizations. All purchased items or services that affect quality must be described, and where appropriate include

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- requirements for approval of product, services, procedures, processes, and equipment,
- requirements for qualification of personnel, and
- requirements for managing quality.

7.4.4 Verification of Purchased Products and Services:

All *PASIN* members verify that their vendors perform as required or that items delivered are correct and usable. They take steps to assure that work performed or equipment, materials, or other services provided meet specified purchase requirements.

7.5 Construction and Maintenance:

7.5.1 Control of Construction and Maintenance Processes:

Requirements are specified and monitored to ensure that construction and maintenance activities are carried out under controlled conditions by *PASIN* members. These conditions include, as applicable:

7.5.1.1 The availability of procedures, specifications, and quality plans at point of use that define work practices for the production of raw materials, formulation of asphalt in the asphalt plants, delivery of asphalt to the construction site, placement of asphalt, testing of asphalt wherever such testing occurs, and maintenance of installed asphalt pavement, where the absence of such procedures could adversely affect quality.

7.5.1.2 Clear acceptance criteria available to those who need to make quality decisions to produce, deliver, place, test, or maintain asphalt pavement.

7.5.1.3 Clear and accessible standards of workmanship for work performed to produce, deliver, place, test, or maintain asphalt pavement, where applicable.

7.5.1.4 The availability or accessibility in the construction field offices of current construction plans, drawings and specifications. Prior to placement of the asphalt on the roadway, appropriate inspection, test, and audit activities are scheduled.

7.5.1.5 The availability or accessibility of current project administrative manuals and test method manuals in the construction field offices.

7.5.1.6 Where necessary, the availability or accessibility of project plans, process maps, procedures, and work instructions.

7.5.1.7 Regularly planned maintenance and calibration, as needed, of equipment and devices used for production, delivery, placement, testing, and maintenance.

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7.5.1.8 The availability and use of calibrated monitoring and measuring devices that are used to test the asphalt at the construction site is the responsibility of the *PASIN* member. Trained, competent operators are provided to perform the testing.

7.5.1.9 Monitoring activities must be implemented to inspect or observe production, installation, and maintenance activities and ensure data accuracy.

7.5.1.10 The implementation of the defined processes for the timely release and distribution of data, test results, and status reports

7.5.1.11 Safe work environments that conform to all applicable codes and regulations.

7.5.2 Validation of Construction and Maintenance Processes:

PENNDOT construction and maintenance representatives input their requirements during the design stages by conducting reviews and submission of comments. Validation of construction and maintenance processes are carried out using monitoring, inspection, testing, and auditing methodologies during the construction and maintenance phases. Lessons learned from completed projects are documented and used as inputs for future projects.

7.5.3 Identification and Traceability:

Where appropriate and practical, all *PASIN* members have methods for identifying and controlling mix design data and construction materials. This prevents the inadvertent use of incorrect or defective items.

7.5.4 Customer Property:

There is no customer property or customer-supplied product to be controlled by *PASIN* members

7.5.5 Preservation of Products and Materials:

PASIN members have methods to ensure adequate handling, packaging, storage, and protection of materials.

7.6 Control of Monitoring and Measuring Devices:

All parties involved in the asphalt pavement delivery process ensure the accuracy of all inspection, measuring, and test equipment unless used for reference only. Each organization must have documented procedures for ensuring calibration and control of their specific devices. (Calibration and control processes must include, at a minimum, the elements included in procedure QPM010-XX).

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SECTION 8 MEASUREMENT, ANALYSIS, AND IMPROVEMENT

8.1 General:

PASIN members define, plan, and implement measurement and monitoring activities required to ensure product conformities, promote customer satisfaction, and pursue continual improvement. Quality goals; supplier performance ratings; design, construction, and maintenance nonconformities; customer satisfaction data; and internal and external audit findings all contribute to the improvement efforts. These activities include statistical techniques for monitoring the goals and objectives of the organization where appropriate.

8.2 Monitoring and Measurement:

8.2.1 Customer Satisfaction:

8.2.1.1 Methods are established and maintained to collect data directly from internal and external customers and stakeholders concerning their satisfaction with processes employed and products provided. Data is also collected on how well the *PASIN* members meet their commitments to each other and responsiveness to customer feedback. This data is collected, analyzed, and trends are used to make improvements. Ref: (QM016-01)

8.2.1.2 PENNDOT gathers data and analyzes information concerning external customer satisfaction (e.g. motoring public) and stakeholder through established survey methodologies and products.

8.2.1.3 The QRE establishes and maintains methodologies to measure and analyze internal customer satisfaction.

8.2.2 Internal Audit:

8.2.2.1 QRE maintains documented procedures for planning and implementing internal quality audits to verify quality activities, to assure that related results comply with pilot project requirements, and to determine the effectiveness of the QMS. Internal quality audits are scheduled on the basis of the status and importance of the activity to be audited and are carried out by qualified personnel independent of those having direct responsibility for the activity being audited. Auditors will not assess competitor organizations. Ref: (QPM001-04)

8.2.2.2 A summary of results and associated corrective actions is maintained and items requiring action are brought to the attention of the personnel responsible for the activity that was audited. Management personnel of *PASIN* member organizations responsible for the audited activity, take timely corrective action on deficiencies found during the audit.

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8.2.2.3 The QRE verifies follow-up audit activities by evaluating and recording the implementation and effectiveness of the corrective action taken. The QRE reviews the results of internal audits.

8.2.3 Monitoring and Measurement of Processes:

PASIN members use appropriate methods and techniques for measurement and monitoring of core processes, especially at the asphalt plants and job sites where the asphalt is placed onto the roadways. Process measurements can include internal or external audit results, supplier performance ratings, achievement of quality goals, customer satisfaction ratings, and contract performance indices. *PASIN* member organizations use corrective and preventive action systems to correct and improve processes that fall short of expectations. Ref: (QPM016-02)

8.2.4 Monitoring and Measurement of Product:

8.2.4.1 *PASIN* member organizations ensure they meet all requirements by measuring and monitoring work products at all stages of the asphalt pavement delivery process. This includes the design, production, delivery, placement, testing, and maintenance phases. Ref: (QPM016-03)

8.2.4.2 HMA plants use incoming inspections and certificates of analysis to monitor suppliers. PENNDOT personnel monitor operations and quality control plans at these plants.

8.2.4.3 Contractors, inspection, quality assurance, and testing personnel typically collect and test product samples during placement of asphalt on the roadways to determine acceptable quality.

8.2.4.4 After opening a roadway to traffic, PENNDOT periodically tests and inspects the roadway to determine if the roadway has deteriorated prematurely.

8.2.4.5 *PASIN* members maintain records at all stages of the process to verify that the stages were successfully completed and to indicate the persons responsible for all quality management system processes.

8.3 Control of Nonconformances:

8.3.1 Definition:

Nonconformance is defined as a product, process, or service not meeting requirements. Nonconformances can arise from a number of different sources during the design, production, delivery, placement, testing, or maintenance of asphalt pavement. They may be from out-of-specification test results, unmet schedules, material nonconformances, customer complaints, accelerated roadway deterioration, etc.

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8.3.2 Procedure:

Control of nonconformances includes identification, documentation, evaluation, disposition, and notification to all concerned parties. Anyone may discover a nonconformance and must document it to promote appropriate resolution.

When a nonconforming situation is encountered the appropriate manager is notified and he or she proceeds in accordance with the nonconformance procedure established within each *PASIN* member organizations. Ref: (QPM001-05)

Records are maintained of nonconformances, actions taken and concessions obtained.

Corrections made to eliminate or mitigate nonconforming conditions are verified.

When nonconformities are detected after the fact, appropriate action is taken to inform all affected parties in accordance with the nonconformance procedure established within all *PASIN* member organizations.

If such nonconformance is serious enough, it is documented in corrective actions.

8.4 Analysis of Data:

Nonconformances are tracked and analyzed on a regular basis for possible trends and/or improvement opportunities.

The *PASIN* members maintain methods for the collection and analysis of performance data that can be used to help identify the cause and frequency of process and procedural failures. Organizations use this data and information to foster continuous improvement. Documented procedures are in place to analyze data related to

- internal and external customer and stakeholder satisfaction,
- conformity of products to requirements, and
- characteristics and trends of processes and products including opportunities for preventive action.

8.5 Improvement:

The *PASIN* QRE plans and manages the processes necessary for the continual improvement of the quality management system. It facilitates the continual improvement of the quality management system using the quality policy, objectives, customer complaints, customer surveys, audit results, and management review. Continual

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improvement activities of all types including corrective and preventive actions are key topics in Management Reviews.

8.6 Corrective Action:

8.6.1 General:

PASIN member organizations use documented procedures for implementing corrective action. These procedures specify the use of a formalized problem solving approach of a degree appropriate to the magnitude of the problem. This multi-discipline approach requires that the responsible party define and verify the root cause of the problem, identify containment actions, and implement permanent corrective actions. Unless otherwise required contractually, the *PASIN* member's quality assurance function verifies closure to ensure it prevents recurrence of the problem. *PASIN* internal audit team members close internal audit findings generated by *PASIN* internal audits. If *PASIN* processes initiate corrective action, *PASIN* personnel verify corrective action closure. The QRE reviews *PASIN* level corrective actions at Management Reviews.

8.6.2 Corrective Action Policy:

PASIN member organizations identify, analyze, and resolve problems identified by customer complaints, project or material nonconformities, and system noncompliances or inefficiencies. The result of the corrective action is to correct the root cause of the problem and, where necessary, to revise the *PASIN* QMS, the company's QMS, quality control plan, procedures, and other documentation, as appropriate. Ref: (QPM001-06)

8.6.3 Reporting:

PASIN member organizations keep records to compile nonconformance reports, initiate corrective action, and track corrective action status. They provide reports to their senior management and to the QRE as part of the periodic management review meeting.

8.7 Preventive Action:

PASIN member organizations document and review data and information from a variety of sources, including (but not limited to) internal and external audits, comments from internal and external customers, and quality records. Based on the review of information gathered, trend analysis, and subsequent senior management review, member organizations take actions appropriate to the effect of the potential problems to eliminate the cause of potential nonconformities in order to prevent their occurrence. Ref: (QPM001-07)

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SECTION 9 ANNEXES

9.1 ANNEX A – Quality and Reliability Committee (QRE):

9.1.1 Responsibility:

The Quality and Reliability Committee, comprised of an Executive Committee and Technical Teams, manage this network. Its responsibilities include

- conducting management reviews,
- analyzing customer feedback and the results of the quality management system described in this manual (QM01),
- initiating projects to be undertaken by member organizations to improve customer satisfaction and,
- recommending policy changes to PENNDOT to improve customer satisfaction.

The QRE makes policy recommendations to improve roadway quality, initiates actions to improve roadway quality, and assesses and annually reports to all network members and the Deputy Secretary of Highway Administration on customer satisfaction and progress toward achieving the quality policy and goals described in this manual.

All members of the QRE communicate to their respective organizations the importance of the Quality Policy contained in this manual and the role that suppliers and employees at each organization play in meeting this quality policy.

9.1.2 Membership:

9.1.2.1 Executive Committee:

This Committee provides oversight of all QRE activities and meets at least twice each year. Chairperson and Vice Chairpersons exercise voting rights to effect *PASIN* decisions. The committee will maintain records of meeting proceedings and distribute minutes to interested parties and member organizations. Advisors provide valuable input to executive decisions. The Executive Secretary performs all functions of the ISO Management Representative. The QRE includes the following standing positions:

- Chairperson: PENNDOT
- Vice-chairperson: Pennsylvania Asphalt Pavement Association (PAPA)
Executive Committee member
- Vice-chairperson: Pennsylvania Aggregate and Concrete Association (PACA)
Executive Committee member

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- Vice-chairperson: Pennsylvania Association of Asphalt Material Applicators (PAAMA) Executive Committee member
- Vice-chairperson: American Council of Engineering Companies, (ACEC) Executive Committee member
- Advisor: Pennsylvania Turnpike Commission (PTC)
- Advisor: Federal Highway Administration (FHWA)
- Advisor: AASHTO Materials Reference Laboratory (AMRL)
- Executive Secretary: ISO Management Representative

9.1.2.2 Technical Teams:

Technical teams evaluate data and make recommendations for policies, procedures, and projects to improve customer satisfaction and the quality management system. They meet at least once per quarter each year. They will maintain records of meeting proceedings and distribute minutes to interested parties and member organizations.

- Contract Development Team - Highway and pavement design related to asphalt pavement (BOMO Pavement Design; Engineering District Design; Consulting Design Engineering)
- Materials Development Team - Aggregate and Asphalt Cement Selection, Job Mix Formula Design (BOCM Bituminous Engineer, Asphalt Cement Producer, BOCM Geologist, District Materials Engineer, HMA Plant Operations Manager)
- Materials Production Team - Aggregate Production and Storage, Raw Materials Storage, HMA Plant Operation and Storage (BOCM QA, District Materials Engineer, HMA Plant)
- HMA Delivery and Lay-Down Team - Transport, Transfer, Placement, Compaction (HMA Contractors, District Engineering Assistant Construction Engineer)
- Inspection, Testing, and Quality Assurance Team – Raw material, plant, field and laboratory inspection, testing, and quality assurance (BOCM QA, MTD Engineer of Tests, District Construction Inspection, Consultant Inspection, HMA Plant and HMA Paving Contractor Quality Manager)
- Construction Management Team - Work Zone Traffic Control, Construction Supervision, and Project and Schedule Management (District Construction, Construction Management Consultant, BHSTE, and HMA Contractor Management)

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- Pavement Management Team - Pavement Maintenance and Planning (BOMO Pavement Management, District Planning Unit, District Maintenance Unit, County Maintenance Office, Pennsylvania Aggregate and Concrete Association, Pennsylvania Asphalt Pavement Association

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9.2 Annex B – Level 2 Process Maps:

Document No.	Document Name	ISO 9001 Section	QMS Section
QPM001-01	Management Review	5.6	5.6
QPM001-02	Document Control	4.2.3	4.2.2
QPM001-03	Records Control	4.2.4	4.2.3
QPM001-04	Internal Auditing	8.2.2	8.2.2
QPM001-05	Control of Nonconformances	8.3	8.3
QPM001-06	Corrective Action	8.5.2	8.6
QPM001-07	Preventive Action	8.5.3	8.7
QPM002-02	Preliminary Engineering & 30% Design Review Process	7.3	7.3
QPM002-03	Final Design & 90% Design Review Process	7.3	7.3
QPM002-04	Letting Process	7.2	7.2
QPM003-01	Consultant Selection Process	7.4.1, 7.4.2	7.4.2
QPM003-02	Contractor Pre-Qualification Process	7.4.1, 7.4.2	7.4.2
QPM003-03	Bulletin 15 – Approved Asphalt Cement Supplier Process	7.4.1, 7.4.2	7.4.1, 7.4.2
QPM003-04	Bulletin 14 – Approved Aggregate Producers Process	7.4.1, 7.4.2	7.4.1, 7.4.2
QPM003-05	Bulletin 41 – Approved HMA Producers Process	7.4.1, 7.4.2	7.4.1, 7.4.2
QPM004-01	Material Selection & Job Mix Design Process	7.4	7.4
QPM005-01	Asphalt Cement Production & Supply	7.5.1	7.5.1
QPM006-01	Quarrying & Aggregate Production	7.5.1	7.5.1
QPM007-01	Hot Mix Asphalt Production – Batch Process	7.5.1	7.5.1
QPM007-02	Hot Mix Asphalt Production – Parallel Flow Process	7.5.1	7.5.1
QPM007-03	Hot Mix Asphalt Production – Counter Flow Process	7.5.1	7.5.1
QPM008-01	Hot Mix Asphalt Delivery Process	7.5.1	7.5.1

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Document No.	Document Name	ISO 9001 Section	QMS Section
QPM009-01	Hot Mix Asphalt Placement Process	7.5.1	7.5.1
QPM010-01	QA/QC/Inspection & Material Testing Oversight Process	8.2.4	8.2.4
QPM011-01	Pre-Construction and Mobilization Process	7.5.1	7.5.1
QPM011-02	Construction and Project Management	7.5.1	7.5.1
QPM011-03	Post Construction and Demobilization	7.5.1	7.5.1
QPM012-01	Asphalt Pavement Highway Operations	7.5.1	7.5.1
QPM012-02	Asphalt Pavement Highway Maintenance	7.5.1	7.5.1
QPM013-01	Roadway Inventory & Testing Process	8.2.4, 8.4	8.2.4.4
QPM014-01	Lifecycle Planning Process	7.5.1	7.5
QPM015-01	Planning & Programming Process	7.1	7.1
QPM016-001	Customer Satisfaction Measurement Processes	8.2.1	8.2.1
QPM016-002	Process Monitoring and Performances Processes	8.2.3	8.2.3
QPM016-003	Product Monitoring and Performance Processes	8.2.4	8.2.4