Integrated QA/QC System for Ashghal Projects
Prof. Dr. Hany Hussein

Quality Expert,
Quality & Safety Department,
Public Works Authority (Ashghal)
Presentation Objectives

1. Public works Authority’ “Ashghal” is responsible for the planning, design, procurement, construction, delivery, and asset management of all infrastructure projects and public buildings in Qatar.

2. Ashghal projects covering roads, drainage, sewerage and buildings valued at QR 100 billion to be delivered within the next five to seven years.
Presentation Objectives (continue)

3. Ashghal applies outsourcing policy for conducting testing for all projects through independent testing laboratory.

4. Ashghal QA/QC system integrate between three main activities; namely, independent approved laboratories procedure, inter laboratory testing and lab quality tracking system to optimize the project control process.
What is Public works Authority (Ashghal)

• The Public Works Authority 'Ashghal' was established in 2004 to be responsible for the planning, design, procurement, construction, delivery, and asset management of all infrastructure projects and public buildings in Qatar.

• Ashghal’s key responsibilities include governing the design, construction, and management of major projects including roads, drainage and buildings such as public buildings, schools and hospitals.
# Ashghal responsibilities

<table>
<thead>
<tr>
<th>ROADS</th>
<th>BUILDINGS</th>
<th>DRAINAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>governing the design, construction, delivery and maintenance of all expressway and major roads that cater to current and future traffic demand across Qatar.</td>
<td>governing the design, construction and delivery of public buildings and amenities for a number of government entities. This includes schools, hospitals, parks and cultural centres</td>
<td>design, construction, delivery and maintenance of all major projects including storm and rain water, waste water and sewerage drainage and treatment across Qatar.</td>
</tr>
</tbody>
</table>
1. THE EXPRESSWAY PROGRAMME

- Delivers approximately 240 major interchanges with four level interchanges with tunnels and flyover.
- More than 30 major projects to be delivered.
- **Projects currently under construction is estimated at QR 16 billion**

2. THE LOCAL ROADS & DRAINAGE PROGRAMME

the Local Roads and Drainage Programme includes the development of roads, drainage and new infrastructure in all areas of Qatar to raise the standard of living for all the citizens and residents.

**Total estimated cost is: QR 50 billion.**
Annual comparison of the tested samples of Ashghal’s projects

<table>
<thead>
<tr>
<th>Year</th>
<th>No of annual tested sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>9237</td>
</tr>
<tr>
<td>2014</td>
<td>197318</td>
</tr>
<tr>
<td>2015</td>
<td>229386</td>
</tr>
</tbody>
</table>
QA/QC of Ashghal’s projects

- Projects QA/QC is requested to have reliable and efficient tool(s) for conducting testing of all these projects samples.

- The rate of testing activity required to cover all Ashghal projects and implementing ashghal policy was found to be around 20-30 thousand per month. While the tests conducted for contractor quality control and other projects is not considered and not accounted.

- Ashghal applies outsourcing policy for sample testing through independent testing laboratory.

- The applied policy necessitate the presence of professional and efficient system to optimize the QA/QC of all of these projects.
Integrated QA/QC system for ashghal projects

Ashghal approved Laboratories

QA/QC of Projects

Laboratory Quality tracking system

Ashghal Center for R&D as a reference lab
1- Ashghal approved Laboratories

Activity flow in for independent laboratory approval

Sampling, Handling, Transport and Storage
- Sampling plan
- Sampling documentation
- Sample identification
- Sample protection and integrity
- Transport conditions
- Storage conditions

Testing
- Controlled environmental conditions
- Written procedures
- Qualification of personnel and material
- Equipment calibration and maintenance, 5.5 and 5.6
- Method validation, 5.4.5

Reporting Including uncertainty
- Test conditions
- Test results
- Estimated uncertainty, 5.4.6
- Traceability
- Control of nonconforming results

Maintenance of records
- Record integrity
- Data security
Ashghal policy for lab testing evaluation

The evaluation process focused into:

1. Sampling process
2. Testing activity
3. Quality of the data results.
1. Sampling process

Sampling is the process of selecting unit from a bulk or population of interest in order to study and fairly generalize the results back to the bulk from which the sample was chosen. Sampling process is highly influenced by the following:

- Sampling condition
- Sample collection and delivery
- Sample handling
Sample collection and delivery

To avoid Bias samples, the main responsibility of the sample collection and delivery lies mainly on:

1- Project Engineer (Ashghal staff)
2- Consultant/Representative
3- Competent laboratory staff

Otherwise, any collected or delivered sample will not be considered
2- Testing Activity

Lab Evaluation and qualification

Laboratory qualification is based on evaluation of a laboratory’s management, technical qualifications, and competence for conducting predefined approval and test Procedures. The evaluation process could be summarized in the following:

1- Laboratory Inspection Information Requist (LIIR).
2- Document review
3- Scheduling of on-site assessment.
4- Conduct an on-site assessment.
5- Approval or Rejection of the lab
# Laboratory Inspection Information Request (LIIR)

## 1. General Information

| Date Of Request: |  |
| Lab Name: |  |
| Laboratory Location: |  |
| Mailing Address |  |
| Lab. Manager |  |
| Name and Title of Point of Contact: |  |
| Contact details | Tel. |
| | Fax. |
| | Mob. |
| | P. O. Box |
| | E.Mail. |
| Quality System  
If yes reference your system ! | Yes □ | Accreditation Programs (if Yes, list date and type of accreditations) | Yes □ |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No □</td>
<td>No □</td>
<td></td>
<td>No □</td>
</tr>
</tbody>
</table>

Quality Manual

Proficiency Sample Programs:  
(Please Mention which International Coordinator and attach all related reports)

<table>
<thead>
<tr>
<th>Aggregate</th>
<th>□</th>
<th>Bituminous Materials</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>□</td>
<td>Masonry</td>
<td>□</td>
</tr>
<tr>
<td>Soil</td>
<td>□</td>
<td>Water</td>
<td>□</td>
</tr>
<tr>
<td>Others (list)</td>
<td>□</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Certified Technicians (if Yes, State number, List of names & type of certifications and attach copy of certificates)

<table>
<thead>
<tr>
<th>Yes</th>
<th>□</th>
</tr>
</thead>
</table>
3- **Area of Inspection Desired**

**Area of Inspection Desired:**

Please check the appropriate areas for which this inspection is requested and complete the questionnaire below.

<table>
<thead>
<tr>
<th>1- Aggregates</th>
<th>□</th>
<th>2- Bituminous Materials</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>3- Concrete</td>
<td>□</td>
<td>4- Masonry</td>
<td>□</td>
</tr>
<tr>
<td>5- Rock</td>
<td>□</td>
<td>6- Soil</td>
<td>□</td>
</tr>
<tr>
<td>7- Water analyses</td>
<td>□</td>
<td>8- Geotechnical Studies</td>
<td>□</td>
</tr>
<tr>
<td>9- Others ( )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4- **Required Test List**

The requested test list is mainly QCS Bases, otherwise these tests will not be considered or could be under conditional approval with the application of **Star Policy**

<table>
<thead>
<tr>
<th>Test Procedure</th>
<th>Test Method (Ref.)</th>
<th>Required Equipment</th>
<th>Calibration Status</th>
<th>Calibration Agency</th>
<th>Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
2- Documents Review and Desk assessment against Ashghal Requirements

- The laboratories evaluation team assessors may identify nonconformities in the documentation.

- Nonconformities are discussed with the Authorized Representative of the lab.

- The laboratory must address them prior to the on-site assessment.
Laboratories Evaluation criteria

- Accreditation for ISO 17025
- Staff qualification & training
- Equipment and facilities
- Sampling facility and sample control
- Testing Quality control/ quality assurance
- Participation in proficiency test program
Scheduling of on-site assessment

The applicant laboratory is contacted by the assessor to schedule a mutually acceptable date for the on-site assessment. An assessment normally takes one day. Every effort is made to conduct an assessment with as little disruption as possible to the normal operations of the laboratory.

Conduct an on-site assessment

An on-site assessment is conducted at all applicant laboratory locations where evaluations are performed. Assessors use checklists provided by the QSD so that each laboratory receives an assessment comparable to that received by others.
ONSITE ASSESSMENT WILL INCLUDE:

Based on the information taken from the LIIR, the assessment will start to include the inspection of all the laboratory components, including, testing methods, equipment calibrations, staff competency and all the other components.
Final lab approval

- Equipments calibration
- Test methods & Quality control measures
- Staff training and qualification

ASHGHAL
APPROVED LAB LIST
Ashghal’s Approved Tests List

Ashghal’s approved tests list is a short list of the most competent independent laboratories which take the responsibility of conducting testing services for all Ashghal projects.

This labs list issuance is prepared on a monthly basis and the approved laboratories should comply with Ashghal quality requirements.

User Category
Companies

Service Category
Technical Support Affairs

Documents & Forms
Ashghal Approved Tests List November 2015
2- Ashghal Center for R&D as a reference lab
Ashghal Inter-laboratory Testing Program
1- To build up and maintain mutual confidence between Ashghal and testing services, to reach a state of equivalence in the operation of accredited laboratories.

2- Removal of technical barriers of testing and Measurements activities.
According To ISO /IEC Guide 43-1 & ISO 13528

Z Score \( Z_i = \frac{X_i - \bar{X}}{S} \)

- \( X \) : mean Value, \( S \) : Standard deviation
- \( |z| \leq 2 \) Satisfactory
- \( 2 < |z| < 3 \) Questionable
- \( |z| \geq 3 \) Unsatisfactory

Bias (%) \( = \frac{X_i - \bar{X}}{\bar{X}} \times 100 \)
Concrete Testing
28 Day Concrete Compressive strength

Average Value

Acceptable limits

Questionable limits

Concrete Cube Compressive strength N/mm$^2$

Z Scores

% Bias

Laboratories
Aggregate samples Testing
Comparison of % water Absorption of Aggregate samples

![Graph showing the comparison of water absorption for different laboratories.](image-url)
Asphalt Testing
Comparison Between Z Score and % Bias in Binder content test
Comparison Between Z Score and % Bias In Stability Test
Comparison Between Z Score and % Bias In % Voids in Mix
Comparison between Z scores and % Bias of Bulk density test
Laboratories Quality tracking system is an advanced software to build a projects data base.

The data base included all testing data of all Ashghal projects, put to be accessible to all projects engineers and consultants through ashghal website.

Each Engineer could have a detailed testing report (s), that could give a real evaluation of the project(s) quality. Moreover, statistical analyses of the projects data could be used as a performance indicator for quality of any projects.

Testing reports is directly uploaded from approved laboratories with their conformance evaluations of the tested samples without any interference from either contractor or consultant.
• Approved laboratories are requested to directly upload test reports of their approved Ashghal projects.
• The data reports should be uploaded as soon as the test results are ready and will be saved into Ashghal database.
• Laboratory should comment on the report to show the conformance status of the test results to the specification.
• All data results will be accessible to all projects engineers based on their given access from the department.
Lastrada Program for Data Handling

![Lastrada Program for Data Handling](image)
Dear User, Welcome to the LASTRADA - Quality Portal.

The LASTRADA - Quality Portal provides statistics for all your projects. It contains two parts:

- Management Reports - to give a management overview of all tests (conforming, non-conforming and not evaluated)
- Technical Reports - to show the test results including Min., Max. and Target values

Please choose your next step.
### Technical Report

#### Please make your selection

<table>
<thead>
<tr>
<th>Category</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Period</td>
<td>Last 365 Days</td>
</tr>
<tr>
<td>Affairs</td>
<td>Ashghal</td>
</tr>
<tr>
<td>Department</td>
<td>Quality, Safety</td>
</tr>
<tr>
<td>Contractor</td>
<td>- All -</td>
</tr>
<tr>
<td>PMC</td>
<td>- All -</td>
</tr>
<tr>
<td>Consultant</td>
<td>- All -</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Ashghal</td>
</tr>
<tr>
<td>Producer</td>
<td>- All -</td>
</tr>
<tr>
<td>Materials</td>
<td>Final effluent</td>
</tr>
<tr>
<td>Projects</td>
<td>Doha South</td>
</tr>
<tr>
<td>Test Categories</td>
<td>9 : Environmental Tests</td>
</tr>
<tr>
<td>Tests</td>
<td>9.14 : Chemical Oxygen Demand (COD)</td>
</tr>
<tr>
<td>Test Parameters</td>
<td>COD</td>
</tr>
</tbody>
</table>

#### Please select the type of report

<table>
<thead>
<tr>
<th>Reports</th>
<th>Output Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Series for one test parameter</td>
<td>Time Series Chart (pt)</td>
</tr>
<tr>
<td>Field</td>
<td>Value</td>
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<tr>
<td>---------------------</td>
<td>--------------------------------------------</td>
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<td>Time Series for one test parameter</td>
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</tbody>
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Sample for technical report generated from Lastrads program
Sample for technical report generated from Lastrads program
Comparison between the sample tested for the different Ashghal departments in 2014
Comparison between sample tested of the different approved laboratories in 2014
Comparison between the sample tested for each treatment plant in 6 months
Conclusion

• Ashghal system provide a fast and highly controlled testing activities.

• Published Ashghal approval tests list considered to be the first lab testing data base that helps integration between different laboratories in different testing fields.

• The approved list includes national and international laboratories, which helps also integration between laboratories.
• The system enables projects engineers to access their projects data as soon as it tested and uploaded to the system.

• Each project engineer could have a good statically analysis reports about his project to evaluate the construction performance.

• Different types of reports could be generated to be used as a quality performance indicators for:
  – Contractors
  – Consultants
  – Materials
  – Laboratories
Thank You