OFFICE OF INSPECTOR GENERAL

AUDIT OF USAID/WEST BANK AND GAZA CONSTRUCTION PROGRAMS

AUDIT REPORT NO. 8-294-16-001-P
FEBRUARY 22, 2016

FRANKFURT, GERMANY

Office of Inspector General

February 22, 2016

MEMORANDUM

TO: USAID/West Bank and Gaza Mission Director, R. David Harden

FROM: Regional Inspector General/Frankfurt, James C. Charlifue /s/

SUBJECT: Audit of USAID/West Bank and Gaza Construction Programs (Report No. 8-294-16-001-P)

This memorandum transmits our final report on the subject audit. In finalizing the audit report, we considered your comments on the draft report and included them in their entirety, excluding attachments, in Appendix II.

This report contains 15 recommendations to help the West Bank and Gaza mission improve its construction programs. After reviewing information provided in response to the draft report, we acknowledge management decisions on all recommendations and final action on Recommendations 1 through 5 and 9 through 15. Please provide evidence of final action on the open recommendations to the Audit Performance and Compliance Division.

Thank you for the cooperation and assistance extended to us during this audit.

Frankfurt, Germany
http://oig.usaid.gov/

CONTENTS

Abbreviations

The following abbreviations appear in this report:

ANERA	American Near East Refugee Aid
A&E	architectural and engineering
EWAS II	Emergency Water and Sanitation Program (Phase II)
IBC	International Building Code
INP I	Infrastructure Needs Program (Phase I)
INP II	Infrastructure Needs Program (Phase II)
LCP	Local Construction Program
LGI	Local Government and Infrastructure Program
MOU	memorandum of understanding
OIG	Office of Inspector General
PCID	Palestinian Community Infrastructure Development Program
RIG	Regional Inspector General
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers

SUMMARY OF RESULTS

The overall goal of USAID/West Bank and Gaza's construction program is to help the Palestinian people by providing public infrastructure projects. USAID has supported such projects in this region since 1963, when the Agency paid for a road between Jerusalem and the Dead Sea.

Yet much work remains, as the Palestinian Authority has outlined in its 2014-2016 National Development Plan, which calls for improving water and wastewater management, building a safer, more effective transportation system, and increasing access to public services. To help those goals come to fruition, the mission has organized its current infrastructure efforts into three intermediate results.

1. Increased access to clean water and sanitation services
2. Improved transportation infrastructure
3. Improved or developed social infrastructure facilities[1]

As of March 31, 2015, the mission finished two construction programs and had four more in process, listed in Table 1 below. At that time, the mission had obligated $762.5 million and disbursed $604.5 million under these six programs, the earliest of which began in May 2008.

Table 1. Construction Programs in West Bank and Gaza

Program	Status	Procurement Mechanism	Project Description	Amount Obligated ($ Millions)	Amount Disbursed ($ Millions)
Emergency Water and Sanitation Phase II (EWAS II)	Completed	Cooperative agreement[2]	Road, social infrastructure, and water projects	64.8	64.7
Infrastructure Needs Program Phase I (INP I)	Completed	Multiple contracts	Road, social infrastructure, and water projects	281.5	278.8
Infrastructure Needs Program Phase II (INP II)	Ongoing	Multiple contracts	Road and water projects	254.3	163.4
Local Construction Program (LCP)	Ongoing	Multiple contracts	Road projects	11.4	4.1
Local Government & Infrastructure Program (LGI)	Ongoing	Cooperative agreement	Road, social infrastructure, and water projects	102.7	73.6
Palestinian Community Infrastructure Development Program (PCID)	Ongoing	Cooperative agreement	Social infrastructure and water projects	47.8	19.9
Total				**762.5**	**604.5**

Source: USAID/West Bank and Gaza data.

[1] Social infrastructure facilities are schools, health facilities, and community centers.
[2] A cooperative agreement is a legal instrument intended to transfer a thing of value to a recipient to carry out a public purpose, and for which substantial involvement is expected between the agency and the recipient when carrying out the activity described in the agreement.

The Regional Inspector General (RIG)/Frankfurt conducted an audit of USAID/West Bank and Gaza's construction programs to answer the following questions.

- Are USAID/West Bank and Gaza's construction programs providing infrastructure to meet the needs of Palestinian residents of the West Bank and Gaza?
- Are USAID/West Bank and Gaza's infrastructure projects maintained after completion?
- Are the construction quality assurance processes used by USAID/West Bank and Gaza and its implementing partners meeting industry best practices for ensuring quality construction and safety on construction work sites in the West Bank?

We determined that the programs' projects (listed by location in Table 2) met the needs of Palestinian residents of the West Bank (page 5). As of March 2015, the programs had completed 79 water and wastewater projects, 115 road projects, and 104 social infrastructure projects. The road projects improved connections between Palestinian communities, facilitated trade, and improved road safety. The work in the water and wastewater sector focused on improving the existing water network, installing new networks, renovating wells, and providing technical assistance and technology to help the Palestinian Authority manage its existing water resources. The mission's efforts to improve the social infrastructure included renovating or building 55 schools, 24 municipal citizen service centers, and 25 health clinics.

Because of the security restrictions on travel to Gaza, we could not go there. So we used the mission's third-party monitoring firm to visit the sites of ten completed projects and interview beneficiaries to determine whether they met the needs of Palestinian residents. The firm found problems with maintenance and usage at two of the sites.[3]

Table 2. Location and Approximate Cost of Construction Projects as of March 31, 2015

Location	Number of Projects	Amount Disbursed ($ Millions)	Average Cost per Site ($Millions)
Bethlehem	63	76.4	1.2
Hebron	97	160.8	1.7
Jenin	42	77.9	1.9
Jericho	13	23.8	1.8
Jerusalem	28	37.3	1.3
Nablus	35	100.9	2.9
Qalqilya	11	9.2	0.8
Ramallah	51	54.0	1.1
Salfit	22	9.4	0.4
Tubas	10	6.8	0.7
Tulkarm	23	24.9	1.1
Gaza	30	9.6	0.3
Multiple locations	12	13.5	1.1
Total	**437**	**604.5**	**1.4**

Source: USAID/West Bank and Gaza data.

[3] Since the testing is based on a judgmental sample, the results are limited to the items tested, which are described on page 8.

We found that recipients have maintained most of the completed sites in the West Bank and that 46 of the 48 sites we visited there during this audit were in acceptable condition and used as intended. We also found that the mission's contractors are using industry best practices for quality construction and safety at most construction sites. Employees from the U.S. Army Corps of Engineers (USACE) helping us with this audit commented that, in most cases, the contractors and implementing partners had impressive experience, an excellent understanding of construction, and were very skilled in construction management.[4]

However, we found several areas where the mission could improve its construction programs.

- Most completed sites in the West Bank were in good condition but risks to utilization and sustainability persist (page 6).

- Restrictions limited the mission's ability to provide sustainable infrastructure projects in Gaza (page 8).

- Projects lacked rigorous design and oversight of construction (page 10).

- The quality of materials and work was poor at several projects (page 12).

- Contractors did not follow safe construction practices in seismic zones (page 14).

We recommend that USAID/West Bank and Gaza:

1. Require its partners, as part of their annual work plans, to evaluate the usage of completed mission-funded community infrastructure projects before providing any new ones to a municipality or ministry (page 7).

2. Send a written request to the parties included in the memorandum of understanding (MOU) for the health clinic in Ash Sheikh Sa'd, Jerusalem and the Qira Primary Co-educational School in Salfit to uphold the terms of the MOU or justify why they cannot (page 7).

3. Re-evaluate the 611(e) certification for programs performing road construction and document that the Palestinian ministry responsible for maintaining infrastructure projects provided by USAID has enough budget resources. If it does not, provide a written justification for continuing to build roads before starting any new ones (page 7).

4. Evaluate the condition of the Al Rahma water reservoir and apply any lessons learned to the new reservoir construction work in Gaza (page 9).

5. Send a written request to the parties included in the MOU for the Al-Ahli Arab Hospital in Gaza to uphold the terms of the MOU or justify why they cannot (page 9).

[4] The engineers issued a report of their technical evaluation of the programs on May 5, 2015, and we have incorporated it into this audit. The report found isolated and systematic problems with the mission's completed and ongoing construction programs and included many recommendations. OIG gave the mission a copy of the report on June 15, 2015. (It is in Appendix III of this report.)

6. Amend Mission Order 202 to (1) include modified procedures to oversee construction programs in Gaza, given the restrictions on travel to the area, and (2) require an evaluation of the condition of similar recently completed USAID-funded projects when performing future 611(e) certifications of construction projects there (page 9).

7. Develop and implement an action plan to (1) review the six recommendations related to isolated and systematic cooperative agreement issues identified in the USACE technical report, and (2) include actions to implement these recommendations and justifications for deviations (page 12).

8. Amend Mission Order 202 to require an architectural and engineering (A&E) firm to oversee construction programs implemented under cooperative agreements (page 12).

9. Develop and implement an action plan to (1) review the 68 site-specific recommendations documented in the USACE technical report for project sites completed under programs that have ended, and (2) include actions to implement these recommendations and document justifications for deviations (page 13).

10. Develop and implement an action plan to (1) review the 51 recommendations documented in the USACE technical report specific to Infrastructure Needs Program Phase II (INP II) and Local Construction Program (LCP) projects, and (2) include actions to implement these recommendations and document justifications for deviations (page 14).

11. Develop and implement an action plan to (1) review the 65 recommendations documented in the USACE technical report specific to Local Government and Infrastructure Program (LGI) projects, and (2) include actions to implement these recommendations and document justifications for deviations (page 14).

12. Develop and implement an action plan to (1) review the 21 recommendations documented in the USACE technical report specific to Palestinian Community Infrastructure Development Program (PCID) projects, and (2) include actions to implement these recommendations and document justifications for deviations (page 14).

13. Develop and implement an action plan to (1) review the recommendation related to systematic seismic issues identified in the USACE technical report, and (2) include actions to implement this recommendation and justifications for deviations (page 15).

14. Develop and implement an action plan to help its implementing partners with educational and training programs to improve their ability to comply with the International Building Code's (IBC's) seismic standards (page 15).

15. Develop and implement an action plan to confirm that all sites currently under construction or in the design phase under LGI and PCID programs meet the building code requirements outlined in the mission's May 30, 2014, memo (page 15).

Detailed findings appear in the following section, and Appendix I has information on the scope and methodology. Our evaluation of management comments starts on page 16, and the comments are in Appendix II.

AUDIT FINDINGS

Programs Met Needs of Palestinian Residents in the West Bank

The Palestinian Authority's 2014-2016 National Development Plan is a framework for establishing a sovereign state. Its approach to the infrastructure sector provides a sustainable, equitable network of infrastructure that contributes to economic development, independence, social justice, and connectivity throughout the West Bank and Gaza.

USAID/West Bank and Gaza supports implementation of this plan in the West Bank with three types of construction projects: roads, water and wastewater, and social infrastructure. Because of the challenges the mission faced when working in Gaza, we describe construction projects there separately (page 8).

Roads. The National Development Plan states that the first priority for the transportation sector is to continue to construct, rehabilitate, and develop internal and regional roads. The plan calls for improvements to road networks and regular maintenance that provides for a modern, safe, and sustainable transportation network, in keeping with international standards, for all Palestinian communities.

The mission's work in the roads sector is consistent with this priority. As of March 2015, the six infrastructure programs had finished 115 road projects in the West Bank. They included large two-lane regional roads, agricultural roads, city streets, and access roads for municipal facilities and industrial areas. With help from the USACE engineers, we visited 19 completed road projects and found that they were used as intended and were meeting community needs.

Water and Wastewater. The plan calls for targeted projects and water resource management. Currently, the Palestinian Authority does not have many water resources available to meet the growing demand of its citizens, farmers, and industries. It seeks donor funding to support "coping strategies," such as drilling new wells, rehabilitating existing wells, water conservation, water harvesting, desalination, and reusing wastewater for irrigation.

The mission's work in the water and wastewater sector is consistent with this plan and focuses on improving the existing water network, renovating wells, and providing technical assistance and technology to help the Palestinian Authority manage existing water resources. As of March 2015, the six construction programs had completed 79 water projects in the West Bank, including sewage systems in communities that previously lacked them and water reservoirs. With the assistance from the USACE engineers, we visited 14 completed water and wastewater projects and found that they were used as intended and appeared to be meeting community needs.

Social Infrastructure. The plan calls for the Palestinian Authority to reduce inequities within its communities. To provide services to all Palestinians more efficiently and fairly, the authority plans to upgrade the institutional capacity and the social infrastructure throughout the West Bank. This includes building new primary and secondary schools, health clinics, municipal citizen service centers, sports facilities, and youth centers, or renovating existing structures.

The mission’s LGI and PCID programs work with underserved municipal governments when building these projects. As of March 2015, the six programs had renovated or built 55 schools, 24 citizen service centers, and 25 health clinics. With the assistance from the USACE engineers, we visited 15 completed projects and found that each one was used as intended and appeared to be meeting community needs, except for sites described on page 7.

USAID/West Bank and Gaza also uses these construction programs to respond to political commitments that frequently arise in the region. For example, in November 2013, Secretary of State John Kerry pledged to $100 million worth of infrastructure projects throughout the West Bank. Within a year of this announcement, the mission had completed 30 projects and started 58 more to deliver on his pledge. Furthermore, the mission's close coordination with the Palestinian ministries responsible for roads, water, municipal governments, and with Israeli government officials contributed to the quick development and completion of these projects.

The mission’s construction projects meet the needs of Palestinian residents in the West Bank and help the U.S. Government provide humanitarian assistance. As a result, we are not making a recommendation relating to this subject.

Most Completed Sites in the West Bank Were in Good Condition but Risks to Utilization and Sustainability Persist

Each USAID/West Bank and Gaza site requires a different level of maintenance and host-country support to make sure it is used as intended. The mission assesses a recipient’s ability to maintain completed infrastructure projects in an internal document known as a 611(e) certification, prepared at the beginning of a construction program. These certifications are not required for each construction project; rather, the mission completes a certification for the overall program. When a project is finished, the mission includes a warranty period to cover the cost of warranty-related repairs that arise in the first year. Repairs in subsequent years are the responsibility of the recipient organization. The mission outlines maintenance and site management expectations in a MOU signed by the mission director or a designated implementing partner and the recipient organization responsible for managing the facility, such as a municipality or government ministry.

To encourage community involvement and improve the likelihood that the infrastructure projects are used, USAID designed the LGI and PCID programs to provide construction projects and community engagement at the local government level in the planning stages.

During the audit, we visited 48 completed projects in the West Bank and noted that most were in either good or acceptable condition and were being used as intended. However, we found two areas where USAID was not working with the Palestinian Authority and local communities to make sure sites are used as intended and completed projects were maintained.

Sustainability of Road Projects. USACE engineers observed that 5 of 19 completed road projects inspected during the audit showed signs of deterioration. A recent study commissioned by the mission found that the Palestinian Authority has not earmarked enough money to maintain the roads that USAID paid to have resurfaced, rehabilitated, or reconstructed. According to that study, the Palestinian Ministry of Public Works and Housing currently allocates about $1,021 annually per kilometer to road maintenance, less than half the $2,300 annual per kilometer average that the mission-commissioned study said was needed for routine maintenance. Given this level of funding, the ministry cannot maintain the roads built with USAID funding at a level to last as long as they should.

The Palestinian Authority's ability to set aside portions of a fuel tax to support road maintenance has proven difficult, because funds are used to support other priorities in the annual budget. So, USAID-funded road projects will not be fully sustainable until the authority dedicates tax revenue to maintain these critical civic resources.

Usage of Community Development Projects. Two of 15 community development projects we visited in the West Bank were not being used as intended. One is a health clinic built in November 2014, but still not equipped, staffed, or used as of February 2015. The second site is a school where the implementer built additional classrooms and a computer lab in November 2012; however, the lab did not have any computers.

The costs to equip and staff a facility influence the utilization of a project after its completion. The receiving organization is usually responsible for these costs, as outlined in the MOU associated with the project. For the projects referenced above, the Palestinian Authority ministry responsible has not provided enough funding to install computers at the school, equip the health clinic, or maintain road projects.

If the ministry does not meet the terms of the MOU, such as providing the equipment and staff necessary to operate a health clinic, the mission can remind the signors of the agreement's terms through formal channels, such as a letter to the respective minister or community leader responsible for the site. The mission also can withhold funds for future projects until the ministry or community meets the terms. Mission officials whom we interviewed said that, to their knowledge, the mission has never withheld project funding because a ministry or community did not meet the terms of an MOU.

Most completed projects in the West Bank visited during this audit were in either good or acceptable condition and are providing beneficiaries with the intended services. However, when sites are not used or maintained, intended beneficiaries do not receive the benefit of services from USAID's construction projects. The 611(e) certification process and MOUs with recipient organizations incorporate sustainability planning during the design and implementation phases of construction. Despite this, in some cases sites are still not used and maintained. To address the concerns noted with road and community development projects, we make the following recommendations.

> ***Recommendation 1.*** *We recommend that USAID/West Bank and Gaza require its partners, as part of their annual work plans, to evaluate the usage of completed mission-funded community infrastructure projects before providing any new ones to a municipality or ministry.*
>
> ***Recommendation 2.*** *We recommend that USAID/West Bank and Gaza send a written request to the parties included in the memorandum of understanding for the health clinic in Ash Sheikh Sa'd, Jerusalem and the Qira Primary Co-educational School in Salfit to uphold the terms of the memorandum or justify why they cannot.*
>
> ***Recommendation 3.*** *We recommend that USAID/West Bank and Gaza re-evaluate the 611(e) certification for programs performing road construction and document that the Palestinian ministry responsible for maintaining infrastructure projects provided by*

USAID has enough budget resources. If it does not, provide a written justification for continuing to build roads before starting any new ones.

Restrictions Limited Mission's Ability to Provide Sustainable Infrastructure Projects in Gaza

Mission Order 202, "Review and Oversight of Construction Activities under USAID Awards," establishes policies and procedures for mission staff responsible for oversight of mission-funded construction programs. It requires the mission's engineering staff to conduct field inspections and other forms of oversight during construction planning and implementation.

In addition, the mission traditionally designs construction projects to align with the Palestinian Authority National Development Plan or in response to a request from a community to address a specific need. However, since 2007 Hamas has controlled the government in Gaza—a condition that hampers the mission's oversight of projects and government coordination because the U.S. Government has designated Hamas as a foreign terrorist organization. Therefore, the mission's infrastructure projects in Gaza are restricted to supporting nongovernmental organizations, five municipalities unaffiliated with Hamas, and certain approved emergency water and sanitation projects. In 2015, authority was expanded to allow the mission to work on new water and sanitation projects.

The U.S. Consulate in Jerusalem has also limited the mission's work in Gaza because of safety concerns. U.S. direct-hire staff cannot visit Gaza, and Agency employees, contractors, and partners cannot contact Hamas. As a result, the mission hired a monitoring service to support its oversight work there, primarily to monitor ongoing projects, not for visiting completed projects.

Despite all of these constraints, the mission completed 30 construction projects in Gaza, worth $9.6 million, between 2008 and 2013. It planned to start 12 new ones—budgeted at $5.2 million—in fiscal year 2015.

To determine the status of completed projects in Gaza, we used the mission's third-party monitoring firm to visit 10 of the 30 recently completed sites there. It found issues at two; a medical diagnostics facility was not being used, and a water project was not functioning at its full capacity.

Al-Ahli Arab Hospital Diagnostics Center. The mission built a new diagnostics center at this private hospital in Gaza for $820,510. The facility has been empty since it was finished in 2013. The director of the hospital said this was because they were waiting for donated equipment from charitable organizations, and they expected to open the center during the second half of 2015.

After an initial visit in December 2014, we asked the monitoring service to visit the site again in June 2015. They reported that the center was still not equipped.

Al Rahma Water Reservoir. The mission funded the construction of a water reservoir and pumping station in Khan Younis Governorate—one of the five municipalities in Gaza not controlled by Hamas. The reservoir was built for $1,464,431, and it was completed in April 2012. Soon afterward, two of the six pumps became inoperable, and employees have not repaired them. The technicians managing the site said the pumps should be replaced because they were not suitable for this reservoir.

Based on a review of the project, the USACE engineers assisting with this audit could not determine why the pumps failed, nor could the mission engineers. As of June 2015, the equipment remained in disrepair and the reservoir was not operating at its full capacity.

An additional contributing factor to the problems at the Al Rahma reservoir is that Mission Order 202 does not outline the unique challenges of working in Gaza or include compensating controls to ensure that construction projects there have mission oversight, like requiring the third-party monitoring service to visit completed construction sites during the 1-year warranty period to see whether any repairs are needed and that sites are being used as intended. The mission has a separate mission order that outlines the procedures for monitoring projects in Gaza; however, this document also lacks guidance on construction-specific oversight practices.

The reservoir project highlights the risk of what can happen when a mission funds a bulk water supply project without the related support. USAID/West Bank and Gaza's project approval documents noted that these projects require major operational and maintenance assistance. In practice, this means that they need technicians who can operate equipment properly and maintenance budgets to ensure that site managers can repair equipment. In the West Bank, the mission funded an operation and maintenance program, implemented at the West Bank Water Department, to improve the staff's ability to track and implement preventative and corrective maintenance tasks. A similar program does not exist for technicians in Gaza because of legal restrictions, so the mission proceeded with construction of this reservoir without a concurrent operation and maintenance program.

After the conflict with Israel in the summer of 2014, Secretary Kerry pledged $47 million to support the humanitarian needs and recovery efforts in Gaza. This gave the mission a new opportunity to implement assistance programs, and the mission has already used some of the money to support humanitarian relief efforts. However, the inability to coordinate with the national government in Gaza increases the risk that projects completed in municipalities where USAID is allowed to work will be underutilized or fall into disrepair—situations witnessed at two of the ten projects in Gaza visited during this audit.

Because the legal and policy restrictions are beyond the mission's control, we are not making a recommendation on broader program implementation in Gaza. However, the mission is planning new reconstruction projects and recently spent $9.6 million in infrastructure projects there. Therefore we make the following recommendations relating to completed projects and planning for future ones in Gaza.

> ***Recommendation 4.*** *We recommend that USAID/West Bank and Gaza evaluate the condition of the Al Rahma water reservoir and apply any lessons learned to the new reservoir construction work in Gaza.*
>
> ***Recommendation 5.*** *We recommend that USAID/West Bank and Gaza send a written request to the parties included in the memorandum of understanding for the Al-Ahli Arab Hospital in Gaza to uphold the terms of the memorandum or justify why they cannot.*
>
> ***Recommendation 6.*** *We recommend that USAID/West Bank and Gaza amend Mission Order 202 to (1) include modified procedures to oversee construction programs in Gaza, given the restrictions on travel to the area, and (2) require an evaluation of the condition of similar recently completed USAID-funded projects when performing future 611(e) certifications of construction projects there.*

Projects Lacked Rigorous Design and Oversight of Construction

USAID's Automated Directive System, Section 303, "Grants and Cooperative Agreements to Non-Governmental Organizations," limits the use of cooperative agreements for construction projects. This policy is in place because under cooperative agreements, USAID has limited control over making sure that design and construction are done properly, thereby increasing the risk of poor-quality or unsafe work. For such projects, the Agency recommends using contracts and task orders, which allow the Agency to manage the design and construction.

USAID/West Bank and Gaza has a waiver from this restriction, however, in part because in recent years, contractors were not allowed to operate in Gaza. The mission developed Mission Order 202, "Review and Oversight of Construction Activities under USAID Awards," to oversee its construction programs, implemented through both contracts and cooperative agreements.

As of March 2015, the mission had two active cooperative agreements (LGI and PCID) to implement projects in the West Bank and Gaza. In addition, one cooperative agreement (for EWAS II) was completed recently. All of these accounted for approximately 62 percent of the mission's fiscal year 2014 infrastructure budget (it used contracts to implement the remaining 38 percent.)

The mission used cooperative agreements generally for smaller, community-based projects, like the pavilion in the photo below. Eighty-two percent of the construction projects built through agreements cost less than $500,000.

This shade area at Al Buweib Coeducational School was paid for by USAID. (Photo by RIG/Frankfurt, January 29, 2015)

Table 3 shows the number of construction projects implemented in the West Bank according to award type and cost.

Table 3. West Bank Construction Projects

Cost	Award Type	
	Contract	Cooperative Agreement
Less than 500,000	5	209
500,000 to 1,000,000	15	36
More than1,000,000	108	10
Total	**128**	**255**

Source: USAID/West Bank and Gaza data.

We found inconsistencies in the performance of the two cooperative agreements. They included an inability to (1) track job site liability issues, (2) monitor design and construction for errors and omissions, and (3) track requirements for standards of care at job sites.

For example, the mission is renovating the Old Market in Bethlehem for more than $2 million. This project is implemented through a cooperative agreement with American Near East Refugee Aid (ANERA), and the site is not subject to oversight provided by an A&E firm hired by the mission. Instead, ANERA's engineers supervised the excavation, steel construction, and other work, and ANERA hired an A&E firm to support them. The construction staff did not seem to understand steel construction, however, and neither mission staff nor staff from ANERA knew which building standards were used. This substantially increased the risk that the quality of the work will be poor. In another example at this site, workers were excavating beneath a building, which could cause it to collapse.

USAID is paying for renovations of the Old Market in Bethlehem. The work includes excavating under an existing building, left, and building foundations (right) for large, metal shade structures. (Photos by RIG/Frankfurt, February 3, 2015)

The USACE engineers concluded that these types of inconsistencies happened, in part, because the cooperative agreements do not specify the building codes for structural design, welding, and roadwork. For instance, the lack of welding codes was evident at the Old Market, where the construction designs call for dozens of large metal shades, but ANERA employees did not know what standard would be used to evaluate whether the welding was done correctly.

Moreover, although the mission hired an A&E firm to provide design and construction management services for its construction contracts, cooperative agreements are not subject to this oversight. Instead, the mission relies on A&E firms hired by implementing partners and its own engineers, who are required to monitor the quality of work at all sites estimated to cost more than $100,000.

In the projects we visited, however, the mission did not require implementing partners to hire an A&E firm to conduct oversight. Nor did it expand the scope of the firm hired to oversee construction funded through contracts to cover work done through cooperative agreements.

USACE engineers said the mission's system was insufficient and that construction performed under cooperative agreements needed more oversight. They also said that having a staff engineer monitor work quality does not replace the need for independent on-site construction management provided by an A&E firm.

The inconsistencies in the performance of these two cooperative agreements, inadequate oversight of some of their construction work, and a mix of design standards used at these construction projects highlight the potential for significant problems with the sites. Furthermore, unsafe construction practices increase the risk of injury at mission-funded sites.

Given the limitations inherent with the use of cooperative agreements for large construction projects and the engineers' observations, we make the following recommendations.

> ***Recommendation 7.*** *We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the six recommendations related to isolated and systematic cooperative agreement issues identified in the U.S. Army Corps of Engineers technical report, and (2) include actions to implement these recommendations and justifications for deviations.*

> ***Recommendation 8.*** *We recommend that USAID/West Bank and Gaza amend Mission Order 202 to require an architectural and engineering firm to oversee construction programs implemented under cooperative agreements.*

Quality of Work and Materials Was Poor at Several Projects

USAID's *Basic Engineering Construction Oversight Principles for Development Professionals: A Primer* includes guidance for USAID missions implementing construction programs. It states:

> The main goal of any construction project is to have the required product or facility delivered according to the design and specifications, in accordance with industry quality standards, on time, within budget, providing the intended service, with no outstanding liabilities or claims, and be sustainable.

In addition, the USACE engineers cited international building standards as a basis for their evaluation of community development projects like hospitals and schools. These standards require builders to use equipment and material that can withstand heavy use and can be cleaned easily.

The USACE engineers found examples of poor quality work and materials at sites for which the original plans indicated that the construction would conform to internationally recognized building standards. These included paint, faucets, concrete construction, and steel design. They suggested the following possible causes:

- The majority of the contractors and implementing partners working with USAID did not have experience in designing steel and bolted, welded connections.

- Peeling paint noted at completed sites may have been due to either poor surface preparation, poor adhesion of paint, or moisture in the walls.

- The worn paint striping on the pavement of road projects may have been due to paint quality and/or thickness.

- The problems with concrete construction may have resulted from a failure in the design or preparation of the site to handle the weight of wet concrete, unacceptable materials used to prepare the site, or not inspecting the site before pouring the wet concrete.

The overall effect of poor work and materials is that some mission-funded construction projects had problems soon after they were finished. For example, low-grade faucets installed at health clinics were rusting and in disrepair—factors that make the facilities less sanitary.

The USACE report (in Appendix III) includes observations made at specific sites visited during the audit and has 205 recommendations. Table 4 below lists the program's name, status, the implementer or contractor responsible for oversight, and number of recommendations noted at the implementer sites visited during this audit.

Table 4. Summary of USACE Recommendations

Program	Status	Implementer or A&E Contractor	Number of Recommendations
Emergency Water and Sanitation Phase II	Ended	ANERA	28
Infrastructure Needs Program Phase I	Ended	MWH Global	40
Infrastructure Needs Program Phase II and Local Construction Program	Ongoing	Black & Veatch	51
Local Government & Infrastructure	Ongoing	Global Communities	65
Palestinian Community Infrastructure Development Program	Ongoing	ANERA	21
Total			**205**

Source: USACE report.

As a result, we make the following recommendations.

Recommendation 9. *We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 68 site-specific recommendations* *documented in the U.S. Army Corps of Engineers technical report for project sites completed under programs that have ended, and (2) include actions to implement these recommendations and document justifications for deviations.*

Recommendation 10. *We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 51 recommendations documented in the U.S. Army Corps of Engineers technical report specific to Infrastructure Needs Program Phase II and Local Construction Program projects, and (2) include actions to implement these recommendations and document justifications for deviations.*

Recommendation 11. *We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 65 recommendations documented in the U.S. Army Corps of Engineers technical report specific to Local Government and Infrastructure Program projects, and (2) include actions to implement these recommendations and document justifications for deviations.*

Recommendation 12. *We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 21 recommendations documented in the U.S. Army Corps of Engineers technical report specific to Palestinian Community Infrastructure Development Program projects, and (2) include actions to implement these recommendations and document justifications for deviations.*

Contractors Did Not Follow Safe Construction Practices in Seismic Zones

The USAID/West Bank and Gaza mission director issued a memo on May 30, 2014, calling for the mission's construction firms to begin complying immediately with the seismic safety standards included in the Uniform Building Code (UBC) of 1997 and transition to the more stringent International Building Code (IBC) seismic standards within 18 to 24 months.

A March 2007 report prepared for USAID by the U.S. Geological Survey examined the seismic hazards of the Middle East. It found that the most heavily populated areas of Israel, Jordan, and the West Bank and Gaza are vulnerable to strong earthquakes.

The mission's ongoing construction projects implemented through contracts—INP II and LCP—were complying with IBC before the May 2014 memo. The two programs implemented through cooperative agreements (LGI and PCID), which are responsible for designing and building community infrastructure projects, adopted UBC as a minimum requirement for the transition period, and were still in the process of figuring out how they will comply with the new requirement to use IBC.

During site inspections, USACE engineers noted three areas where implementer construction practices were unsafe: lack of reinforcing in walls, design of building floors and ceilings, and inadequate seismic evaluation of existing buildings.

Walls. Walls in buildings help reduce the risk of a building collapsing during an earthquake. To be effective in such an event, a building's structure and walls should be connected and reinforced. Unreinforced walls do not improve the overall rigidity of the structure, and during an earthquake the strength and stiffness of an unreinforced wall degrades. This means that the walls could collapse during a small to moderate earthquake. USACE engineers noted that mission-funded construction included unreinforced walls at schools currently under construction.

Floors and Ceilings. The typical floor and ceiling design used in most buildings constructed with mission funds was a combination of concrete beams and blocks held in place by friction only. There is no reinforcement in this type of construction to prevent the blocks from falling during an earthquake.

Seismic Evaluation of Existing Buildings. Existing buildings that are structurally altered, have additions built onto them, or are an adaptive reuse of an existing building should undergo a seismic evaluation and, if necessary, be retrofitted to meet construction standards that reflect any risks.

However, all of the additions and alterations built by the implementing partners inspected during the audit were designed and constructed without seismic evaluations. USACE engineers found that local design firms did not have the experience, training, and design tools to adapt IBC within the 18- to 24-month timeframe set by the mission's May 2014 memo. The implementation schedule for the new seismic design requirements was unrealistic for the implementing partners because they did not have the engineering capacity to hold the local firms to these standards.

As a result, implementing partners run the risk of not incorporating these building codes into their work, and sites currently under construction or in the design phase will not meet the codes the mission requires.

USACE engineers said that under current building practices used at mission-funded construction projects, ceilings, floors, and walls could collapse during a seismic event. To facilitate the implementation of improved seismic designs for USAID projects in the West Bank and Gaza, we make the following recommendations.

> ***Recommendation 13.*** *We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the recommendation related to systematic seismic issues identified in the U.S. Army Corps of Engineers technical report, and (2) include actions to implement this recommendation and justifications for deviations.*
>
> ***Recommendation 14.*** *We recommend that USAID/West Bank and Gaza develop and implement an action plan to help its implementing partners with educational and training programs to improve their ability to comply with the International Building Code's seismic standards.*
>
> ***Recommendation 15.*** *We recommend that USAID/West Bank and Gaza develop and implement an action plan to ensure that all sites currently under construction or in the design phase under the Local Government and Infrastructure and Palestinian Community Infrastructure Development Programs meet the building code requirements outlined in the mission's May 30, 2014, memo.*

EVALUATION OF MANAGEMENT COMMENTS

In their response to the draft report, USAID/West Bank and Gaza officials agreed with all the recommendations. The mission made management decisions on all 15 and took final action on Recommendations 1 through 5 and 9 through 15. Final action on 6, 7, and 8 is pending completion of certain tasks outlined below, which the mission estimated would be done by September 30, 2016. An evaluation of the comments follows.

Recommendation 1. Mission officials agreed, and asked their partners to, as part of their annual work plans, evaluate the usage of completed USAID-funded community infrastructure projects before awarding new ones. We acknowledge the mission's management decision and final action.

Recommendation 2. The mission sent a written request to the parties to the MOU for the health clinic in Ash Sheikh Sa'd and asked them to uphold the terms of the memorandum or justify why they cannot. The mission also provided evidence that, subsequent to our site visit, the computer lab at the Qira Primary Co-educational School was equipped with computers. We acknowledge the mission's management decision and final action.

Recommendation 3. The mission re-evaluated the 611(e) certifications for programs performing road construction. We acknowledge the mission's management decision and final action.

Recommendation 4. The mission sent three of its current partners to assess the Al Rahma Reservoir in Gaza. Officials then reviewed the assessment reports the partners prepared and applied the lessons learned from Al Rahma in the designs for new water projects in Gaza. We acknowledge the mission's management decision and final action.

Recommendation 5. The mission contacted the management at Al-Ahli Arab Hospital and learned that it recently secured donor funding to purchase the required medical equipment. We acknowledge the mission's management decision and final action.

Recommendation 6. Mission officials agreed to amend Mission Order 202 to (1) include modified procedures to oversee construction programs in Gaza, given the restrictions on travel to the area, and (2) require an evaluation of the condition of similar recently completed USAID-funded projects when performing future 611(e) certifications of construction projects. We acknowledge the mission's management decision. Final action is pending the amendment to Mission Order 202, which the mission estimated would be done by September 30, 2016.

Recommendation 7. Mission officials agreed to develop and implement an action plan to (1) review the six recommendations related to isolated and systematic cooperative agreement issues identified in the USACE report, and (2) include actions to implement these recommendations and justifications for deviations. We acknowledge the mission's management decision. Final action is pending the completion of this action plan, which the mission estimated would be done by September 30, 2016.

Recommendation 8. Mission officials agreed to amend Mission Order 202 to require recipients of cooperative agreements that have a construction element to hire an A&E firm to oversee construction activities implemented under their award. We acknowledge the mission's management decision. Final action is pending the amendment to Mission Order 202, which the mission estimated would be done by September 30, 2016.

Recommendation 9. The mission prepared an action plan for the 68 site-specific recommendations included in the USACE report for project sites completed under programs that have ended. The mission then shared this plan with its partners implementing current programs to make sure they apply these recommendations to ongoing and future projects. We acknowledge the mission's management decision and final action.

Recommendation 10. The mission reviewed the 51 recommendations and developed an action plan to implement them and document justifications for deviations. The mission then communicated the required actions in writing to the partner to implement in current and future projects. We acknowledge the mission's management decision and final action.

Recommendation 11. The mission reviewed the 65 recommendations and developed an action plan to implement them and document justifications for deviations. The mission then communicated the required actions in writing to the partner to implement in current and future projects. We acknowledge the mission's management decision and final action.

Recommendation 12. The mission reviewed the 21 recommendations and developed an action plan to implement them and document justifications for deviations. The mission then communicated the required actions in writing to the partner to implement in current and future projects. We acknowledge the mission's management decision and final action.

Recommendation 13. The mission reviewed the recommendation related to the systematic seismic issues identified in the USACE report. The mission then developed a scope of services for its A&E contractor to assist in the transition to IBC and to develop the required expertise. We acknowledge the mission's management decision and final action.

Recommendation 14. The mission developed a scope of services for its A&E contractor to help implementing partners comply with IBC's seismic standards. We acknowledge the mission's management decision and final action.

Recommendation 15. The mission agreed with this recommendation. Sites inspected during audit fieldwork in early 2015 were in an advanced stage of construction, and, as a result, the mission had not incorporated seismic building standards into these designs. However, for sites currently under construction or in the design phase, the mission developed a system to verify that these structures comply with seismic requirements outlined in the mission's May 30, 2014, memo. We acknowledge the mission's management decision and final action.

SCOPE AND METHODOLOGY

Scope

RIG/Frankfurt conducted this performance audit in accordance with generally accepted government auditing standards. They require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions in accordance with our audit objectives. We believe that the evidence obtained provides that reasonable basis.

The objectives of the audit were to determine whether (1) USAID/West Bank and Gaza's construction programs are providing infrastructure to meet the needs of Palestinian residents of the West Bank, (2) infrastructure projects are maintained after completion, and (3) construction quality assurance processes used by the mission and its implementing partners are meeting best practices for ensuring quality construction and safety on construction work sites in the West Bank.

USAID/West Bank and Gaza had four active construction programs (INP II, LCP, LGI, and PCID) and recently completed two other construction programs (EWAS II and INP I). All were included in the scope of this audit. The mission awarded a number of cooperative agreements and contracts to implement the programs. As of March 31, 2015, USAID/West Bank and Gaza had obligated $762.5 million and disbursed $604.5 million to support them. The disbursed amount represents the amount tested during this performance audit.

The audit covered the period from the earliest of these programs' inception on May 2, 2008, through March 31, 2015. We conducted audit fieldwork from November 17, 2014, to March 19, 2015, at the USAID/West Bank and Gaza mission and projects located in the West Bank. We used the mission's third-party monitoring firm to visit completed projects and interview beneficiaries in Gaza. This firm visited ten sites in December 2014 and performed a follow-up visit to three in June 2015. We also relied on engineering technical expertise provided by USACE.

In planning and performing the audit, we assessed the significant internal controls the mission used to manage the programs, which included work plans, progress reports, performance monitoring and evaluation plans, approval of construction documents, and meetings with contractors and cooperative agreement holders. We also reviewed the mission's FY 2014 assessment of internal controls required by the Federal Managers' Financial Integrity Act of 1982.

Methodology

To determine whether construction projects provided by USAID/West Bank and Gaza met the needs of Palestinian residents in the West Bank and were being maintained, we met with mission officials, including the contract and agreement officers' representatives, mission engineers, Palestinian Authority officials, municipal workers, and beneficiaries. We assessed the mission's coordination with the Authority's strategic development plans and its coordination with other donors. We established an error rate of 10 percent and a 90 percent confidence rate, selected a random statistical sample of 43 completed construction sites in the West Bank, and then retained USACE engineers to help evaluate these sites. Logistical planning allowed the audit team to visit the 43 sites, as well as 5 additional sites, for a total of 48. We verified reported results by reviewing source documents, observing program implementation, and interviewing beneficiaries. Since the testing is based on statistical samples, the results can be projected to the entire audit universe of completed projects in the West Bank.

For the site visits, we relied on the computer-processed data maintained by the mission and its implementing partners. We assessed the reliability of these data and concluded that they were reliable to use in answering the audit objective.

Because of the security restrictions on travel to Gaza, we performed limited procedures to determine whether completed construction projects the mission provided met the needs of Palestinian residents and were being maintained. We used the mission's third-party monitoring firm to visit ten completed projects and interview beneficiaries. Since the testing of these sites is based on a judgmental sample, the results are limited to the items tested and cannot be projected to the entire universe of Gaza construction projects.

To determine whether construction quality assurance processes used by USAID/West Bank and Gaza and its implementing partners meet industry best practices for ensuring quality construction and safety on construction work sites, the audit team relied on the USACE engineers. They visited ten sites where construction was in progress. They also visited the offices of the mission's A&E firm (responsible for oversight of construction implemented through contracts) and the two cooperative agreement holders to gain an understanding of construction management controls used at USAID-funded sites in the West Bank. During these visits, USACE staff interviewed engineers and project managers responsible for oversight of the four active programs and reviewed policies and procedures for managing subcontractors. Since this testing was based on a judgmental sample, the results are limited to the items tested and cannot be projected to the entire audit universe, except when USACE engineers noted otherwise.

MANAGEMENT COMMENTS

USAID | WEST BANK/GAZA
FROM THE AMERICAN PEOPLE

UNCLASSIFIED

Date: December 23, 2015

To: Regional Inspector General, Frankfurt, James C. Charlifue

From: Mission Director, USAID West Bank and Gaza, R. David Harden /s/

Subject: Mission's Comments on the Draft Audit Report on USAID/West Bank and Gaza Construction Programs

Draft Audit Report No. 8-294-16-XXX-P dated October 30, 2015

Reference: Charlifue/Harden memorandum dated October 30, 2015

USAID West Bank and Gaza thanks the Regional Inspector General/Frankfurt (RIG/F) and the U.S. Army Corps of Engineers (USACE) for conducting the referenced performance audit of USAID/West Bank and Gaza Construction Programs. Construction of infrastructure to support human and economic development for Palestinian residents of the West Bank and Gaza is a vital component of the U.S. Government interagency effort to lay the foundation for a two state solution to the Palestinian - Israeli conflict. We welcome RIG/F and USACE contributions to assist us to improve our development and implementation of construction activities.

Overall, we are pleased with the positive outcome of the performance audit, particularly the summary findings for each of the three performance areas, namely that:

1. our infrastructure programs are meeting the priority needs of Palestinian residents;
2. the vast majority (95.8% of construction sites visited) of our projects have been maintained by recipients and are being used as intended; and
3. our implementing partners are using industry best practices for quality construction and safety at most construction sites.

These findings are encouraging given both the large scale and breadth of USAID's support for infrastructure development in the West Bank and Gaza. We appreciate the USACE team's observation that the Mission is implementing some of the most complicated USAID-funded infrastructure projects in the world.

The Mission appreciates this opportunity to comment on the draft audit report. The Mission accepts all fifteen recommendations and provides the following comments.

Recommendation No. 1

We recommend that USAID/West Bank and Gaza require its partners, as part of their annual work plans, to evaluate the usage of completed mission-funded community infrastructure projects before providing any new ones to a municipality or ministry.

Response: USAID/WBG Mission sent emails to its partners, ANERA and Global Communities, on December 7, 2015 requesting that, as part of their annual work plans, they evaluate the usage of completed USAID-funded community infrastructure projects before awarding new ones. Copies of the emails are attached (Attachments A and B). The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 2

We recommend that USAID/West Bank and Gaza send a written request to the parties included in the memorandum of understanding for the health clinic in Ash Sheikh Sa'd, Jerusalem, and the Qira Primary Co-educational School in Salfit to uphold the terms of the memorandum or justify why they cannot.

Response: On December 15, 2015, USAID/WBG Mission sent a letter to Mr. Ibrahim Ramadan Muhammad Za'atra, the Head of the Ash Sheikh Sa'd Village Council, asking him to uphold the terms of the memorandum of understanding for the health clinic or justify why he cannot. USAID also sent a letter to Dr. Attah Qre'a, the General Director of Health Affairs in Jerusalem, urging him to provide the necessary equipment and personnel to operate the Sheikh Sa'd Clinic promptly. The letter also notes the Ministry of Health's' written commitment to the project, dated July 4, 2013. The letters and associated references are attached (Attachment C). Regarding Qira Primary Coeducational School in Salfit, the computer lab was equipped on March 10, 2015, subsequent to the completion of the audit field work. Attached are the official delivery reports by the Ministry of Education and photos of the computer lab (Attachments D and E). The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 3

We recommend that USAID/West Bank and Gaza re-evaluate the 611(e) certification for programs performing road construction and document that the Palestinian ministry responsible for maintaining infrastructure projects provided by USAID has enough budget resources. If it does not, provide a written justification for continuing to build roads before starting any new ones.

Response: The Mission agrees with the RIG's recommendation. The Mission re-evaluated the 611(e) certifications for programs performing road construction and found that the certifications were still valid. At the request of the Ministry of Public Works and Housing (MPWH), the Mission completed a Road Economic Study to help the MPWH quantify total annual costs for sustaining a comprehensive road maintenance program and explore various models for securing a sustainable source of revenue to meet those requirements. The MPWH used this analysis to lobby for additional funding from the Ministry of Finance and succeeded in receiving 10M NIS (around USD 2.55M) for maintenance (refer to attached letter from MPWH "Attachment F" and related newspaper advertisements "Attachment G"). Although this is encouraging, the Mission acknowledges that optimal maintenance funding may be variable in the near future. The existing 611(e) certifications explain how the current fiscal situation poses a risk to the sustainability of USG assistance. However, this will be mitigated by the continuing support and recognition of the international donor community given the importance they place on the infrastructure sector as a measure for avoiding humanitarian catastrophe. The Mission's portfolio of road projects, including road rehabilitations that are designed to minimize maintenance requirements, will help the MPWH cope with any budget shortfalls. The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 4

We recommend that USAID/West Bank and Gaza evaluate the condition of the Al Rahma water reservoir and apply any lessons learned to the new reservoir construction work in Gaza.

Response: The Mission agrees with the RIG's recommendation. The Mission has deployed three of its current partners - Black & Veatch (a U.S.-based architectural and engineering firm), ANERA (a nongovernmental organization and the implementing partner for the Emergency Water and Sanitation and Other Infrastructure Program (EWAS II), under which this subject project was implemented), and El Wafa Company (an audit firm contracted by the Mission to perform third-party monitoring of USAID's programs in Gaza) to assess the Al Rahma Reservoir. Having reviewed the assessment reports prepared by the three independent organizations, the Mission concluded that the causes for failure of horizontal pumps at the Al Rahma Reservoir cannot be attributed to a single factor. Several factors led to this failure, including power outages, access to spare parts (or lack thereof), and failure of the existing network (which affected operating conditions) as a result of an incomplete design. The Mission has applied the lessons learned from Al Rahma in the designs for new water projects in Gaza. For example, for its new large-scale water projects in Gaza, which include the construction of four reservoirs and pumping stations, the Mission has already addressed the probable causes of failure at Al Rahma by incorporating the following measures in the final design package for the four reservoirs (dated June 2015):

1. Frequent power outages in Gaza: The Mission will provide each reservoir site with a diesel generator designed to work extended, continuous hours. The generators will operate automatically if the main power line fails. Switchgears, transformers, and variable frequency drives (VFDs) were also included in the new design to protect the equipment against power failures and to enable the adjustment of the pumping parameters based on actual changing conditions on the ground. Please refer to the highlighted items of the BOQ (Attachment H) confirming the incorporation of those items in the newly awarded water reservoirs.

2. Accessibility to spare parts: The Palestinian Water Authority will be provided with essential spare parts for each pump unit as part of the new projects that are implemented, to ensure an immediate response in case of failure. This will help address the lack of accessibility to equipment in Gaza for approximately 10 years under expected operating conditions. Please refer to the highlighted items of the attached specification sheet (Attachment I) confirming that spare parts shall be provided for each delivered new pump.

3. Incomplete design: The Mission strongly believes that the design for water reservoirs cannot be completed as discrete elements without looking deeply into upstream and downstream conditions. As such, to address these lessons learned and mitigate risks that may be associated with the failure of the existing pipes, the Mission modeled services for the four new reservoirs and incorporated the outcome in their design.

Please see Attachment J from the Engineer of Record (Black and Veatch) confirming the same.

The Mission has already applied lesson learned from Al Rahma reservoir in new interventions, and therefore requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 5

We recommend that USAID/West Bank and Gaza send a written request to the parties included in the memorandum of understanding for the Al-Ahli Arab Hospital in Gaza to uphold the terms of the memorandum or justify why they cannot.

Response: The Mission agrees with the RIG's recommendation. ANERA received confirmation from the Al Ahli management that they had a pledge from different donors to provide them with the needed medical equipment and that they would be ready for installation directly after the completion of the construction.

Due to the tight closure on Gaza that followed and the subsequent restrictions on the importation of any kind of equipment with electrical components which were put in place following the 2012 and 2014 wars in Gaza, these original pledges were cancelled because the donors realized that there was no way to deliver the required and pledged medical equipment to Al Ahli Hospital. Hence, Al Ahli management has not been able to provide the needed equipment since the completion of the project.

Recently and after tremendous efforts by the CEO to find other donors, Al Ahli finally found the Donors to fund the purchasing of the required medical equipment. The Purchase Orders have already been issued, and the medical equipment is expected to be delivered around mid-December 2015. Please refer to the email from the CEO of the Al Ahli hospital (Attachment K). As such, the Mission requests that this recommendation is closed upon issuance.

Recommendation No. 6

We recommend that USAID/West Bank and Gaza amend Mission Order 202 to (1) to include modified procedures to oversee construction programs in Gaza, given the restrictions on travel to the area, and (2) require an evaluation of the condition of similar recently completed USAID-funded projects when performing future 611(e) certifications of construction projects there.

Response: The Mission agrees with the RIG's recommendation. It is worth noting that since the beginning of FY 2014, the Mission has been utilizing the services of a local audit firm to monitor the implementation of Mission's activities in Gaza. In light of the recent expanded assistance to Gaza, the Mission is in the process of developing tailored third-party monitoring to be performed by El Wafa Company on the newly awarded programs in the infrastructure office. The Mission also is proceeding with plans to hire two new USAID locally employed staff engineers in Gaza to provide the Mission with on the ground monitoring of the construction activities. USAID is installing cameras at some new construction sites, which will enable staff to monitor progress. In addition, contractors submit construction material requirements into the Gaza Reconstruction and Materials Monitoring System (GRAMMS); these requests are reviewed by the Palestinian and Israeli governments.

In addition, by no later than September 30, 2016, the Mission will amend Mission Order 202 to (1) include modified procedures to oversee construction programs in Gaza, given the restrictions on travel to the area, and (2) require an evaluation of the condition of similar recently completed USAID-funded projects when performing future 611(e) certifications of construction projects there, which is current practice.

Recommendation No. 7

We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the six recommendations related to isolated and systematic cooperative agreement issues identified in the U.S. Army Corps of Engineers technical report, and (2) include actions to implement these recommendations and justifications for deviations.

Response: The Mission agrees with the RIG's recommendation. By no later than September 30, 2016, the Mission will develop and implement an action plan to (1) review the six recommendations related to isolated and systematic cooperative agreement issues identified in the U.S. Army Corps of Engineers technical report, and (2) include actions to implement these recommendations and justifications for deviations.

Recommendation No. 8

We recommend that USAID/West Bank and Gaza amend Mission Order 202 to require an architectural and engineering firm to oversee construction programs implemented under cooperative agreements.

Response: The Mission agrees with the RIG's recommendation. By no later than September 30, 2016, the Mission will amend Mission Order 202 to require that recipients of cooperative agreements that have a construction element contract the services of an architectural and engineering firm to oversee their construction activities implemented under their award. This requirement will not apply to renovation works, such as painting, replacing windows, and other minor non-structural works.

Recommendation No. 9

We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 68 site-specific recommendations documented in the U.S. Army Corps of Engineers technical report for project sites completed under programs that have ended, and (2) to include actions to implement these recommendations and document justifications for deviations.

Response: The Mission agrees with the RIG's recommendation. The Mission has prepared the requested action plans for the Infrastructure Needs Program I (INP I) and EWAS II recommendations (Attachments L and M). The required actions were communicated to partners implementing our current programs to ensure that these recommendations are applied for on-going and future projects. Partner confirmations were received from Black & Veatch on December 15, 2015, and from ANERA on December 18, 2015. The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 10

We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 51 recommendations documented in the U.S. Army Corps of Engineers technical report specific to Infrastructure Needs Program Phase II and Local Construction Program *projects, and (2) include actions to implement these recommendations and document justifications for deviations.*

Response: The Mission agrees with the RIG's recommendation. The Mission has reviewed the 51 recommendations for the Infrastructure Needs Program II (INP II) and has developed the attached action plan (Attachment N). This action plan includes actions to implement the recommendations and documents justifications for deviations. The required actions were communicated to the partner to ensure that these recommendations are implemented for on-going and future projects, and the partner's confirmation was received by the Mission on December 15, 2015. The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 11

We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 65 recommendations documented in the U.S. Army Corps of Engineers technical report specific to Local Government and Infrastructure Program projects, and (2) include actions to implement these recommendations and document justifications for deviations.

Response: The Mission agrees with the RIG's recommendation. The Mission has reviewed the 65 site specific recommendations documented in the USACE technical report for the Local Government and Infrastructure (LGI) Program and has developed the attached action plan (Attachment O). This action plan includes actions to implement the recommendations and documents justifications for deviations. The required actions were communicated to the partner to ensure that these recommendations are implemented for on-going and future projects, and the partner's confirmation was received by the Mission on December 15, 2015. The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 12

We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the 21 recommendations documented in the U.S. Army Corps of Engineers technical report specific to Palestinian Community Infrastructure Development Program projects, and (2) include actions to implement these recommendations and document justifications for deviations.

Response: The Mission agrees with the RIG's recommendation. The Mission has reviewed the 21 site specific recommendations documented in the USACE technical report for the Palestinian Community Infrastructure Program and has developed the required action plan (Attachment P). This action plan includes actions to implement the recommendations and documents justifications for deviations. The required actions were communicated to the partner to ensure that these recommendations are implemented for on-going and future projects, and the partner's confirmation was received by the Mission on December 18, 2015. The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 13

We recommend that USAID/West Bank and Gaza develop and implement an action plan to (1) review the recommendation related to systematic seismic issues identified in the U.S. Army Corps of Engineers technical report, and (2) include actions to implement this recommendation and justifications for deviations.

Response: The Mission agrees with the RIG's recommendation. The Mission reviewed the recommendation related to the systematic seismic issues identified in the U.S. Army Corps of Engineers technical report. The Mission agrees with the recommendation to consider actions to assist in the development of in-house and local expertise in the area of seismic design of buildings. The Mission has already developed a scope of services for its architecture and engineering contractor (Black & Veatch) to assist in the transition to the International Building Code (IBC) and to develop the required expertise (Attachment Q). This work is currently on-going and is expected to be finalized by summer 2016. In addition, as part of the scope of work, Black & Veatch has researched the availability of seismic maps and has found that there are maps available that meet the seismic return periods for designing to IBC 2012, which is the version of code that Black & Veatch recommends for use by the Mission due to the availability of training materials (many states in the U.S. have not yet adopted IBC 2015). The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 14

We recommend that USAID/West Bank and Gaza develop and implement an action plan to help its implementing partners with educational and training programs to improve their ability to comply with the International Building Code's seismic standards.

Response: The Mission agrees with the RIG's recommendation. The Mission has developed a scope of services for its architecture and engineering contractor (Black & Veatch) with actions needed (including the training components) to help implementing partners comply with the IBC's seismic standards (Attachment Q). The Mission requests that this recommendation be closed upon issuance of the final report.

Recommendation No. 15

We recommend that USAID/West Bank and Gaza develop and implement an action plan to ensure that all sites currently under construction or in the design phase under the Local Government and Infrastructure and Palestinian Community Infrastructure Development Programs meet the building code requirements outlined in the mission's May 30, 2014, memo.

Response: The Mission agrees with the RIG's recommendation, as well as with the importance of complying with seismic standards. Following the issuance of the Mission's action memo on building code requirements, the Mission confirmed with all partners that they were complying with the Universal Building Code (UBC) 97 for seismic, as required in the memo for the 18-24 month transition period to the IBC.

Pursuant to its issuance of the memo, the Mission developed a system to review the design proposed by the Local Government and Infrastructure and Palestinian Community Infrastructure Development Programs to ensure compliance with the subject notice, specifically with UBC 97. The system in place entails reviewing the structural report to check for compliance with the UBC 97. The Mission's engineer checks that the design parameters include the correct seismic zoning and that relevant factors are considered and incorporated in the structural design, as per the UBC 97 requirements. Please refer to the samples (Attachment R) of the Mission's review comments, as well as the partner's comments, which confirm the same.

In addition, for some projects designed under the Local Government and Infrastructure Program, a peer review is conducted by a third party engineering center - Earth Science and

Seismic Engineering Center Team - to confirm that the proposed design conforms to UBC 97 design best practices. Attached please find samples of peer review documents (Attachment S).

Construction activities are implemented in accordance with design documents that comply with UBC 97. The Mission's engineers conduct periodic visits to construction sites to confirm that construction activities are implemented in accordance with pre-approved designs. The Mission requests that this recommendation be closed upon issuance of the final report.

Attachments:

A- Abboud/Al Aref email dated December 7, 2015.
B- Rantissi/ Abu Hijleh email dated December 7, 2015.
C- USAID/WBG’s letter to Ash Sheikh Sa’d Village Council dated December 15, 2015, and letter to the Palestinian Ministry of Health dated December 4, 2015, and related communications.
D- Ministry of Education’s receipt of computers provided to Qira Primary Co-educational School.
E- Photos of Qira School computer lab.
F- Ministry of Public Works and Housing letter dated November 12, 2015.
G- Ministry of Public Works and Housing notices for road maintenance.
H- Power outage equipment for new water projects in Gaza.
I- List of spare parts for new water projects in Gaza.
J- Black and Veatch modeling confirmation.
K- Al Ahli Hospital CEO’s email dated November 4, 2015.
L- INP I action plan.
M- EWAS II action plan.
N- INP II action plan.
O- LGI action plan.
P- PCID action plan.
Q- Scope of services for the International Building Code (IBC) implementation support.
R- USAID/WBG’s design review comments and responses samples.
S- Design peer review samples.

U.S. Army Corps of Engineers Technical Report

U.S. Army Corps of Engineers
Ft. Worth District/Northwestern Division

USAID AUDIT-WEST BANK, ISRAEL

May 5, 2015

Table of Contents

Date: 5 May 2015

From: [redacted], P.E., US Army Corps of Engineers, Northwestern Division, [redacted] P.E., US Army Corps of Engineers, Fort Worth District

To: [redacted] USAID/West Bank and Gaza Mission

Subject: Internal audit of USAID construction projects in the West Bank, Israel

Field Inspection Dates: January 26-Febuary 4, 2015.

Names of Internal Auditors: [redacted] P.E., US Army Corps of Engineers, [redacted] P.E., US Army Corps of Engineers

Introduction

The USAID/OIG has retained the US Army Corps of Engineers to assist with the evaluation of selected completed construction sites and sites where construction is in progress. The intent of this report is to provide an unbiased description as to whether compliance to standard building codes and the standard of care or usual practices of design and construction of infrastructure projects that have been planned and funded under USAID has been met. In addition, the USACE audit team has evaluated the following:

1. The effectiveness in existing best practices for reviewing design documents. This includes internal review procedures and use of 3rd party contractors.
2. Observations of projects completed by contractors vs. cooperative agreements
3. A list of isolated problems and a list of systematic problems
4. Identify problem areas and draft recommendations
5. Prepare disclaimers and qualifications as necessary

In conjunction with USAID, the USACE audit team performed and documented site investigations, made sketches, wrote narratives, took measurements, identified pertinent structural members and took photographs as needed to adequately describe observed conditions. In addition, the USACE audit team interviewed witnesses and involved parties or people knowledgeable of local or site conditions to determine if quality assurance practices were in place and operating effectively.

The procedures that were followed by the USACE audit team involved gathering data that included obtaining original construction drawings and specifications. It also included determining the building code used and the standard of care or usual practices at the time of original design.

Great care has been taken to report only on what was actually observed, tested, or analyzed and without general speculation about unknowns unless the USACE audit team possessed a high degree of certainty based on education, training, or prior experience. USAID/OIG understands that there are unknowns, i.e. areas not accessible for observation, unavailable drawings, missing or lost documents, etc. that may prohibit a complete evaluation of conformance to required standards.

This assessment is based on guidelines provided from the Council of American Structural Engineers – CASE 962A-National Practice Guidelines for the Preparation of Structural Engineering Reports for Buildings (Revised 2012).

Photos

Photographic documentation is located in “Appendix A, Photos” of this report.

Relevant Codes and Standards

USAID issued an action memorandum dated 30 May 2014 that recommend adaption of the International Building Code (IBC) 2012 version. IBC would apply to all buildings designed and constructed within the next 18 months (Nov 2015). In the interim, all design and construction must meet Unified Building Code (UBC) 1997 requirements. For this audit, the code and standard used for evaluation is the 1997 UBC. The relevant codes and standards referenced by the 1997 UBC are as follows:

1. ASCE 37, Design Loads on Structures During Construction
2. AASHTO, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011
3. American Concrete Institute (ACI) ACI 318, Building Code Requirements for Structural Concrete
4. CRSI Manual of Standard Practice 28th Edition by Concrete Reinforcing Steel Institute. 2009.
5. PCI MNL-120, PCI Design Handbook 7th Edition by Precast/Prestressed Concrete Institute. 2010.
6. ACI 530/530.1, Building Code Requirements and Specifications for Masonry Structures
7. ANSI/AISC 360, Specification for Structural Steel Buildings, by American Institute of Steel Construction. 2010.
8. AISC 325, Steel Construction Manual, 14th Edition by American Institute of Steel Construction. 2011.
9. American Institute of Steel Construction (AISC) AISC 303, Code of Standard Practice for Steel Buildings and Bridges
10. AISC 341, Seismic Provisions for Structural Steel Buildings
11. American National Standards Institute (ANSI). Safety in Welding, Cutting, and Allied Processes, Z49.1
12. American Welding Society (AWS) AWS D1.1, Structural Welding Code - Steel

Summary

There are several projects that are well done and show consistent and competent management. These include the rehabilitation of roads in Sinjil, Baga Ash Shargiy, ‘Arab ar Rashayida, Wadi Albalat and Wadi Al Nar. Also included is the construction of roads in Mirka-Al Jarba, Der Sharaf and Beit Wazan, the construction of sewers in Qalqilya, the reservoir construction in Dura-Sinjir, construction of the Community Center in Sinjil, Construction of a health Center in Ash Sheikh Sa'd, and Ramallah and construction of the secondary boys school in Hindaza and Bureid'a .

In most cases, the audit committee found the Engineer partners performing work for USAID are well educated and have impressive experience and backgrounds. They have an excellent understanding of construction, geotechnical and earthwork requirements, material requirements, control of compaction and density of soils, quality testing and selection of aggregates, concrete and asphalt mix design and concrete additives. Most are very skilled in the areas of concrete and masonry design and construction management.

The audit team did find areas where there was a lack of consistent code application and interpretation, a lack of trained designers, lack of quality management, and lack of adequate load transfer in seismic design.

Findings of Isolated and Systematic Deficiencies

The audit team was tasked with identifying isolated and systematic deficiencies. Isolated deficiencies are defined as deficiencies that tend to happen randomly with no meaningful pattern. Systematic deficiencies are defined as deficiencies that occur on a regular basis with a meaningful pattern. When systematic deficiencies are found in the audit sample, there is a reasonably probability the non-audited population has a similar number and type of deficiencies. For this audit, the USACE audit team was provide a sample of 58 projects to examine.

Isolated Deficiencies

1. USAID - Inconsistency in technical expertise due to attrition, turnover and workloads. Because of this, designs are sometimes reviewed by individual engineers who may lack expertise in critical areas. This makes it difficult to develop and maintain a strategy in filling gaps of technical expertise (e.g., electrical and structural engineering).

   Recommendations – Identify areas of needed expertise and develop a strategy to obtain the necessary skill sets when needed (e.g., add staff, identify reach-back capability within USAID, contract employees, reach out to other agencies, etc.)

2. Engineer Partners/Contractors - Inconsistent performance of work. There is some inconsistency in the in the selection and performance of design professionals and Contractors. These inconsistencies range from design (inadequate reinforcing and detailing, incorrect loading assumptions) to construction (placement of reinforcing, lap splices and stirrups. Installation of plumbing features). Examples of inconsistent experience in design and performance of work include:

    a. Storm Water Drainage System at Qabatia Township
    b. Construction of Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School

c. Renovation of the Postnatal Section at the Holy Family Hospital
d. Construction of Bethlehem Old Market
e. Construction of Al Zababida-Raba-American University Road

Systematic Deficiencies

1. USAID - There is inconsistency in performance of cooperative agreements due to lack of definitive language in the scopes of work. This inconsistency in performance includes an inability to track jobsite liability issues, monitor design and construction for errors and omission issues and track requirements for standard of care. Of the 58 projects inspected, 32 projects were awarded as cooperative agreements. Most of these projects consisted of schools, community centers, sewage collection networks, wells, health centers, a hospital ward and some roads. The remaining 26 projects were primarily road design and construction projects and were awarded with defined scopes and plan requirements. Examples of inconsistency in performance of cooperative agreements are as follows:

    a. Cooperative agreements do not specify which codes will be used for structural design, welding, roadwork, etc.
    b. There is a lack of interim reviews of the design work.
    c. There is little or no control in design or construction activities.
    d. Because of limited staffing, security, and agreement restrictions, USAID has limited involvement with a project.
    e. There is no method for systematically tracking the performance of Engineering partners and Contractors.
    f. There is little or no control or oversight in construction cost increases and schedule delays.

    Recommendations – Modify the language in the scope of services for cooperative agreements to include the following:

    a. Specify which codes will be used for structural design, welding, roadwork, etc. If multiple codes are used, describe what provisions will be allowed.
    b. Require interim reviews of 30%, 60%, 90% and 100% completion for design work. Each review should be followed by an approval before subsequent design work can take place.
    c. Provide language that exerts greater control in construction activities. This should include monitoring, reviewing and approving RFI's, change orders, cost increases and schedule changes.
    d. Clarify the responsibilities of design professionals and contractors. This should include language in the scopes of work that outlines requirements for standards of care, responsibilities for errors and omissions, and jobsite liability.
    e. Develop a performance rating system for Grantees, Engineering partners and Contractors to be used in the section of services for future projects.

2. USAID –The Engineering partners working with USAID are having difficulty transitioning to the new seismic standards in the IBC. There is a need for a comprehensive plan to improve seismic design and implementation of new code requirements through cooperative outreach of educational and training programs with the Engineering partners.

    Recommendations-USAID should consider actions to assist in development of in house and local expertise in the area of seismic design of buildings based on IBC 2015, ASCE7-10 and ASCE 41-13 requirements. A course should be sponsored that is based on the design of new buildings and the analysis and retrofit of existing buildings, the design and analysis of non-building structures and the design and analysis of building components and their anchorages such as piping, HVAC equipment, electrical components, masonry infill walls, etc. This course should contain lectures and materials to train Engineers in the areas of seismic design criteria, seismic design procedures, and design of structural elements that include diaphragms, walls, frames, masonry, mechanical, electrical, architectural elements and utilities.

At this time, the existing seismic requirements for buildings are based on UBC 1997 criteria. For seismic design, the probabilistic seismic hazard map used in the West Bank is based on a return period of 10% in 50 years, or 475 years. IBC 2015 directly references ASCE 7 requirements for seismic design and evaluation. ASCE 7 requires the design ground motions be based on a maximum considered earthquake (MCE) with a return period of 5% in 50 years, or 2,475 years. ASCE 7 also requires building designs be evaluated using short term and long duration spectral accelerations along with consideration of soil site conditions. There has been no development of a hazard map that provides this information in the West Bank at this time. In the past, USAID and USGS have served as sponsors and partners in the development of a report titled “Earthquake Hazard Assessments for Building Codes”, 2007. Figure 13 of this report shows a proposed seismological hazard map that show peak ground accelerations that corresponds to a return period of 10% in 50 years, or 475 years. USAID should consider providing outreach assistance in developing a hazard map, based on ASCE 7-10 design requirements, that shows maximum considered ground motions for spectral accelerations of 0.2 and 1seconds with a probability of exceedance of 5% in 50 years, or a return period of 2,475 years.

3. USAID – Mix of highway design standards. There are no specific guidelines or consistency in the application of road design and construction standards in the scopes of work for highway projects. A combination of three standards is used for highway construction for USAID projects. They are as follows:

    a. The Hashemite Kingdom of Jordan, Ministry of Public Works & Housing, Specifications for Highway and Bridge Construction
    b. The Public Works Department of Israel
    c. AASHTO, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011

    Interviews were conducted with USAID personal and their Engineering partners. Each was asked about what specifications, standards and guidelines were used for geometric layout, design and construction of highways. The three specifications shown above were cited by various Engineering partners, however none could explain what specific provisions from each standard was used for any aspect of design and construction and how they all tie together. At this time, each of the Engineering partners interprets the standard requirements differently.

    Recommendations –Define in the highway scopes of work, the standards and applicable provisions that are needed for general layout, geometric design, signage, construction requirements and acceptance standards so that all of the Engineering partners are performing a consistent quality of work.

4. Engineer Partners - Application of updated seismic criteria. Engineering partners do not have the experience, training and design tools to transition to adaption of the 2015 International Building Code (IBC)/ ASCE 7-10. The existing seismic requirements for buildings are based on requirements in UBC 1997. The probabilistic seismic hazard map used in the West Bank for seismic design is based on a return period of 10% in 50 years, or 475 years. IBC 2015 directly

references ASCE 7 requirements for seismic design and evaluation. ASCE 7 requires the design ground motions be based on a maximum considered earthquake (MCE) with a return period of 5% in 50 years, or 2,475 years. ASCE 7 also requires building designs be evaluated using short term and long duration spectral accelerations along with consideration of soil site conditions. There has been no development of a hazard map that provides this information in the West Bank at this time.

Recommendations – See Systematic Deficiencies, Recommendation #2.

5. Engineer Partners - Lack of understanding and oversight of steel design, bolted connections and welded connection design and construction. The majority of Engineer partners working for USAID do not have sufficient experience in steel design and design of bolted and welded connections. There is also inadequate quality control and visual inspection of welds. Projects with examples of incomplete and incorrect steel design and construction work includes:

    a. Storm Water Drainage System at Qabatia Township
    b. Addition to Al-Buweib Coeducational School
    c. Bil'in Water Reservoir Project
    d. Construction of Bethlehem Old Market
    e. Construction of Secondary Girls School in Aqqaba

    Recommendations – Include language in the scopes of work for review and approval of qualifications that show that Engineering partners have personnel experienced in steel design. The qualifications need to show that Engineers have taken, and passed a course in the design of steel structures at an approved university. The coursework should include principles of structural steel design, material properties, design of tension and compression members, design of structural fasteners, design of welds, design of laterally supported beams, effects of torsion and lateral torsional buckling of beams, design of plate girders, design of beam columns, design of braced, unbraced and rigid frames and design of composite steel members.

6. Engineer Partners – Design of building diaphragms. There are inconsistencies in correctly designing and applying the concepts of load transfer into building diaphragms, understanding of lateral force resisting systems, load transfer into drag struts, ties and collectors (or equivalents). The typical floor and ceiling design used in most buildings constructed for USAID is a combination of concrete beam and block configuration held in place with friction only, there is no interlocking mechanism to prevent the blocks from falling out if there is any excessive deflection from loads or movement due to seismic events (see Appendix A, February 2015, Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School, photos 1- 4). The floors and ceilings have limited capability to act as a shear panel to transfer in-plane shear loads or to resist tension and compression forces. The result of this is that the roof and floors will not be able to behave as a structural diaphragm and transfer seismic loads per 1997 UBC chapter 16 requirements. This also means that because there is no interlocking mechanism, anchorages or restraints connecting the floor blocks, there is a risk for collapse of ceiling and floors during a seismic event. Projects with examples of deficient diaphragm design includes:

    a. Construction of Multipurpose Hall in Al Yamun
    b. Construction Qalqiliya Girls Secondary School
    c. Addition to Al-Buweib Coeducational School
    d. Construction of Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School

Recommendations – See Systematic Deficiencies, Recommendation #2.

7. Engineer Partners – Lack of reinforcing in masonry infill walls. None of the infill walls inspected at USAID projects were reinforced or anchored into the CIP concrete reinforced frames. Infill walls in buildings are used to help resist lateral loads due to heavy wind and seismic loading. The frame and infill wall needs be connected to behave like a shear wall and serve as a diagonal compression strut between the intersections of the frame members. Unreinforced masonry infill walls will not fully engage the framing and the capacity of the diagonal compression struts will not be developed. Buildings with unreinforced masonry are inherently brittle and have limited ductility. They rely on friction and overburden from supported loads and wall weights and have highly variable material properties. During an earthquake, the strength and stiffness of an unreinforced wall degrades with each cycle of response to motions and are more vulnerable to incremental damage. This also means that there is not sufficient shear strength and ductility of the concrete columns to resist racking of the unreinforced infill, and that there is a strong risk for collapse of the infill walls during a small to moderate seismic event. Projects with examples of unreinforced masonry infill wall design includes:

    a. Construction of Multipurpose Hall in Al Yamun
    b. Construction Qalqiliya Girls Secondary School
    c. Addition to Al-Buweib Coeducational School
    d. Construction of Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School
    e. Construction of a Secondary Boys school in Hindaza and Bureid'a
    f. Construction of Anab Al-Kabir Co-educational School
    g. Construction of El Ezzariah 8 Classrooms

8. Engineer Partners – Inadequate seismic evaluation of existing buildings. All of the USAID building additions and alterations inspected were designed and constructed with no consideration or evaluation of seismic loads acting on new construction. Existing buildings that are structurally altered, additions built onto or adaptive reused need to undergo a seismic evaluation and if necessary, retrofitted to meet performance objectives. Projects with examples of inadequate seismic evaluation of existing buildings includes:

    a. Addition to Al-Buweib Coeducational School
    b. Addition to El Elzdriah School

    Recommendations – See Systematic Deficiencies, Recommendation #2.

9. Engineer Partners – Inadequate oversight of construction activities.

    a. Construction of Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School
    b. Construction of Bethlehem Old Market

    Recommendations – Include language in the scopes of work that clarifies the role of the Contractor to perform construction work, develop and implement a quality control plan and meet contract milestones. USAID should consider hiring the services of an independent resident Engineer with construction and supervision experience to provide acceptance of work and direction of re-work to insure contract compliance with plans, specifications, construction documentation and as-built records. The resident Engineer should also provide receipt, review and direction of submittals, RFI's, field memos and change order requests.

10. Engineer Partners/Contractors – There are several areas where the materials and workmanship quality are poor on a recurring basis. The reason may be due to locally accepted materials or practices, and are reflected in the construction in place even when the contract plans indicate an internationally recognized standard.

    a. Flashing at roof and parapet. Many of the building have a problem with moisture in the walls. One of the primary causes is poor practices in flashing and coping on the roofs.
    b. Paint quality. In several of the completed new construction, renovations and refurbishment projects there is paint peeling or flaking from the walls and metal works. In some cases, moisture in the walls is causing the problem. However, in other cases there is poor surface preparation or poor adhesion of the paint to the subsurface.
    c. Paint striping on pavement. The paint stripes are wearing away on several projects. This appears to be the result of paint quality and/or thickness.
    d. Low grade fixtures and appurtenances in clinics and hospitals. Residential grade fixtures and appurtenances have been installed in the restrooms of some of the clinic and hospital projects. Public facilities require industrial strength fixtures and medical facilities require fixtures and appurtenances that can withstand high use and are easily sanitized. Section 422 of the International Plumbing Code, Health Care Fixtures and Equipment.
    e. Concrete curing methods. The only curing method observed in the on-going projects was wet curing, covering the surface with burlap. While this method may be successful for horizontal concrete element, if carefully monitored to remain wet, it is not reasonable to expect wet curing to be effective on vertical elements. The burlap dries quickly and in many cases does not contact the concrete surface to hold the moisture in even when the burlap is wet. This results in surface cracks appearing due to drying, as observed in several projects.
    f. Form work, chamfer strips and false work quality. It was evident on several projects by the cast in place concrete that the form work, chamfer strips or false work had moved during placement. This can result from a failure in the form design or construction to handle the lateral loads of wet concrete, unacceptable materials being used as forms and false work, or a failure to inspect forms prior to concrete placement.
    g. Expansion joints and joint covers. The construction of expansion joints and application of sealant is most often not as detailed in the plans, including the expansion joint materials, depth, use of backer rods and application of sealant. In all cases were plans were available for review, expansion joint covers were detailed which are specifically designed for expansion joints and permits independent movement. In the buildings which were inspected, the expansion joint covers were constructed with thin strips of metal anchored to the wall on one or both sides of the joint with screws.

    Recommendations – Modify the language in the scopes for contracts and requirements for cooperative agreements to include the following:

    a. Ensure the materials and workmanship are designed to international standards (e.g.- International Building Code) and described adequately in the specifications.
    b. Use construction management methods for quality control to ensure the designed level of quality is met during construction

Inspection Date: 26 Jan 2015

Location: Hebron

Inspector: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Project: Anab Al-Kabir Elementary Co-Educational School

Program: EWAS II

Description: Additional classrooms and upgrading of the water and sanitation facilities at Anab Al-Kabir Co-educational school

Description of Structure

The work involved adding a second floor to a one-story concrete structure and renovating the sanitation facilities. The design and construction of the Anab Al-Kabir Co-educational school addition is completed. The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams. The design and construction of the floor and roof diaphragms is unknown.

Background: This work was completed in 2012. No plans were made available for this project.

Discussion of Findings

Field Observations

1. The paint is not adhering to walls in several locations (photo 1, 3, 4, 6, 10, 11, 13).
2. Metal works are rusting (photo 1, 5, 14).
3. The plaster is cracking at the masonry to column connections (photo 2, 12).
4. There are broken and missing drain grates (photo 3, 12).
5. A downspout is missing (photo 4).
6. Plaster is cracking on walls and at the parapet (photo 4, 6, 7, 9, 10).
7. There is no flashing at the parapet walls (photo 6, 7, 8, 9, 10).
8. The plaster and caulk is cracking at windows (photo 14).
9. Furniture is stored on roof (photo 8).

Isolated Deficiencies

1. Broken and missing drain grates.
2. Missing downspout.
3. Furniture stored on roof

Systematic Deficiencies

1. Paint peeling and flaking from walls.
2. Rusting metal works.
3. Plaster cracking at the masonry to column connections.
4. Plaster cracking on walls and at the parapet.
5. No flashing at the parapet walls.

6. Plaster and caulk cracking at windows.
7. Furniture stored on roof.

Recommendations

1. Paint sections of wall where it is needed. Select appropriate paints and ensure walls have been prepped appropriately before applying paint.
2. Ensure metal works are primed and painted per plans and specs or building code.
3. Ensure anchors are designed and constructed connecting CMU and concrete columns.
4. Ensure drain grates are of a permanent quality and are installed in accordance with the manufacturer's recommendations.
5. Ensure supports for vertical piping such as downspouts are provided per plans and specs or building code.
6. Ensure plaster and waterproofing (flashing, caulk, etc.) are installed per plans and specs or building code
7. Ensure flashing is installed per plans and specs or building code
8. Ensure caulk and plaster is installed per plans and specs or building code to prevent moisture intrusion at windows

Inspection Date: 26 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Hebron

Project: Rehabilitation Works for Al Fawwar Club

Program: LGI

Description: The project included general maintenance of the building, painting, installation of windows, installation of doors, construction of concrete screed and roof insulation.

Description of Structure

The work for this project did not add to or alter the building structure. The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block. The design and construction of the floor and roof diaphragms is unknown.

Background

The project was inspected for quality of the materials and completed work. As-built and tender drawings were provided for this project.

Discussion of Findings

All work and installations appeared to be at an acceptable level of quality.

Field Observations

1. No deficiencies were observed.

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

1. No comments.

Inspection Date: 26 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Hebron

Project: Rehabilitation Works for Khursa Secondary Boy's School

Program: LGI

Description: The project included painting school corridors, windows, doors and external columns. External works consisted of painting and marking the school playgrounds, construction of a sunshade, retaining walls, and flower boxes. Additionally, external works included the construction of stairs between upper and lower playgrounds, tiling works, and installation of an external fence.

Description of Structure

The work for this project did not add to or alter the building structure. The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block. The design and construction of the floor and roof diaphragms is unknown.

Background

The painting and external works were inspected for quality of materials and completed work. As-built and tender drawings were provided for this project.

Discussion of Findings

The quality of paint or paint preparation appears to be problematic.

Field Observations

1. Paint is peeling or flaking in numerous locations (Photos 1-6)

Isolated Deficiencies

1. None noted.

Systematic Deficiencies

1. The paint is not adhering to surfaces even though the project was completed less than one year ago. This may be the result of poor surface preparation, paint selection and/or workmanship.

Recommendations

1. Ensure surfaces are properly prepared and primed, if necessary, paints selected appropriately for surfaces and applied in accordance with manufacturer's recommendations.

Inspection Date: 26 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Hebron

Project: Completion and Finishing of Luqman Al-Hakim Elementary Co-educational School

Program: LGI

Description: The project consisted of finishing works for the existing school structure to have four classrooms, one administration room, one teachers' room, in addition to finishing works for the existing water cistern and the sanitary unit. The project also included construction and finishing of a library, canteen, staircase and a septic tank as well as school roof insulation and other external works related to rehabilitation of a playground, boundary and retaining walls.

Description of Structure

The work for this project did not add to or alter the building structure. The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block. The design and construction of the floor and roof diaphragms is unknown.

Background

As-built and tender drawings were provided

Discussion of Findings

The building interior and roof were inspected. The primary issues discovered in this inspection were related to paint not adhering to walls and improper installation of flashing.

Field Observations

1. Missing door strikes (photo 1)
2. Missing and bent anchor bolts (photo 2)
3. Paint not adhering to walls (photos 3, 5, 6, 16, 17)
4. Improper installation of flashing at parapet walls (photos 4, 5, 6, 7, 10, 11, 12, 13, 14, 15)
5. Plaster cracking at parapet (photos 7, 8)
6. Missing roof drain grate (photo 12)

Isolated Deficiencies

1. Missing roof drain grate. Missing drain grates can permit trash and rodents to enter the drain line and possibly cause clogging.

Systematic Deficiencies

1. Missing door strikes. Most door frames have nothing more than holes cut in the frame for latching. It is possibly a common industry practice to not install strike plates.
2. Missing and bent anchor bolts. For each sun shade there are bent or missing anchor bolts.
3. Paint peeling and flaking. The paint is not adhering to surfaces even though the project was completed less than one year ago. This may be the result of poor surface preparation, paint selection and/or workmanship.
4. Improper installation of flashing at parapet walls. The flashing at the parapets on the roof is not correctly installed. This permits water to enter at the parapet capping and at the seam between the asphalt membrane and plastered parapet.
5. Plaster cracking at parapet. Cracks are appearing in external plaster. One possible cause is improper flashing at parapet.

Recommendations

1. Add strike plates to door hardware schedule, especially when using higher quality hardware.
2. Ensure anchors are design and constructed for connection to walls and that the walls are designed and constructed to provide for required anchorage.
3. Ensure surfaces are properly prepared and primed, if necessary, and paints selected and applied appropriately for surfaces.
4. Ensure flashing is installed per plans and specs or building code.
5. Ensure plaster and flashing are performed per plans and specs or building code.
6. Ensure drain grates are of a permanent quality and are installed in accordance with the manufacturer's recommendations.

Inspection Date: 26 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Hebron

Project: West Hebron Water Supply Projected – Distribution Piping for Beit Awwa and Al Kom

Program: INP I

Description: This project consisted of a 12.045 km distribution network for Beit Awwa and a 35.212 km distribution network for Al Kum. It includes the installation of steel and ductile pipes with diameters of 25mm, 75mm, 100mm and 150mm, in addition to the construction of all the related valve chambers. A water reservoir was also constructed under this project.

Description of Structure

The reservoir is a reinforced concrete structure.

Background

This project was completed in November 2010. As-built drawings were provided for review.

Discussion of Findings

A several valves in manholes were inspected, along with the water reservoir. There were no significant deficiencies identified. The overall quality of the construction appears to be good.

Field Observations

1. Unpainted weld on valve (photos 1, 4)
2. PVC conduit and plastic j-box designed may not be designed for exterior use (photo 2)
3. Water in manhole (photo 3)

Isolated Deficiencies

1. PVC conduit and plastic j-box. Many plastics, when exposed to the sun, will oxidize, become brittle and break
2. Water in manhole. This is a sign of a possible water leak

Systematic Deficiencies

1. Unpainted weld on valve. Lack of paint will permit corrosion on at the welds.

Recommendations

1. Ensure metal works are primed and painted per specs or code.
2. Ensure j-boxes and conduit are selected appropriately for their environment and application.
3. Check the manhole during the dry season to determine if the water is due to rainfall or a leak in the water line. Another method is to check the water in the manhole for chlorine, an indicator of treated water.

Inspection Date: 26 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Hebron

Project: Nuba Tarqumia Water System

Program: INP I

Description: This project consists of rehabilitation of the 1000 m3 Tarqumia reservoir, the construction of the 1000 m3 Beit Ula reservoir, an 11.22 km transmission main pipeline and an 18.346 km Tarqumia distribution network.

Description of Structure

No structures were inspected.

Background

This project was completed in 2009. Tender drawings were provided for review.

Discussion of Findings

One valve and manhole were inspected.

Field Observations

1. No deficiencies were observed

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

1. No comments.

Inspection Date: 27 Jan 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Northwestern Division
[redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Jenin

Project: Construction of Sanur Well Pump Station

Program: INP II

Description: CIP Reinforced Concrete Construction of Well Pump Buildings

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Description of Structure

The Sanur Well Pump Station is designed as a series of CIP reinforced concrete structures, reservoir, pump equipment and electrical wiring (see photos 1-4). The buildings were the only structure completed during this phase. All other mechanical and electrical equipment was temporary.

Background

Questions were asked regarding design and use of building codes. Plans, specifications and geotechnical and environmental reports were provided for this project. An inspection of the construction site followed afterwards.

Discussion of Findings

With some exceptions, construction is proceeding according to correct application of building codes, design and construction.

Field Observations

2. The water stops that were installed need to be cleaned of the concrete and laitance on the surface (see photo 5).
3. There was no observed horizontal reinforcing steel in the construction of the retaining wall (see photo 6).
4. Some of the pipe welds were visually inspected and appeared adequate, however the inspector on site stated that all welds were non destructive tested (NDT) using radiographic testing (RT), ultrasound testing (UT) and 100% visually inspected (see photo 7). The bottom of the pipe had all of the slag in place, so 100% visual inspection could not be done. There was no sign of RT and UT reports or any construction that indicated an RT test could be made.
5. Plank formwork is being used for structural concrete. The structural concrete, where it is being cured, is being water cured using draped burlap. Some areas lack any curing effort (see photos 8-11).

Isolated Deficiencies

Incorrectly installed waterstops.

Systematic Deficiencies

2. No horizontal reinforcement in the building wall per American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete, Section 14.3.3.
3. Inadequate quality control and NDT of welds per AISC 325, Steel Construction Manual, 14th Edition by American Institute of Steel Construction. 2011, and American Welding Society (AWS) AWS D1.1, Structural Welding Code – Steel requirements.
4. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.
5. Using plank formwork instead of panels which conform to the specifications. Section 03100-Concrete Formwork, 2.1.A, states that formwork for walls will be Steel, fiberglass, or plywood panel material
6. Using curing methods which are not in compliance with the contract. Section 03300-Cast-in-Place Concrete, 2.2-Curing Materials specify approved curing materials and methods.

Recommendations

2. Clean waterstops prior to placing concrete.
3. Install horizontal reinforcement in the building wall per ACI 318, Building Code Requirements for Structural Concrete, Section 14.3.3.
4. Review site supervision and ensure adequate and qualified supervision and quality management personnel are providing oversight of the project.
5. Remove plank formwork from the job site and use panels which comply with the contract.
6. Remove burlap curing material from the job site and use curing methods and materials which comply with the contract.

Inspection Date:	27 Jan 2015
Location:	Jenin
Inspectors:	[redacted] P.E., US Army Corps of Engineers, Northwestern Division P.E., US Army Corps of Engineers, Fort Worth District
Project:	Mirka-Al Jarba Road
Program:	INP II
Description:	Construction of Mirka-Al Jarba Road

Description of Roadway

The Mirka-Al Jarba Road is outside of Jenin in the North West Bank area (see photo 1). The lanes are approximately 8'-6" (2.6 m) wide with sections of CIP concrete ditch liners and sections of rubble stone retaining walls.

Background

Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design and pavement placement. A meeting was also held with Engineers at the Black & Veatch office on 3 Feb in Ramallah to discuss QA/QC standards, design, compliance to applicable codes and standards and inspect standard drawings and designs. Black & Veatch is one of the primary engineering partners performing roadway design for USAID. Final as-built drawings were provided for this project.

The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

Discussion of Findings

With some exceptions, design and construction of the Mirka-Al Jarba Road was performed according to correct application of building codes and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate (see photo 2).
2. The ride quality of the pavement is good.
3. No signs of raveling or breaking up at the pavement free edges.
4. No evidence of alligator, block, longitudinal or transverse cracking.
5. No signs of polishing of surface binder and exposure of aggregate particles.
6. No potholes, blow ups or signs of rutting in the pavement.

7. Average asphalt thickness of 13 cm/5” was measured and is compliant with the requirements in the plans.
8. All of the retaining walls were constructed with stone ruble with some having a placement of unreinforced concrete on top (see photo 3).
9. The guard railing is inadequate to resist the loads from the trucks in the areas (see photo 4).
10. Some of the type III object markers are missing or damaged (see photo 5).
11. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg).

Isolated Deficiencies

1. Missing or damaged type III markers.

Systematic Deficiencies

1. All of the retaining walls were constructed with stone ruble with some having a placement of unreinforced concrete on top. This method of construction is not consistent with the reinforced concrete retaining wall standards developed by Black & Veatch and presented to the audit team as a standard design in current use.
2. Overloaded roadways. Roadways that are constantly overloaded will deteriorate and fail in shorter time frames.
3. Narrow roadway width. Roadways that provide service for larger, heavier trucks are typically constructed with 12’ (3.7 m) wide lanes.
4. Structurally inadequate guard rails.
5. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.

Recommendations

1. Use the retaining wall standards developed by Black & Veatch.
2. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
3. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
4. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
5. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 27 Jan 2015

Location: Jenin

Inspectors: [redacted] P.E., US Army Corps of Engineers, Northwestern Division
P.E., US Army Corps of Engineers, Fort Worth District

Project: Al Zababida-Raba-American University Road

Program: INP II

Description: Construction of Al Zababida-Raba-American University Road

Description of Roadway

The Al Zababida-Raba-American University Road is outside of Jenin in the North West Bank area (see photos 1-4). The road has sections of reinforced CIP retaining walls, a roundabout and curbs.

Background

Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. A meeting was also held with Engineers at the Black & Veatch office on 3 Feb in Ramallah to discuss QA/QC standards, design, compliance to applicable codes and standards and inspect standard drawings and designs. Final as-built drawings were provided for this project.

The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

Discussion of Findings

With some exceptions, design and construction of the Al Zababida-Raba-American University Road was performed according to correct application of building codes and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. The ride quality of the pavement is good.
3. No signs of raveling or breaking up at the pavement free edges.
4. No evidence of alligator, block, longitudinal or transverse cracking.
5. No signs of polishing of surface binder and exposure of aggregate particles.
6. No potholes, blow ups or signs of rutting in the pavement.
7. Average asphalt thickness of 13 cm/5" was measured and is compliant with the requirements in the plans.

8. There is a large crack in one section of retaining wall. There was one (1) #4 bar found in the concrete, otherwise no other reinforcement was found in the concrete (see photo 5).
9. There is no footing in a section of retaining wall (see photo 6).
10. There are several weepholes that are plugged with concrete.
11. The guard railing is inadequate to resist the loads from the trucks in the areas.
12. There is no grout pack on the base plate of the light poles.
13. One of the type III object markers is damaged (see photo 7).
14. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg) on roads and bridges.
15. Large aggregate in base material, up to 5 cm, observed. There is no sloped shoulder, guard rail or gravity wall in several locations (see photos 8, 14).
16. Control joints do not continue across the concrete pavement with consistent shape or depth (see photo. (see photo 12).
17. Sign posts are damaged and missing (see photo 13).
18. The expansion joints are made of Styrofoam. No backer rods are used and the Styrofoam placement appears to be inconsistent. Sealant is not bonding to the concrete (see photos 9, 10).
19. Large rocks are being used as border and foundation for base material (see photo 8).
20. A telephone pole tied to the barrier wall with a cable (see photo 11).

Isolated Deficiencies

1. Damaged type III markers.
2. The large rocks are unacceptable backfill and base material.
3. The sharp side slope drop in elevation creates a traffic hazard. This deficiency is related to not meeting side slope requirements in AASHTO, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, Ch 6. In addition, the road cross-sections on sheets 32-39 of the contract indicate a gravity wall in locations where there is no shoulder.

Systematic Deficiencies

1. The section of cracked retaining wall had little or no reinforcing. This brings up a concern that the remaining retaining structures have similar issues with lack of reinforcing. The observations made in the field of the existing retaining structures are not consistent with any code or standard or with the reinforced concrete retaining wall standards developed by Black & Veatch and presented to the audit team as a standard design in current use. This deficiency is related to improper detailing and installation of reinforcing steel per 1997 UBC, Chapter 19, Section 1907 requirements and American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete. Also, there is no horizontal reinforcement in the retaining wall per American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete, Section 14.3.3.
2. There are sections of retaining wall with no foundation to resist sliding, overturning, bearing, settlement and overall stability. The audit team could not determine if all of the retaining walls and footings were built correctly due to fill and embankment cover. This brings up a concern that the remaining retaining structures have similar issues with lack of footings. This deficiency is related to1997 UBC, Chapter 16, Section 1611.6 requirements, improper detailing and installation of reinforcing steel per 1997 UBC, Chapter 19, Section 1907 requirements and American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete.

Also, there is no horizontal reinforcement in the retaining wall per American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete, Section 14.3.3.

3. There are several weepholes that are plugged with concrete. Weepholes are intended to provide subdrainage to reduce loads due to lateral soil pressures. If the weepholes are plugged, lateral loads may increase by as much as 180% on a retaining wall.
4. Light poles have base plates that require grouting to prevent bending of the anchors.
5. There is no grout pack on any light pole base plate.
6. Overloaded roadways. Roadways that are constantly overloaded will deteriorate and fail in shorter time frames.
7. Structurally inadequate guard rails.
8. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.
9. The contract plans, sheets 32-39, for road crossections, show a sloped shoulder (3:1 or 4:1) in all cross-sections where there is no wall. The lack of shoulders or walls poses a traffic hazard. This deficiency is related to not meeting side slope requirements in AASHTO, A Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, Ch 6.
10. Control joints are not construction per the contract plans, sheet 53 - Detail of Construction Joint.
11. Expansion joints are not well constructed.

Recommendations

1. Use the retaining wall standards developed by Black & Veatch, as shown on sheet 53 - Detail of Rubble Concrete Gravity Wall.

2. Grout all light pole base plates.

3. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.

4. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.

5. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.

6. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.
7. Provide base material in accordance within the specified grade tolerances and with shoulders graded according to the contract plans, sheets 32-39, for road crossections. Where it is not possible to provide shoulders according to the contract templates, provide gravity walls or rails.
8. Although it is not a design or construction deficiency, consider using break-away posts for signage near intersections. (see detail "E" on sheet 28 of the Sinjil Road plans for an example) The break-away posts will reduce the maintenance and replacement cost and effort.
9. Construct control joint in concrete paving per the contract plans, sheet 53 - Detail of Construction Joint.
10. Construct expansion joints in accordance with industry standards.
11. Ensure existing features are appropriately repaired, replaced or removed (e.g., the electrical pole which is bound to the gravity wall with a cable).

Inspection Date: 27 Jan 2015

Inspectors: [redacted] P.E., US Army Corps of Engineers, Northwestern Division
[redacted] P.E., US Army Corps of Engineers, Fort Worth District

Location: Jenin Governorate

Project: Storm Water Drainage System at Qabatia Township

Program: PCID

Description: Construction of Storm Water Drainage System at Qabatia Township

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Description of Project

The Storm Water Drainage System at Qabatia Township is located southeast of Jenin in the North West Bank area (see photos 1-5). The project is a reinforced CIP box culvert that carries vehicular traffic.

Background

Questions were asked regarding design and use of building codes. A combination of Jordanian and American specifications was used for design and construction. An inspection of the construction site followed afterwards. Plans and specifications were not provided for this project.

The culvert is next to a quarry that sees heavy truck traffic. The structure was checked for alignment, member and slab thickness, placement and removal of forms, evidence of form ties and general quality of construction.

Discussion of Findings

With some exceptions, design and construction of the storm drain for the Storm Water Drainage System at Qabatia Township was performed according to correct application of building codes and specifications. There is no information on whether storm water runoff, design reoccurance or hydraulic capacity of the culvert was considered or if considerations were made for overload truck loads. There is also no design information on the box culverts.

Field Observations

1. The roadway crossings were checked for construction and found to be adequate.
2. The ride quality of the pavement surface at the crossings is good.
3. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg) on roads and bridges.
4. There is a fence at the inlet of the structure (see photo 1). The fence is welded to an anchor bolt in the concrete (see photo 2).
5. There are several weep holes that are plugged.
6. There are several chamfer strips and form work nails still in place.
7. There are some sections of safety railing that have no welds or anchors (see photos 7-8).

8. None of the welds in the railing meet any code or standards criteria. Several welding flaws were found in the that included misalignment of parts, undercuts, underfills, excessive concavity and convexity, excessive and improper reinforcement, overlaps, burn-throughs, incomplete and insufficient penetration, incomplete fusion, splatter and cracks.
9. In several locations there is evidence in the cast-in-place concrete that the concrete forms were displaced, were bowing, and chamfer strips were out of place prior to or during the concrete placement (see photos 1, 4, 5, 7, 8, 13, 14).
10. Although numerous embed plates were installed for attachment of the rail, in most locations the rails are not aligned with the embed plates and are attached to the concrete with anchor bolts (see photo 10).
11. Shrinkage cracking was present as several locations (see photo 11).
12. Honey combing in the concrete was observed. (see photo 12).
13. Incomplete backfill and backfill which includes rubble and large boulders is present behind the wingwalls at the channel inlet. There is also no evidence of compaction effort (see photos 13, 17).

Isolated Deficiencies

1. Chamfer strips and form work nails still in place.
2. Honey combing in the concrete.
3. Incomplete and unacceptable backfill and lack of compaction of backfill.

Systematic Deficiencies

1. Plugged Weep holes- Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.
2. Weld flaws-Inadequate quality control and visual inspection of welds per AISC 325, Steel Construction Manual, 14th Edition by American Institute of Steel Construction. 2011, and American Welding Society (AWS) AWS D1.1, Structural Welding Code – Steel requirements, Sections 6.1-6.9 & Table 6.1,
3. Welding on steel galvanized surfaces. Welding on galvanized surfaces is considered hazardous and when made, the weld material becomes contaminated from the zinc coating resulting in a lower strength weld. The heated zinc also vaporizes into metal droplets and when inhaled, results in metal fume fever. The symptoms of metal fume fever are severe thirst, pain in the legs, shivering, congestion in the head, dryness, tickling of the throat, and a cough. In very bad cases the victims feel severe shivering, a high fever, buzzing in the ears, nausea, vomiting, and even hallucinations and convulsions. Refer to the American National Standards Institute (ANSI). Safety in Welding, Cutting, and Allied Processes, Z49.1 for guidance on this subject.
4. No standard used for the design of the box culverts.
5. Formwork for concrete. Formwork should be designed for anticipated loads. Prior to placement of concrete, rebar, formwork, falsework, and ties should be examined to ensure they are within tolerances and ready for placement of concrete.
6. Shrinkage and drying cracks are typically the result of temperature differentials in the concrete or moisture loss during curing. Moisture loss can be controlled by using appropriate curing methods.

Recommendations

1. Remove the fence at the inlet of the structure. This will only collect debris and plug the drain.
2. Ensure formwork is designed by qualified and competent personnel. Inspect rebar, formwork, chamfer strips, falsework and form ties prior to concrete placement to ensure they are installed per the contract requirements and within tolerance.
3. Use approved and effective curing methods. For example, it is difficult to control moisture loss in vertical concrete structural elements by using water curing methods alone.
4. Approve metal work shop drawings, for metal hand railing and fences, for example, and coordinate with concrete forming shop drawings and placement plan prior to laying out embed plates which will be cast into the concrete and used for anchorage of the metal works. Prior to placing concrete take final measurements during the pre-placement inspection to ensure embed elements are placed in the correct locations.
5. To avoid honeycombing ensure qualified concrete finishers are present to supervise placement, vibration and finishing of concrete in place.
6. Use only acceptable materials for backfill. Ensure work is compacted in accordance with building standards and completed to final grade.

Inspection Date:	27 Jan 2015
Inspectors:	[redacted] P.E., US Army Corps of Engineers, Northwestern Division [redacted] P.E., US Army Corps of Engineers, Fort Worth District
Location:	Jenin Governorate
Project:	Construction of Multipurpose Hall in Al Yamun
Program:	LGI
Description:	Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Description of Structure

The design and construction of the multipurpose hall in Al Yamun is completed. The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams (see photos 1-2). The design and construction of the floor and roof diaphragms is unknown.

Background

There were no construction photos, copies of product submittals or testing reports provided for inspection and review. Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards. Tender drawings and as-built drawings were provided.

Discussion of Findings

Most buildings, infill walls are used to help resist lateral loads due to heavy wind and seismic loading. The frame and infill wall should be connected to behave like a shear wall and serve as a diagonal compression strut between the intersections of the frame members. The infill walls of the multipurpose hall in Al Yamun are probably not reinforced or anchored into the frame, therefore the members will not fully engage the framing and the capacity of the diagonal compression struts will not be developed. This also means that there is not sufficient shear strength and ductility of the concrete columns to resist racking of the unreinforced infill, and that there is a strong risk for collapse of the infill walls during a small to moderate seismic event.

Field Observations

1. The retaining walls have weep holes that are plugged (see photo 3).
2. There is a disconnected roof drain (see photo 4).
3. There are no anchors on the roof AC units, ductwork, piping and water tanks (see photos 5-7).
4. Welds and cuts for metal equipment supports on roof are not welded properly or primed and painted (see photo 8).

Isolated Deficiencies

1. Disconnected roof drain.
2. Painting of welds and cuts in metal works.

Systematic Deficiencies

1. Probably inadequate design of infill masonry. Infill walls do not meet 1997 UBC, Chapter 16, Section 1611.4 requirements for anchorage of concrete and masonry walls.
2. No anchorage of AC units, ductwork, piping and water tanks to resist wind and seismic loads per 1997 UBC, Chapter 16, Sections 1609 & 1610.
3. Plugged Weep holes- Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.
4. Inadequately braced downspout.
5. Improper welding. Welds do not cover basis steel design requirements and do not meet any recognized international code or standard.

Recommendations

1. Re-evaluate the new and existing building structure and if necessary, retrofit the diaphragm and infill masonry wall designs per ASCE 41-13 requirements, to insure adequate transfer of seismic forces into cords, collectors, and shear walls.
2. Ensure weepholes are clear before turnover of completed facility.
3. Provide anchorage between supports and piping, ductwork, water tanks and AC units on the roof in accordance with 1997 UBC, Chapter 16, Sections 1609 and 1610.
4. Ensure all vertical piping, such as downspouts, receives proper bracing.
5. Prepare and paint welds and cuts in metal works with a material and method designed for this purpose.

Inspection Date:	28 Jan 2015
Inspector:	[redacted] P.E., US Army Corps of Engineers, Northwestern Division
Location:	Qalqiliya
Project:	Construction Qalqiliya Girls Secondary School
Program:	INP I
Description:	Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Description of Structure

The design of the Qalqiliya Girls Secondary School is an older type of building construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams (see photos 1-2). The floor and roof diaphragms consist of cast in place concrete beams with infill hollow core CMU.

Background

Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards.

Discussion of Findings

Most buildings are designed and constructed utilizing the floor and roof system as a structural diaphragm to transfer lateral loads to shear walls or frames. These are usually constructed of plywood, oriented strand board, metal deck, composite metal deck or a concrete slab in concrete construction.

From review of the plans, the concrete beam and block configuration of the floor and ceiling design of the Qalqiliya Girls Secondary School is held in place with friction only, there is no interlocking mechanism to prevent the blocks from falling out if there is any excessive deflection from loads or movement due to seismic events. The existing floor and ceiling have limited capability to act as a shear panel to carry in-plane shear loads.

This means that the floors and ceilings have limited capacity to transfer loads into the shear walls or to resist tension and compressive forces. Because of this, there is a strong risk for collapse of the ceiling and floors during a small to moderate seismic event.

In buildings, infill walls are used to help resist lateral loads due to heavy wind and seismic loading. The frame and infill wall should be connected to behave like a shear wall and serve as a diagonal compression strut between the intersections of the frame members. The infill walls of the Qalqiliya Girls Secondary School are not reinforced or anchored into the frame, therefore the members will not fully engage the framing and the capacity of the diagonal compression struts will not be developed. This also means that there is not sufficient shear strength and ductility of the concrete columns to resist racking of the unreinforced infill, and that there is a strong risk for collapse of the infill walls during a small to moderate seismic event.

Field Observations

1. There is water damage on the second floor (see photo 3). This has been repaired on the outside.
2. There are some lights on the outside roof that are hanging (see photos 4-5).
3. There are no anchors on the roof AC units, ductwork, piping and water tanks (see photo 6).
4. There are vertical medium sized cracks in the wall next to the columns (see photo 7). These are due to shrinkage and lack of anchorage of the unreinforced masonry infill walls to the concrete columns.
5. There is a combination of horizontal and vertical cracking on the outside of the retaining walls (see photo 8). This is due to water infiltration of the outside stucco.
6. The steel hatch for the water collection system (sewer) is welded shut (see photo 9).

Isolated Deficiencies

1. Water damage on the second floor.
2. Hanging lights on the outside roof.
3. Steel hatch for the water collection system (sewer) is welded shut.

Systematic Deficiencies

1. Inadequate design of structural diaphragms. Based on observations, the floor and roof design does not meet 1997 UBC, Chapter 16, Section 1607 requirements for distribution of live loads and Division IV requirements for earthquake design.
2. Inadequate design of infill masonry. Infill walls do not meet 1997 UBC, Chapter 16, Section 1611.4 requirements for anchorage of concrete and masonry walls.
3. No anchorage of AC units, ductwork, piping and water tanks to resist wind and seismic loads per 1997 UBC, Chapter 16, Sections 1609 & 1610.
4. No flashing on top of the retaining walls to prevent water infiltration into the stucco.
5. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.

Recommendations

1. Re-evaluate the new and existing building structure and if necessary, retrofit the diaphragm and infill masonry wall designs per ASCE 41-13 requirements, to insure adequate transfer of seismic forces into cords, collectors, and shear walls.
2. Repair the hanging lights on the roof.
3. Anchor the AC units, ductwork, piping and water tanks to resist wind and seismic.
4. Install flashing on top of the retaining wall and repair the cracks.
5. Grind off the welds of the water collection steel hatch to allow inspection.

Inspection Date: 28 Jan 2015

Inspector: [redacted] P.E., US Army Corps of Engineers, Northwestern Division

Location: Habla town- Qalqilya Governorate

Project: Construction of Secondary Sewage Collection Network and House Connections

Program: PCID

Description: Cast in place reinforced concrete manholes, excavation and installation of sanitary sewer pipe.

Description of Structure

This work included supply and installation of 1246 m of 6" UPVC, 3078 m of 8" UPVC and manholes. Work also included repair of pavement from excavation.

Background

This work was completed 14 Dec 2014. The only inspection that could be made was opening selected manholes and verifying drains and pipes were correctly installed. No plans were made available for this project, however a fact sheet was provided by the Engineer that showed construction photos.

Discussion of Findings

1. A sample of manholes was opened and the drains inspected.

Field Observations

1. The inside of the manholes show correct placement of piping and drains along with sealed surfaces (see photos 1-2).

Isolated Deficiencies

1. None observed

Systematic Deficiencies

1. None observed

Recommendations

1. None

Inspection Date: 28 Jan 2015

Inspector: [redacted] P.E., US Army Corps of Engineers, Northwestern Division

Location: Kafr Thulth Municipality - Qalqilya Governorate

Project: Construction of Citizen Service Center for Kafr Thulth Municipality

Program: LGI

Description: Renovation of citizen service center.

Description of Structure

This work included installation of windows, updated wiring, updated lights, installation of computer systems, floors, woodwork and trim, and installation of restrooms for the existing citizen service center for Kafr Thulth Municipality (see photos 1-3).

Background

This work was completed 13 Oct 2013. A visual inspection was made of the constructed features.

Discussion of Findings

The audit team considers this project to be a good example of high quality workmanship.

Field Observations

1. The inside office, countertops, windows, floors, woodwork, trim, lights and restroom facilities were inspected and found to be in good condition with good quality workmanship.
2. The computer server and breaker box was inspected and found to be correctly installed (see photos 4-5). The power was shut down at the time of the inspection.

Isolated Deficiencies

1. None observed

Systematic Deficiencies

1. None observed

Recommendations

1. None

Inspection Date:	28 Jan 2015
Inspector:	[redacted] P.E., US Army Corps of Engineers, Northwestern Division
Location:	Nablus
Project:	Beit Iba-Deir Sharaf Tulkarem Road
Program:	INP II
Description:	Construction of Nablus-Beit Iba-Deir Sharaf Tulkarem Road .

Description of Roadway

The Beit Iba-Deir Sharaf Tulkarem Road is Northeast of Nablus (see photos 1-3). The road under construction at this time and has sections of reinforced CIP retaining walls, curbs, lighting, sanitary and storm sewers.

Background

Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. A meeting was also held with Engineers at the Black & Veatch office on 3 Feb in Ramallah to discuss QA/QC standards, design, compliance to applicable codes and standards and inspect standard drawings and designs.

The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

The only inspection that could be made on the sanitary sewers was opening selected manholes and verifying drains and pipes were correctly installed. Plans were made available for this project and checked.

Discussion of Findings

To date, the design and construction of the Beit Iba-Deir Sharaf Tulkarem Road is being performed according to correct application of building codes and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. The pavement wearing course, binder course, and subgrade base course meet specification and design requirements.
3. The ride quality of the pavement is good.

4. The sidewalk reinforcing is placed on the ground, it should be raised at least 2” (5 cm) (see photo 4).
5. A sample of manholes was opened, drains inspected and found to be in compliance with the plans. The inside of the manholes show correct placement of piping and drains along with sealed surfaces (see photos 5-6).
6. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg) on roads and bridges.

Isolated Deficiencies

1. Incorrect placement of sidewalk reinforcement.

Systematic Deficiencies

1. None

Recommendations

1. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
2. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
3. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
4. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 28 Jan 2015

Inspector: [redacted] P.E., US Army Corps of Engineers, Northwestern Division

Location: Nablus

Project: Beit Iba - Qusin - Beit Wazan Road

Program: INP I

Description: Construction of Beit Iba - Qusin - Beit Wazan Road
.

Description of Roadway

The Beit Iba - Qusin - Beit Wazan Road is Northeast of Nablus (see photo 1). This road was constructed in 2010. at this time and has sections of reinforced CIP retaining walls, curbs, lighting, sanitary and storm sewers.

Background

Questions were asked regarding design and use of building codes. Plans were made available for this project and checked. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. A meeting was also held with Engineers at the Black & Veatch office on 3 Feb in Ramallah to discuss QA/QC standards, design, compliance to applicable codes and standards and inspect standard drawings and designs.

The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

Discussion of Findings

To date, the design and construction of the Beit Iba - Qusin - Beit Wazan Road performed performed according to plans, correct application of road design standards and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. The pavement wearing course, binder course, and subgrade base course meet specification and design requirements.
3. The ride quality of the pavement is good, however there was sections of edges breaking off (see photo 1), damage (see photo 2), heavy surface abrasion in isolated areas (see photo 3), isolated sections of pavement delamination (see photo 4) and damage to signs (see photo 5).
4. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that

exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg) on roads and bridges.

Isolated Deficiencies

1. None

Systematic Deficiencies

1. None

Recommendations

1. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
2. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
3. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
4. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 28 Jan 2015

Inspector: [redacted] P.E., US Army Corps of Engineers, Northwestern Division

Location: Tulkarm

Project: Connecting Roads for Baqa Ash Sharqiya: Phase 2: An Nazla Al Gharbiya

Program: LGI

Description: Rehabilitation of connecting Roads for Baqa Ash Sharqiya: Phase 2: An Nazla Al Gharbiya
.

Description of Roadway

The Connecting Roads for Baqa Ash Sharqiya: Phase 2: An Nazla Al Gharbiya is Southeast of Nazlat ‘Isa (see photo 1). This road was constructed in 2011 and has sections rock retaining walls and curbs (see photos 1-3).

Background

Questions were asked regarding design and use of building codes. Plans were not available for this project. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction.

The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

Discussion of Findings

To date, the design and construction of the Connecting Roads for Baqa Ash Sharqiya: Phase 2: An Nazla Al Gharbiya is performing well and was constructed in general compliance and application of applicable road design standards and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. The pavement wearing course, binder course, and subgrade base course appeared to meet specification and design requirements.
3. The ride quality of the pavement is good, however there was damage (see photo 4).
4. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg) on roads and bridges.

Isolated Deficiencies

1. None

Systematic Deficiencies

1. None

Recommendations

1. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
2. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
3. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
4. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 28 January 2015

Inspectors: [redacted] P.E., US Army Corps of Engineers, Fort Worth District

Location: Ramallah

Project: Deir Debwan – Ramoun – Al Taybeh Road

Program: INP I

Description: The Deir Debwan-Ramoun-Al Taybeh Road Project is located in Ramallah and Al Bireh District. It consists of 6.35 km of road reconstruction.

Description of Road

This road project includes excavation, base course works, applying one asphalt layer (7cm thick), construction of additional culverts, sidewalks, retaining walls, stonewalls, installation of guard rail and installation of necessary road markings and traffic signage. There were also some modifications to vertical and horizontal curves.

Background

This project was completed in August 2010. As-built drawings were provided for review.

Discussion of Findings

The deficiencies observed on this project were common to several other road projects, including control/expansion joint for concrete ditches and shoulders. The most serious problem observed was cracking which is appearing in the pavement.

Field Observations

1. Cracks forming in the pavement (photos 1, 2, 3)
2. Incomplete control/expansion joints (photo 4, 5)
3. Joint between pavement and concrete is not clean. Asphalt placed first, then concrete placed against it (photo 5)

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. Cracks in the pavement. Some vehicles on the road may exceed the design loads for those vehicles, resulting in a higher axle weight than anticipated.
2. Incomplete control/expansion joints. The control joints do not continue across the concrete pavement or created as typically required.
3. Joint between pavement and concrete. It is typical industry practice to use joint filler between concrete and asphalt and for expansion joints.

Recommendations

1. Seal cracks and ensure designs consider the type of vehicles and potential axle weight of the vehicle.
2. Ensure joint is created and filler is applied in accordance with plans.
3. Ensure joint filler is used in accordance with plans.

Inspection Date: 28 January 2015

Inspectors: [redacted] P.E., US Army Corps of Engineers, Fort Worth District

Location: Ramallah

Project: Ein Yabroud – Deir Jareer Road

Program: INP II

Description: This project provides a road between Ein Yabroud and Deir Jareer.

Description of Road

This road project includes excavation, base course works, applying one asphalt layer (7cm thick), construction of additional culverts, sidewalks, retaining walls, stonewalls, installation of guard rail and installation of necessary road markings and traffic signage.

Background

The project was completed in May 2014. Conformed plans and specs and an environmental report were provided for review.

Discussion of Findings

The pavement appears to be in good shape and built to an acceptable standard. The most problematic issue is the lack of shoulders or guard rails in several locations, posing a traffic hazard.

Field Observations

1. Wire mesh setting on base rather than in concrete and protruding from the concrete (photos 1, 2, 3)
2. Incomplete control/expansion joints (photos 4, 5, 6, 7)
3. Joint between pavement and concrete is not clean. Asphalt placed first, then concrete placed against it (photos 5, 6, 8)
4. The guardrail posts are driven through the concrete after the concrete has set (photos 9, 10)
5. No shoulder or barrier for vehicles going off side of road (photos 11, 12, 13, 14)
6. Water flows away from curb inlet, crossing intersection (photos 15, 16, 17)

Isolated Deficiencies

1. Wire mesh not embedded in concrete. The feature of a concrete shoulder is actually a deviation from the plans, which does not require this feature. However, even as a deviation, wire mesh should conform to standard practice and be embedded in the concrete.
2. Slope away from curb inlet. Water travels along curb, then away from the curb inlet and across the intersection. This appears to be a design error.

Systematic Deficiencies

1. Incomplete control/expansion joints. The control joints do not continue across the concrete pavement and are not created per the detail, Concrete Side Ditch plan, on Sheet 19.
2. Inconsistent joint between pavement and concrete. Concrete Ditch Detail, Sheet 20, shows a 20mmX 30mm joint with sealant between concrete and pavement.
3. The guardrail posts driven after concrete placement. Driving posts through concrete can create fracturing in the concrete, can damage rebar and the stress the post in the process.
4. No shoulder or barrier. Drawings indicate that there is from no slope to 3:1 slope on shoulders with a note stating, "maximum side slope of 2:1 can be used to avoid grading outside of the right of way limits, at those sections guardrail should be installed".

Recommendations

1. Ensure wire mesh is installed and embedded in concrete in accordance with plans.
2. Ensure joint is created and filler is applied in accordance with plans.
3. Ensure joint filler is used in accordance with plans.
4. Install guardrail posts prior to placing concrete
5. Slope shoulders per cross-section templates in contract or install guardrails as stated on plans.
6. Slope drainage from curb gutter to drain off roadway through curb inlet.

Inspection Date: 28 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Ramallah

Project: Construction of a Community Center in Sinjil

Program: LGI

Description: The project constructs a two-floor building for the local city council. The ground floor consists of a meeting hall, reception area, administration room, archive, storage room, services room, kitchen and four sanitary units. The second floor consists of a mayor's office, reception area, meeting hall, engineering offices, a kitchen and three sanitary units. External works include the construction of retaining walls, boundary walls and sidewalks.

Description of Structure

The building consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block.

Background

This project was completed in November 2014. As-built and tender drawings were provided for review.

Discussion of Findings

The quality of construction for this facility looked good. Only minor deficiencies were noted.

Field Observations

1. No escutcheons (photo 1).
2. Water tanks not properly mounted (photo 2).
3. Downspout not anchored to the wall (photo 3).

Isolated Deficiencies

1. No escutcheons. Wall penetrations are lacking escutcheons.
2. Water tanks not properly mounted. The contractor said that the bottom anchors were not installed because the only structural point in the wall to anchor is in the concrete beam near the top of the wall. Design or shop plans were not coordinated between architectural, structural or mechanical to provide for anchorage of equipment at all required points.

Systematic Deficiencies

1. Downspout not anchored to the wall. Vertical pipes will move and come loose in time if not properly supported.

Recommendations

1. Ensure work is complete and meets quality standards prior to acceptance.
2. Coordinate plans between disciplines and ensure anchor points are provided in walls and ceilings to support mounted equipment.
3. Ensure bracing is provided for vertical piping per plans and specs or building code.

Inspection Date: 28 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Ramallah

Project: Rehabilitation of Internal Roads in Sinjil Town – Phase 1

Program: LGI

Description: The project rehabilitated approximately 2.6 km of internal roads.

Description of Road

This road project includes excavation, base course works, applying one asphalt layer (6cm thick), construction of sidewalks, speed bumps and installation of necessary road markings and traffic signage.

Background

The project was completed around November 2011. As-built and tender drawings were provided for review.

Discussion of Findings

All areas inspected appeared to be constructed at a high level of quality.

Field Observations

1. A speed bump destroyed by snow removal (photo 1)

Isolated Deficiencies

1. Speed bump destroyed. Design should consider operability and maintenance issues like snow removal.

Systematic Deficiencies

1. None observed.

Recommendations

1. Use a more durable speed bump design, such as that created using asphalt.

Inspection Date: 28 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Ramallah

Project: Construction of Agricultural Roads in Al Lubban ash Sharqiya – Phase 2

Program: LGI

Description: This project constructed 900 meters of agricultural roads and 166 meters of stone walls.

Description of Road

The work included excavation, leveling and in installation of a layer of base course.

Background

The project was completed around August 2012. As-built and tender drawings were provided.

Discussion of Findings

The road design is simple, involving base material with sheet flow toward the downhill side for drainage. The road is repaired at the end of each rainy season to correct any damage caused by drainage patterns.

Field Observations

1. The road appeared to be in good condition with the exception of a minor wash across the road. The local administrator explained that this is expected during the rainy season and the roads department budgets and schedules repairs for such areas following the rainy season.

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

No comments.

Inspection Date: 29 Jan 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Hebron

Project: Addition to Al-Buweib Coeducational School

Program: LGI

Description: Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Description of Structure

The design of the addition to Al-Buweib Coeducational School was completed in 2012 (see photos 1-2). This work included a two story addition to an earlier built and similar structure, construction of an outdoor shelter and paving (see photo 3), construction of a flower plot (see photo 7) and construction of restrooms (see photo 9). The building design and construction consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams. The diaphragm is assumed to be a concrete beam and block configuration for the floor and ceiling.

Background

Questions were asked regarding design and use of building codes. No plans were provided for the audit inspection. An inspection of the construction site followed afterwards.

Discussion of Findings

There is no information on the plans and specifications, however the audit team assumes the detailing of the columns, masonry infill walls and diaphragms is consistent with the design and construction of similar buildings inspected during this audit cycle.

The diaphragm design the Al-Buweib Coeducational School is assumed to be a concrete beam and block configuration of the floor and ceiling held in place with friction only. There is no interlocking mechanism to prevent the blocks from falling out if there is any excessive deflection from loads or movement due to seismic events. The existing floor and ceiling have limited capability to act as a shear panel to carry in-plane shear loads.

This means that the floors and ceilings have limited capacity to transfer loads into the shear walls or to resist tension and compressive forces. Because of this, there is a strong risk for collapse of the ceiling and floors during a small to moderate seismic event.

In buildings, infill walls are used to help resist lateral loads due to heavy wind and seismic loading. The frame and infill wall should be connected to behave like a shear wall and serve as a diagonal compression strut between the intersections of the frame members. The infill walls of the addition to the Al-Buweib Coeducational School are not reinforced or anchored into the frame, therefore the members will not fully engage the framing and the capacity of the diagonal compression struts will not be developed. This also means that there is not sufficient shear strength and ductility of the concrete columns to resist racking of the unreinforced infill, and that there is a strong risk for collapse of the infill walls during a small to moderate seismic event.

There is no evidence that any design consideration of lateral seismic loads from the original construction to the new construction or if any portion of the existing building was checked to insure it meets UBC 1997 seismic criteria.

Field Observations

1. There was no consideration made for height clearance requirements on the outdoor shelter (see photo 4).
2. None of the welds in the outdoor shelter meet any code or standards criteria. Several welding flaws were found in the that included misalignment of parts, undercuts, underfills, excessive concavity and convexity, excessive and improper reinforcement, overlaps, burn-throughs, incomplete and insufficient penetration, incomplete fusion, splatter and cracks (see photo 5).
3. The paving (see photo 6) and flower plots (see photo 7) are in good condition.
4. The outside stucco of the restroom building has water damage (see photo 8). This is probably due to improper installation of flashing.
5. The inside of the restrooms is in good condition (see photo 9). All plumbing and lighting is in working order.

Isolated Deficiencies

1. Height clearances
2. Water damage

Systematic Deficiencies

1. Inadequate design of structural diaphragms. Floor and roof design does not meet 1997 UBC, Chapter 16, Section 1607 requirements for distribution of live loads and Division IV requirements for earthquake design.
2. No evidence of any design consideration of effects of lateral seismic loads from the original construction to the new construction per 1997 UBC, Division IV requirements for earthquake design.
3. Inadequate design of infill masonry. Infill walls do not meet 1997 UBC, Chapter 16, Section 1611.4 requirements for anchorage of concrete and masonry walls.
4. Weld flaws-Inadequate quality control and visual inspection of welds per AISC 325, Steel Construction Manual, 14th Edition by American Institute of Steel Construction. 2011, and American Welding Society (AWS) AWS D1.1, Structural Welding Code – Steel requirements, Sections 6.1-6.9 & Table 6.1.
5. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.

Recommendations

1. Install or repair flashing on roof of restroom.
2. Re-evaluate the new and existing building structure and if necessary, retrofit the diaphragm and infill masonry wall designs per ASCE 41-13 requirements, to insure adequate transfer of seismic forces into cords, collectors, and shear walls.

3. Re-evaluate the new outdoor shelter and if necessary, retrofit per requirements in AISC 325, Steel Construction Manual, 14th Edition by American Institute of Steel Construction. 2011, and American Welding Society (AWS) AWS D1.1, Structural Welding Code – Steel requirements.

Inspection Date: 29 Jan 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Hebron

Project: Water Reservoir Project - Dura-Sinjir

Program: INP I

Description: Cast in place reinforced concrete frame

Description of Structure

The Dura-Sinjir Water Reservoir Project was completed in 2010 (see photos 1-3). This work includes construction of foundations, grade beams, columns, stairs, reservoir, placement of pipes, reducers, gate valves, main panel, switchers, circuit breakers, multi phase fuses, and lighting fixtures.

Background

Questions were asked regarding design and use of building codes. Plans were provided for the audit team and an inspection of the construction site followed afterwards.

Discussion of Findings

The plans show proper detailing of reinforcing, lap splices and stirrups. The placement of footings, grade beams, stairs, slabs and reservoir appears to comply with design standards. The welding on the railing is in general compliance with AWS D1.1 requirements (see photo 5). All of the anchors inspected appear to be correctly sized (see photo 6). The installation of piping and electrical controls appears correct.

Field Observations

1. There is a thin cementatious coating and paint on the outside surface of the concrete (see photo 4). The paint is peeling.
2. There is no grout pad in the base of the USAID sign (see photo 7).

Isolated Deficiencies

1. Lack of grout pad in base of sign.

Systematic Deficiencies

1. Peeling paint.

Recommendations

1. Install grout pad in the base of the USAID sign.
2. In the future, do not apply the thin cementatious coating and paint on the outside surface of the concrete.

Inspection Date: 29 Jan 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Bethlehem

Project: 'Arab ar Rashayida Road

Program: LGI

Description: Rehabilitation of the main Road in 'Arab ar Rashayida
.

Description of Roadway

The 'Arab ar Rashayida Road is Southeast of Bethlehem (see photo 1). This road was constructed in 2010 and has sections of reinforced CIP retaining walls, curbs, lighting, sanitary and storm sewers.

Background

Questions were asked regarding design and use of building codes. There are no plans available for this project. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

Discussion of Findings

With some exceptions, the design and construction of the 'Arab ar Rashayida Road was done according to plans, correct application of road design standards and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. The pavement wearing course, binder course, and subgrade base course appears to meet specification and design requirements, although the width of pavement varies from 13’-4” to 16’-0” (4 m - 4.9 m).
3. The retraining wall was inspected. There are no as built drawings to verify correct construction (see photo 3). There are several weep holes plugged with concrete (see photo 4). The construction joint material is a thin Styrofoam that has fallen out of the joint (see photo 5). There is no warning sign at the end of the retaining wall (see photo 6).
4. The ride quality of the pavement is good in most places, however there is pavement cuts for installation of electrical extension cords (see photo 7), and heavy surface abrasion in isolated areas (see photo 8).

Isolated Deficiencies

1. Incorrect material and installation of expansion joint.
2. Varying pavement widths.

Systematic Deficiencies

1. Plugged weep holes.

Recommendations

1. Unplug the weep holes.
2. Reapply construction joint material.
3. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
4. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
5. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
6. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 29 Jan 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Hebron

Project: HWY 60 – Sa'ir - Tekoa Road (Segment A)

Program: INP I

Description: Construction of HWY 60 – Sa'ir - Tekoa Road (Segment A)
.

Description of Roadway

The HWY 60 – Sa'ir - Tekoa Road (Segment A) is in Hebron (see photos 1-2). This road was constructed in 2009.

Background

Questions were asked regarding design and use of building codes. Plans are available for this project. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards.

Discussion of Findings

With some exceptions, the design and construction of the HWY 60 – Sa'ir - Tekoa Road (Segment A) was done according to plans, correct application of road design standards and specifications. Most of the deterioration found was related to truck overloading.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. No signs of raveling or breaking up at the pavement free edges.
3. No evidence of alligator and block cracking.
4. No signs of polishing of surface binder and exposure of aggregate particles.
5. Some areas of abrasion wear.
6. No potholes, blow ups or signs of rutting in the pavement.
7. All of the reflectors are missing due to snow plows (see photo 3).
8. The ride quality of the pavement is good in most places, however there is combinations of longitudinal and transverse cracking (see photo 4).
9. Most of the stripping was worn off.
10. All of the retaining walls are short in height and were constructed with stone ruble.
11. No type III object markers.

12. The pavement wearing course, binder course, and subgrade base course appears to meet specification and design requirements.
13. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg).

Isolated Deficiencies

1. Missing reflectors

Systematic Deficiencies

1. No type III object markers.

Recommendations

1. Seal the cracks in the pavement.
2. Use a higher quality and thicker stripping material.
3. Install type III object markers.
4. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
5. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
6. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
7. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 29 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Nablus

Project: Bureen – Madama – Asira Al Quiblyia - Urif Road

Program: INP I

Description: This road project consists of road reconstruction of 14 km or roads.

Description of Road

The road rehabilitation work includes excavations, asphalt pavement, sidewalks and a storm water system, in addition to the installation of road safety features such as markings, traffic signs, and guard rails.

Background

The project was completed in August 2009. As-built drawings were provided for review.

Discussion of Findings

The ride on the road is smooth. However, cracks are appearing in the pavement and the paint stripe is fading.

Field Observations

1. Longitudinal pavement cracking (photos 1, 2, 3).
2. Horizontal and longitudinal pavement cracking at seam (photos 5, 6).
3. Paint striping wearing away (photos 2, 4, 5, 6).

Isolated Deficiencies

1. Longitudinal pavement cracking. Some vehicles on the road may exceed the design loads for those vehicles, resulting in a higher axle weight than anticipated
2. Horizontal and longitudinal pavement cracking at the seams.

Systematic Deficiencies

1. Paint striping wearing away. The paint quality or thickness is not durable

Recommendations

1. Seal cracks and ensure designs consider the type of vehicles and potential axle weight of the vehicle.
2. Use a higher quality and/or thickness of paint striping material.

Inspection Date: 29 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Nablus

Project: Replacement of Mount Jerzim Water Network

Program: EWAS II

Description: The Mount Jerzim water network project replaced a 25 year old system that had been losing approximately 50% of the supplied quantity.

Description of Water System

This water network on the top of Mount Jerzim provides water for 145 houses, for approximately 855 residents.

Background

This project was completed in August of 2009. Plans and specifications were not provided for review.

Discussion of Findings

Since this project is a buried utility there is very little available to inspect. One manhole cover near the community center was opened and the valve was inspected.

Field Observations

1. The pipe, flange and bolt in a manhole are corroded (photo 1, 2).

Isolated Deficiencies

1. Corrosion on pipe, flange and bolt. The piping materials used, paint or cathodic protection are not sufficient to prevent aggressive corrosion

Systematic Deficiencies

None observed.

Recommendations

1. Ensure design and construction of buried utilities considers corrosion prevention measures.

Inspection Date: 29 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Nablus

Project: Milling and Resurfacing of HWY 57, Salem – Rujeib – Beit Dajan

Program: INP I

Description: This project consists of the reconstruction of approximately 16.35 km of roads.

Description of Road

The road project includes excavation, new base course layers and new asphalt pavement, milling and overlay work, construction of stone walls and sidewalks, construction of retaining walls and storm water drainage system and the installation of upgraded/improved road safety features such as markings, cat eyes, traffic signs, and guard rails.

Background

This project was completed in June 2011. As-built drawings were available for review.

Discussion of Findings

Highway 57 is one of the main thoroughfares through the city of Nablus. The inspection team looked at one side road as well as the highway near and at a main intersection. The intersection has been the sight of demonstrations and military operations, resulting in some pavement damage due to activities such as improvised road blocks, burning tires and the movement of heavy equipment on the roadway.

Field Observations

1. Longitudinal pavement cracking at seam (photo 1).
2. Joint between pavement and concrete is not clean (photos 2, 3, 4).
3. Sign post has been destroyed (photo 5).
4. Horizontal pavement cracking (photo 6).
5. Paint striping wearing away (photos 3, 6, 7).

Isolated Deficiencies

1. Longitudinal pavement cracking at seam. Some vehicles on the road may exceed the design loads for those vehicles, resulting in a higher axle weight than anticipated.
2. Broken sign post. A detail for signage could not be located. This is not necessarily a deficiency, but since posts are embeded in the concrete paving it would be expensive to replace. In areas where posts have a high probability of being damaged by traffic, a break-away post would offer easier, cheaper and quicker maintenance
3. Horizontal pavement cracking.

Systematic Deficiencies

1. Lack of joint between pavement and concrete. Notes on typical INP I plans say, "Joint filler shall be used between concrete and asphalt and for expansion joints". Although the plans for this intersection could not be located, providing a joint between pavement and concrete is a standard detail for roadways.
2. Paint striping wearing away. The paint quality or thickness is not durable.

Recommendations

1. Seal cracks and ensure designs consider the type of vehicles and potential axle weight of the vehicle.
2. Ensure joint filler is used in accordance with plans.
3. Consider break-away posts (see detail "E" on sheet 28 of the Sinjil Road plans for an example).
4. Use a higher quality and/or thickness of paint striping material.

Inspection Date: 29 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Nablus

Project: Badhan Main Road (Segment 1)

Program: INP I

Description: This project consisted of the reconstruction of 1.4 km of roads.

Description of Road

The rehabilitation works for this road included excavations, pavement layers, asphalting, sidewalks, and retaining walls, in addition to the installation of road safety features such as markings, cat eyes, and traffic signs.

Background

The project was completed in May 2009. As-built drawings were provided for review.

Discussion of Findings

The ride of the road was good and no cracking was observed. The overall quality of the road looks good. The project was inspected at a location where the highway passed through a village.

Field Observations

1. Speed bump has an abrupt shoulder (photos 1, 2).
2. Soft plastic conduit is sticking out of the speed bump (photo 3).
3. Base course wearing away at shoulder (photo 4, 5).
4. Paint striping wearing away (photo 2, 6).

Isolated Deficiencies

1. The speed bump is large with sharp shoulders. The gutter has been stopped up by the local community to bridge the curb to the speed.
2. The conduit is buried in the speed bump to transverse the roadway
3. Base course wearing away at shoulder. Vehicles have apparently been entering and exiting the road at this location on the shoulder, however, the shoulder is not designed for driveway or transition to a gravel road.

Systematic Deficiencies

1. The paint quality or thickness is not durable

Recommendations

1. Design and construct speed bumps with smoother edges. Ensure drainage is not impeded and ensure requirements for community access have been considered, such as pedestrian crossings.
2. Do not embed conduit or piping in speed bumps.
3. Ensure traffic patterns are considered and that the road is designed and built to accommodate all anticipated traffic.
4. Use a higher quality and/or thickness of paint striping material.

Inspection Date: 29 January 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Nablus

Project: Construction of Agricultural Roads In Yasid Phase 3

Program: LGI

Description: This project included the construction and expansion of 1,700 m2 of agricultural roads and 3,400 m2 of stone walls.

Description of Road

The work included excavation, leveling and in installation of a layer of base course and stone walls on each side of the road.

Background

As-built and tender drawings were provided for review.

Discussion of Findings

The road design is simple, involving base material with sheet flow toward the downhill side for drainage. The road is repaired at the end of each rainy season to correct any damage caused by drainage patterns.

Field Observations

1. The road appeared to be in good condition. The road is scheduled to be maintained and repaired after each rainy season.

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

1. No comments.

Inspection Date: 1 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Salfit

Project: Construction of Yasul-Iskaka Secondary School

Program: LGI

Description: Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Description of Structure

The design of the Yasul-Iskaka Secondary Boys School consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams. The floor and roof diaphragms consist of reinforced cast in place concrete.

Background

Plans and specifications were not available for review.

Discussion of Findings

The construction site was well kept and workers were wearing Personal Protective Equipment. The project was in the finishes stage with painting, hanging doors, installing metal works, etc.

Field Observations

1. The expansion joint cover appears improvised and not properly installed (photos 1, 2, 3)

Isolated Deficiencies

Systematic Deficiencies

1. Improper expansion joint covers. The expansion joint covers appear improvised and not properly installed. They are not the same as shown in detail on the plans for similar structures designed and constructed in the LGI program.

Recommendations

1. Ensure expansion joints covers are provided and installed per the plans and specifications.

Inspection Date: 1 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Salfit

Project: Rehabilitation of the Main Entrances of East Salfit Cluster – Phase II Marda

Program: LGI

Description: This project consists of 750 meters of sidewalks and 1500 m2 of road work.

Description of Road

The work included the installation of sidewalks, signage, base course and asphalt paving.

Background

As-built and tender drawings were provided for review.

Discussion of Findings

The work appears to be performed to a good level of quality.

Field Observations

1. No issues observed.

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

1. No comments.

Inspection Date: 1 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Salfit

Project: Rehabilitation of Main Marda Water Well

Program: LGI

Description: The project includes cleaning and plastering the walls of the well and landscaping the surrounding area.

Description of Structure

The Marda Water Well appears to be an old stone masonry structure, with a concrete and block masonry building above, which protects an artesian well that provides water to the local community.

Background

As-built and tender drawings were provided for review.

Discussion of Findings

No issues were observed.

Field Observations

1. No issues were observed.

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

1. No comments.

Inspection Date: 1 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Salfit

Project: Finishing and External Works for Qira Primary Co-Educational School

Program: LGI

Description: The project provided finishing works for three classrooms and seven facilities in addition to external works, which included paving the playground, rehabilitation of retaining walls and the construction of sidewalks. Additionally, the project included renovation of seven classrooms and a kitchen in the existing school.

Description of Structure

The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams. The design and construction of the floor and roof diaphragms is unknown.

Background

The project was completed in November 2012. As-built and tender drawings were provided for review.

Discussion of Findings

The interior of the building and the roof were inspected. The computer class room has been locked and vacant since project completion.

Field Observations

1. Roof penetration lacks water proofing (photos 1, 4)
2. Pipe insulation not complete (photos 4, 6)
3. Incomplete installation of drain pipe (photo 6)
4. Paint and plaster degrading (photos 7, 9)
5. Wireless router hanging from lightning rod (photo 8)

Isolated Deficiencies

1. Roof penetration lacks water proofing. Moisture can enter into walls where penetrations have not been properly weatherproofed.
2. Pipe insulation not complete. Joints in the water pipe on the roof are wrapped with a non-durable tape.
3. Incomplete installation of drain pipe. A drain pipe is left without a permanent termination and the pipe support has a rock inserted, presumably as a temporary measure.
4. Wireless router hanging from lightning rod.

Systematic Deficiencies

1. Paint and plaster degrading. This is likely due to water intrusion from the joint between the capstone and the plaster face of the parapet. This type of parapet is not shown on the parapet details in the plans, Sheet AD15.

Recommendations

1. Ensure water proofing work is complete and meets quality standards prior to acceptance.
2. Ensure pipes are insulated per the specifications and the manufacturer's recommendations.
3. Ensure plumbing works are completed.
4. Ensure all necessary parapet cap flashing details are provided in the plans. (See Detail Sheet AD15).
5. Ensure the requirements and needs of the school, such as providing for wireless communications, have been considered during the planning phase.

Inspection Date: 1 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Salfit

Project: Rehabilitation of Clinic in Hares

Program: EWAS II

Description: This project included painting walls and ceilings for the ground floor and stairwell, maintenance of windows and doors, repairing the roof insulation and water proofing, installing new roof insulation over the stairwell, upgrading the solar water heating system, replacing electrical fixtures, wiring and outlets, rehabilitating toilets, installing new fixtures, installing new sinks in the examination rooms, and extension of the pharmacy room and kitchen.

Description of Structure

The building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams. The design and construction of the floor and roof diaphragms is unknown.

Background

This project was completed in May 2010. Plans and specifications were not available for review.

Discussion of Findings

While the scope of work did not require a high degree of skill, the workmanship and selection of materials for this project were of low quality.

Field Observations

1. Paint easily separates from walls when adhesive tape is removed. (photos 1, 10).
2. Low quality fixtures have been installed (photos 2, 4, 5, 6, 7).
3. Existing equipment not protected from paint and paint not cleaned off (photo 3).
4. Access panel rusting and not secured with a latching device (photo 8).
5. Low quality mini blinds have been installed (photo 9).

Isolated Deficiencies

1. Existing equipment not protected from paint.
2. Access panel rusting and not secured with a latching device.
3. Low quality mini blinds installed. Public facilities require industrial grade features.

Systematic Deficiencies

1. Paint not adhering to walls. This is the result of poor surface preparation, paint selection and/or workmanship.
2. Low quality fixtures installed. Residential grade fixtures and appurtenances have been installed in the restrooms. Public facilities require industrial grade and medical facilities require sanitizable grade fixtures.

Recommendations

1. Ensure surfaces are properly prepared and primed, if necessary, and paints selected and applied appropriately for surfaces.
2. Ensure plans and specs for hospitals and clinics specify the appropriate level of quality and ensure the contractor installs per the plans and specifications.
3. Protect adjacent surfaces from paint. Clean adjacent surfaces after painting.
4. Ensure metal works are primed and painted per specs or building code.
5. Ensure plans and specs for hospitals and clinics specify the appropriate level of quality for installation of features such as mini-blinds and ensure the contractor installs per the plans and specifications.

Inspection Date: 1 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Salfit

Project: Rehabilitation of the Main Entrances of East Salfit Cluster – Phase IV Kifl Haris

Program: LGI

Description: This project consists of approximately 338 meters of road work with sidewalks on both sides.

Description of Road

The work included the installation of sidewalks, signage, base course and asphalt paving.

Background

As-built and tender drawings were provided for review.

Discussion of Findings

The work appears to be performed to a good level of quality with only a couple of minor concerns.

Field Observations

1. The curb stones at a driveway intersection are not set in concrete (photos 1, 2, 3, 8).
2. Trees have been planted in the sidewalk without planters (photos 4, 5, 6, 7).

Isolated Deficiencies

1. Curb stones not set in concrete. It is possible that the concrete was removed during the subsequent installation of an underground utility, however, there is no evidence that the concrete had ever been there in the first place.
2. Trees planted in sidewalk. The paver sidewalk has been damaged, and the location of the trees will inhibit use of the sidewalk by pedestrians in several locations.

Systematic Deficiencies

None observed.

Recommendations

1. Ensure curbs are built in accordance with plans and specifications (See curb detail on sheet 11).

Ensure community requirements and needs are considered in the planning phase of public utilities and included in the design.

Inspection Date: 2 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Jerusalem

Project: Construction of 8 Additional Classrooms at El Ezzariah Girls' High School

Program: EWAS II

Description: Construction of 8 classrooms, including external columns constructed independent of the existing structure. Some of the painting was local participation.

Description of Structure

The existing building is assumed to be an older type of construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams. The design and construction of the floor and roof diaphragms is unknown. The first floor structure is existing and the additional 8 classrooms are on the second floor level.

Background

This project was completed in June 2010. Plans and specifications were not available for review.

Discussion of Findings

The building interior and roof were inspected. The primary issues discovered in this inspection were related to paint not adhering to walls, plaster cracking and improper installation of flashing.

Field Observations

1. Paint on signage is faded to not visible (photo 1, 2).
2. Paint peeling from walls (photos 3, 4).
3. Moisture is causing damage to external plaster (photos 5, 7, 19).
4. Plaster is cracking between columns and block walls (photos 6, 12).
5. Electrical panel is marked "Danger" but does not have a lock-out mechanism (photo 8).
6. Joint filler is detaching at expansion joint (photo 11).
7. Expansion joint cover is bending and warping (photos 9, 10, 11).
8. Moisture is causing damage to internal plaster and paint throughout the building (photos 5, 12, 13, 14, 15).
9. Flashing is improperly installed (photos 16, 17, 18, 20).

Isolated Deficiencies

1. Electrical panel does not have a lock-out mechanism. Electrical panels and equipment need to be locked to prevent injury or death of unqualified personnel.

Systematic Deficiencies

1. Paint on signage is faded. Paint fading can result from poor surface preparation, paint selection and/or workmanship.
2. Paint peeling from walls. This can also result from poor surface preparation, paint selection and/or workmanship.
3. External plaster is cracking. It appears that moisture is causing damage to external plaster. One possible cause in some locations is improper flashing at the parapet.
4. Plaster cracking between columns and block walls. Movement or shrinkage between the structural concrete column and the masonry wall creates cracking in the plaster.
5. Joint filler detaching at expansion joint. Possible causes for this detachment could be that the joint was not cleaned sufficiently, that incorrect material was used as a sealant, and/or the sealant was not applied to the proper depth.
2. Expansion joint cover not properly installed. The expansion joint cover material is not a product intended for this purpose, and is also attached on both sides of the joint which does not permit for movement.
3. Internal plaster and paint flaking. Moisture in the walls is causing the plaster and paint to weaken and detach from the sub-walls. The probable cause is water proofing at the roof, parapets and windows. Flashing does not continue under the capping on parapets. Caulk, alone, is being used to water proof the top edge of the metal strip. The caulk is drying and cracking and permitting water to enter the walls
6. Flashing improperly installed.

Recommendations.

1. Ensure surfaces are properly prepared and primed, if necessary, and paints selected and applied appropriately for surfaces to be painted.
2. Ensure anchors are design/constructed connecting CMU and columns.
3. Use electrical panels designed for use in public areas which can be locked.
4. Ensure joint is prepped, backing rods used for appropriate depth and that sealant is applied to proper depth.
5. Ensure expansion joints covers are provided and installed per the plans and specifications and which are designed for this purpose.
6. Ensure flashing is installed per plans and specs or building code. Ensure exterior weather proofing is accomplished per plans and specs or building code and is performed in a workmanlike manner.

Inspection Date: 2 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Jerusalem

Project: Rehabilitation Works for the Four Homes of Mercy of the Arab Orthodox Society in Al-Eizariya

Program: LGI

Description: This project included the rehabilitation works for patient rooms in the men's ward, painting for the pharmacy, veranda, director's room and corridor. It also included the rehabilitation of all sanitary units, replacement of aluminum for windows and doors and the construction of a sun shade. Split units Air Conditioning was provided in some areas to control temperature and humidity.

Description of Structure

The work for this project did not add to or alter the building structure. The building structural frame is unknown. The sun shade is constructed primarily from metal tubing columns and I-beams which are connected to the building.

Background

This project was completed in June 2012. As-built and tender drawings were provided and available for review.

Discussion of Findings

The overall quality and selection of materials appears to be good.

Field Observations

1. No comments.

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. None observed.

Recommendations

1. No comments.

Inspection Date: 2 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Jerusalem

Project: Construction of Health Center in Ash Sheikh Sa'd

Program: LGI

Description: This project is for the construction of a new 400 m2 health clinic. The clinic includes 3 doctors' rooms, a nurse's room, a storage room, a lab, an X-ray room, a pharmacy, a meeting room, a waiting hall, a secretary's office, an emergency room, a kitchen and 4 sanitary units, in addition to a 350 m2 parking lot.

Description of Structure

Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Background

This project is currently under construction and is in the finishes stage of construction. Tender drawings were provided

Discussion of Findings

The interior, exterior and roof were inspected. The overall quality of this facility looks good.

Field Observations

1. Poor quality/missing door strikes (photos 1, 2, 3).
2. Lack of bracing for vertical pipe runs (photos 4, 5, 6).

Isolated Deficiencies

None observed.

Systematic Deficiencies

1. Poor quality door strikes. Most door frames have nothing more than holes cut in the frame for latching. It is possibly a common industry practice to not install strike plates.
2. Lack of anchorage or poor anchorage to wall for vertical pipes.

Recommendations

1. Add strike plates to door hardware schedule, especially when using higher quality door hardware.
2. Ensure bracing is provided for vertical piping per plans and specs or building code.

Inspection Date: 2 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Jericho

Project: A- Aqabet Jaber Refugee Camp Internal Roads and Water Pipes Network

Program: INP I

Description: This project provided for the reconstruction 3.37 km of roads.

Description of Structure

The project includes the construction of new embankment, new base course layers and new asphalt structural pavement. It also included the construction of retaining walls and a storm water drainage system.

Background

The project was completed in March 2010. As-built drawings were provided for review.

Discussion of Findings

The roadway provided for a smooth ride and looks good overall.

Field Observations

1. Cracks forming in the pavement were observed near the entrance to the village (photos 1, 2)

Isolated Deficiencies

1. Cracks in the pavement. Some vehicles on the road may exceed the design loads for those vehicles, resulting in a higher axle weight than anticipated.

Systematic Deficiencies

1. None observed.

Recommendations

1. Seal cracks and ensure designs consider the type of vehicles and potential axle weight of the vehicle.

Inspection Date: 3 Feb 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Ramallah

Project: Bil'in Water Reservoir Project

Program: PCID

Description: Construction of a 500 m3 elevated water reservoir and rehabilitation of the internal water network for Bil'in

Description of Structure

The Bil'in Water Reservoir Project is currently under construction (see photos 1-3). This work includes construction of foundations, grade beams, columns, stairs, reservoir, placement of pipes, reducers, gate valves, main panel, switchers, circuit breakers, multi phase fuses, and lighting fixtures.

Background

Questions were asked regarding design and use of building codes. There were no plans provided for the audit team. An inspection of the construction site followed afterwards.

Discussion of Findings

There is no knowledge whether proper detailing of reinforcing, lap splices and stirrups were placed or if there was proper placement of footings, grade beams, stairs, slabs and reservoir appears that comply with design standards. The welding on the railing is not general compliance with AWS D1.1 requirements. There were records of construction inspection reports and concrete testing that were reviewed and appeared to be in order.

Field Observations

1. There is some slight shrinkage cracking in the top slab of the reservoir. This is not a structural or serviceability issue.
2. There is a thin cementatious coating on the outside surface of the concrete (see photo 4). The finish surface will be painted, from inspection of similar reservoir facilities, the paint will start to crack and peel within 3-4 years.
3. All of the welds in the railing were ground flush. This was done to remove weld flaws, however there were several sections of burn-throughs (see photo 5). The railing was fabricated using a standard weight pipe. There is also evidence of welding on galvanized surfaces.

Isolated Deficiencies

1. Shrinkage in concrete surface.

Systematic Deficiencies

1. The railing was fabricated using standard weight pipe, which is too thin.
2. Weld flaws-Inadequate quality control and visual inspection of welds per AISC 325, Steel Construction Manual, 14th Edition by American Institute of Steel Construction. 2011, and American Welding Society (AWS) AWS D1.1, Structural Welding Code – Steel requirements, Sections 6.1-6.9 & Table 6.1.
3. Welding on steel galvanized surfaces. Welding on galvanized surfaces is considered hazardous and when made, the weld material becomes contaminated from the zinc coating resulting in a lower strength weld. The heated zinc also vaporizes into metal droplets and when inhaled, results in metal fume fever. The symptoms of metal fume fever are severe thirst, pain in the legs, shivering, congestion in the head, dryness, tickling of the throat, and a cough. In very bad cases the victims feel severe shivering, a high fever, buzzing in the ears, nausea, vomiting, and even hallucinations and convulsions. Refer to the American National Standards Institute (ANSI). Safety in Welding, Cutting, and Allied Processes, Z49.1 for guidance on this subject.

Recommendations

1. Do not cover the surface of the concrete. It will begin to peel within 3-4 years.
2. To keep the pipe from corroding prematurely, use an extra strong or double extra strong pipe should be used.
3. Make all welds according to American Welding Society (AWS) AWS D1.1, Structural Welding Code – Steel requirements, Sections 6.1-6.9 & Table 6.1.

Inspection Date: 3 Feb 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Ramallah

Project: Aboud Main Road

Program: INP II

Description: Mill and overlay w/rehabilitation of Aboud Main Road
.

Description of Roadway

The Aboud Main Road is in Ramallah (see photos 1-3). This road was constructed in 20__.

Background

Questions were asked regarding design and use of building codes. Plans were not available for this project. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards. All of the guardrails and posts were checked for compliance to design standards, proper installation and condition.

Discussion of Findings

With some exceptions, the design and construction of the Aboud Main Road was done according to some plan, correct application of road design standards and specifications. Most of the deterioration found was related to cracking and possible truck overloading.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. No signs of raveling or breaking up at the pavement free edges.
3. No evidence of alligator and block cracking.
4. No signs of polishing of surface binder and exposure of aggregate particles.
5. Some areas of abrasion wear.
6. No potholes, blow ups or signs of rutting in the pavement.
7. The ride quality of the pavement is good in most places, however there are combinations of longitudinal and transverse cracking at 20-30 ft (6-9 m) intervals (see photos 4-5).
8. There are isolated areas of heat damage due to burning (see photo 6).
9. Most of the stripping was worn off.
10. There are sections of damaged guardrail posts and railing (see photo 7).
11. There are several sections of patchwork along the curbs (see photo 8).

12. The pavement wearing course, binder course, and subgrade base course appears to meet specification and design requirements.
13. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg).

Isolated Deficiencies

1. Worn stripping
2. Patchwork along the curbs

Systematic Deficiencies

1. Longitudinal and transverse cracking

Recommendations

1. Seal the cracks in the pavement.
2. Use a higher quality and thicker stripping material.
3. Repair the guardrail posts and railing.
4. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
5. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
6. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
7. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 3 Feb 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Ramallah

Project: Ein Sinya-Wadi Albalat Road

Program: INP II

Description: Construction of Ein Sinya- Wadi Albalat Road
.

Description of Roadway

The Ein Sinya-Wadi Albalat Road is between Nablus and Ramallah (see photos 1-2). This road was constructed in 2014.

Background

Questions were asked regarding design and use of building codes. Plans were available for this project. An inspection of the construction site followed afterwards.

A combination of Jordanian, Israeli and American specifications was used for embankment placement, compaction of subgrade, asphalt mix design, pavement placement and retaining wall construction. The roadway subgrade was checked for construction, compaction and condition. The bituminous pavement was visually inspected for correct thickness, placement and cracking. All of the retaining structures were checked for signs of cracking, overturning, sliding, bearing failures and general compliance to design and construction according to applicable codes and standards. All of the guardrails and posts were checked for compliance to design standards, proper installation and condition.

Discussion of Findings

With some exceptions, the design and construction of the Aboud Main Road was done according to plan, correct application of road design standards and specifications.

Field Observations

1. The roadway subgrade was checked for construction, compaction and condition and found to be adequate.
2. No signs of raveling or breaking up at the pavement free edges.
3. No evidence of alligator and block cracking.
4. No signs of polishing of surface binder and exposure of aggregate particles.
5. No potholes, blow ups or signs of rutting in the pavement.
6. The pavement wearing course, binder course, and subgrade base course meets specification, thickness and design requirements.
7. The ride quality of the pavement is good.
8. There is a large section of rubble stone retaining wall (see photo 3). These retaining structures are not consistent with any code or standard or with the reinforced concrete retaining wall standards developed by Black & Veatch and presented to the audit team as a standard design in current use.

In addition, the rubble stone retaining walls have no foundation to resist sliding, overturning, bearing, settlement and overall stability.

9. The drainage structures were inspected and found to be adequate (see photos 4-5).
10. There are sections of damaged guardrail posts and railing (see photo 6). For this highway, the guardrail, transitions and end terminals are not considered crashworthy per AASHTO standards. Typically guardrail cannot withstand the impact of a vehicle just by the strength of the individual posts and railing. Guardrail functions as a system with the guardrail, posts, connection of rail to the posts, and the end anchors (or terminals). All of these sections play an integral role in how they will function upon impact. In addition, soil conditions, height of rail, presence of curb, weight of impacting vehicle, distance from back of post to hinge point and depth of post within soil will also determine how well the system will function upon impact.
11. The end terminals are similar to a turn down end treatment (see photo 7). Although turned-down end treatments can be successful at preventing vehicular impalements, several years of field experience and crash testing in the U.S. showed that these systems had a tendency to not only vault and roll vehicles but also to channel vehicles into an impact with large objects that the guardrail was intended to shield. These turned-down end treatments were installed extensively in several states in the 1960's and 1970’s, came into disfavor in the 1980’s, and were widely discontinued in the early 1990's.
12. The OM Type 3 object markers are installed in the wrong location (see photo 7).
13. There are several rock quarries and concrete ready mix plants in the area that transport large boulders, crushed rock and concrete. In some cases, single axle trucks were observed that exceeded 92,000 lbs (41,813 kg) in gross vehicle weight (GVW) with axle weights exceeding 60,000 lbs (27,240 kg). For reference, most government agencies limit GVW to 72,000 lbs (32,000 kg) with axle weights restricted to 32,000 lbs (14,528 kg).

Isolated Deficiencies

1. Worn stripping

Systematic Deficiencies

1. Retaining walls do not meet requirements in AASHTO Geometric Design of Highways and Streets, Section 4.10, design requirements related to improper detailing and installation of reinforcing steel per 1997 UBC, Chapter 16, Section 1611.6 and Chapter 19, Section 1907 requirements and American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete.
2. Guardrail installed is not considered crashworthy per AASHTO Geometric Design of Highways and Streets, Section 2.8.1.
3. The guardrail, transitions and end terminals are not considered crashworthy per AASHTO Geometric Design of Highways and Streets, Section 4.10.
4. Incorrect placement of OM Type 3 object markers per AASHTO Geometric Design of Highways and Streets, Section 7.2.6.

Recommendations

1. Seal the cracks in the pavement.
2. Use a higher quality and thicker stripping material.
3. Repair and upgrade the guardrail posts, railing to, transitions and terminals to meet AASHTO Geometric Design of Highways and Streets standards.
4. Reinstall the OM Type 3 object markers behind the guardrail.

5. Develop a pavement preventive maintenance program. A planned strategy is needed to develop cost-effective treatments to existing roadway systems and appurtenances to preserve and extend the life, retard deterioration, and maintain or improve the functional condition of the system. This should include a strategy for increasing pavement thickness to address overloading.
6. Develop a pavement reconstruction program that involves complete removal and replacement of the existing pavement and may include new and/or recycled materials.
7. Draft a Pavement Rehabilitation program that extends the service life of existing pavements and improve load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.
8. Develop a preventive maintenance program that involves a planned treatment on a road in good condition and is intended to preserve the system, retard future deterioration, prolong service life and delay the need for rehabilitation.

Inspection Date: 3 Feb 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Ramallah

Project: Training and commissioning - West Bank Water Department

Program: INP II

Description: Training and commissioning - West Bank Water Department

Description of Structure

This work included supply and installation of PLC, SCADA, server cabinets, server, breaker box, main panel, switches, circuit breakers, lighting fixtures, AC unit, computers, monitors and windows (see photo 1).

Background

This work was completed in 2014. No plans were made available for this project.

Discussion of Findings

The computer server, breaker box, main panel, switches, circuit breakers, and lighting fixtures were inspected and found to be correctly installed and working (see photos 2-3). The floor and paint finishes were holding up adequately.

Field Observations

1. No seismic upgrade of building.
2. No seismic anchors on PLC, SCADA, server cabinets, monitors or computers.

Isolated Deficiencies

1. None observed

Systematic Deficiencies

1. No seismic upgrade of building.
2. No seismic anchors on PLC, SCADA, server cabinets, monitors or computers..

Recommendations

1. Upgrade the building for seismic loads per ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings.
2. Install seismic anchors on PLC, SCADA , server cabinets, monitors and computers.

Inspection Date: 3 February 2015

Inspector: [redacted], P.E., US Army Corps of Engineers, Northwestern Division

Location: Deir Qeddis Village, Ramallah Governorate

Project: Construction of Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School

Program: PCID

Description: Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Description of Structure

The design of the Deir Qeddis Elementary Girls School is an older type of building construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams (see photos 1-2). The floor and roof diaphragms consist of cast in place concrete beams with infill hollow core CMU.

Background

At the time of this inspection, the original prime Contractor had been dismissed due to deficiencies in workmanship and a new Contractor had been awarded the work to complete the Deir Qeddis Elementary Girls School. Previous construction photos, copies of product submittals and testing reports were provided for inspection and reviewed. Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards.

Discussion of Findings

Most buildings are designed and constructed utilizing the floor and roof system as a structural diaphragm to transfer lateral loads to shear walls or frames. These are usually constructed of plywood, oriented strand board, metal deck, composite metal deck or a concrete slab in concrete construction.

The concrete beam and block configuration of the floor and ceiling design of the Deir Qeddis Elementary Girls School is held in place with friction only, there is no interlocking mechanism to prevent the blocks from falling out if there is any excessive deflection from loads or movement due to seismic events (see photos 3-4). The existing floor and ceiling have limited capability to act as a shear panel to carry in-plane shear loads.

This means that the floors and ceilings have limited capacity to transfer loads into the shear walls or to resist tension and compressive forces. Because of this, there is a strong risk for collapse of the ceiling and floors during a small to moderate seismic event.

In buildings, infill walls are used to help resist lateral loads due to heavy wind and seismic loading. The frame and infill wall should be connected to behave like a shear wall and serve as a diagonal compression strut between the intersections of the frame members. The infill walls of the Deir Qeddis Elementary Girls School are not reinforced or anchored into the frame, therefore the members will not fully engage the framing and the capacity of the diagonal compression struts will not be developed. This also means that there is not sufficient shear strength and ductility of the concrete columns to resist racking of the unreinforced infill, and that there is a strong risk for collapse of the infill walls during a small to moderate seismic event.

Field Observations

3. There were several sections in the floor and ceiling of honey combing, exposed reinforcing and cracked CMU's (see photos 3-4).
4. There is improper detailing and installation of reinforcing steel. Picture 5 shows typical column reinforcing with improper spacing and lap development length (12" measured where 20" is needed).
5. Several areas of floor had excessive unbalanced loads from storage of construction materials. Picture 6 shows stacks of CMU's that have a combined weight of over 27,000 lbs.
6. There was no observed horizontal reinforcing steel in the construction of the retaining wall (see photo 7).

Isolated Deficiencies

1. Improper detailing and installation of reinforcing steel per 1997 UBC, Chapter 19, Section 1907 requirements and American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete.
2. No horizontal reinforcement in the retaining wall per American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete, Section 14.3.3.
3. Overloading floor systems during construction.

Systematic Deficiencies

1. Inadequate design of structural diaphragms. Floor and roof design does not meet 1997 UBC, Chapter 16, Section 1607 requirements for distribution of live loads and Division IV requirements for earthquake design.
2. Inadequate design of infill masonry. Infill walls do not meet 1997 UBC, Chapter 16, Section 1611.4 requirements for anchorage of concrete and masonry walls.
3. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.

Recommendations

1. Re-evaluate the building structure and if necessary, retrofit the diaphragm and infill masonry wall designs per ASCE 41-13 requirements, to insure adequate transfer of seismic forces into cords, collectors, and shear walls.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Rehabilitation of the Water Network, Um Salamunah

Program: EWAS II

Description: This project rehabilitated and replaced 2000 meters of 2” and smaller water lines in the village.

Description of System

The project included excavation, installation of pipe lines and fittings, reinstatement and asphalt works to repair road cuts.

Background

This project was completed in April 2013. Plans and specifications were not available for review.

Discussion of Findings

The local community expressed that there are frequent water outages and lack of water pressure is a constant problem. Since most of the work is underground utilities the only elements inspected were a valve hand hole and water meters for the houses.

Field Observations

1. Inadequate water pressure in village. One resident added a booster pump below the meter (photo 1).
2. Valve knob in hand hole is broken (photo 2)
3. Water meter boxes rusting and broken (photo 3)

Isolated Deficiencies

1. Low water pressure. Possible causes posed by locals: local stone quarries using all available water; lack of water provided by Israel; growth of settlements; illegal line taps.
2. Broken valve knob. The knob could be broken due to quality, force required to operate valve or abuse

Systematic Deficiencies

1. Broken water meter boxes. The water meter boxes are light gauge metal and damaged.

Recommendations

1. Ensure community planning is considered and all requirements are gathered in the planning phase of project development.

2. Ensure valves and piping accessories are specified for industrial use in public utilities. Ensure installation is according to plans and specifications
3. Ensure accessories such as valve boxes are specified for industrial use in public utilities.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Construction of Health Clinic in Marah Rabah

Program: LGI

Description: This project is for the construction of a 375 m2 health center, which will contain a basement floor and ground floor. The project will include a storage area in the basement, clinics for women and children, maternal care facilities, vaccination facilities and a laboratory. The project also includes some external works like tiling, construction of a boundary wall and a septic tank.

Description of Structure

Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Background

The project is currently under construction. Plans and specs not available for review

Discussion of Findings

The interior, exterior and roof were inspected. The overall quality of this facility looks good.

Field Observations

1. No strike plates on door frames, even for high quality lock set (photos 1, 2).
2. Use of anchor bolts on security bars (photo 3).

Isolated Deficiencies

1. None observed.

Systematic Deficiencies

1. No strike plates. Most door frames have nothing more than holes cut in the frame for latching. It is possibly a common industry practice to not install strike plates.
2. Anchor bolts on security bars. An intruder could remove security bars with a wrench.

Recommendations

1. Add strike plates to door hardware schedule, especially when using higher quality hardware.
2. Ensure anti-intrusion features are designed and constructed in a manner that cannot be easily compromised.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Well Station Rehabilitation Project – PWA 1

Program: INP I

Description: The project entails removing and delivering the standby diesel generator system to the PWA, building a new electrical room and operation room, removing an existing shed, enclosing the MCC in a new structure, remodeling the existing guard room, supplying and installing a new well pump, ancillaries and riser pipe, supplying and installing a new VFD for a well pump, supplying and installing three new soft-start and soft-shutdown units for booster pumps, replacing booster pump motors, replacing and/or repairing all defected valves and fittings, replacing chlorine dosing pumps, putting into operation the whole chlorine system, and repairing and putting into operation the entire alarm system.

Description of Structure

The structures on this project are cast-in-place concrete frame with masonry walls.

Background

This project was complete in June 2011. As-built drawings were provided for review.

Discussion of Findings

The quality of this project appears good.

Field Observations

1. Gauge is damaged and corroding (photo 1)

Isolated Deficiencies

1. Damaged gauge. The gage may have been damaged after construction completion.

Systematic Deficiencies

1. None observed.

Recommendations

1. Ensure installed equipment is new and in good condition.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Well #17 Pump Station and Conveyance System (Project Partially Terminated)

Program: INP II

Description: Well drilled, then abandoned after a drastic drop in the eastern aquifer of 70 meters. The cause of the drop is under investigations.

Description of Structure

Not applicable.

Background

This project was terminated in January 2013. Plans and specifications were not available for review. A geotechnical report was provided.

Discussion of Findings

The site was visited, however the only visible element of the project is a locked box on top of the well shaft to prevent tampering.

Field Observations

1. No comments.

Isolated Deficiencies

1. No comments.

Systematic Deficiencies

1. No comments.

Recommendations

1. No comments.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Well Station Rehabilitation Project – PWA 3

Program: INP I

Description: The project entails replacing existing well pumps with new ones, repairing existing vertical canned booster pumps and replacing one, replacing all the electrical motors, repairing existing switchgear, providing a new switchgear (medium voltage, low voltage and control), constructing new electrical buildings and extensions for guard rooms, adding new electrical equipment and control for the submersible pump and booster pumps, MV-VFD and soft starters, adding booster pumps, control valves and surge tanks, upgrading existing chlorination room and chlorination system, and repairing and upgrading electrical conduits and wiring.

Description of Structure

The structures on this project are cast-in-place concrete frame with masonry walls.

Background

This project was completed in July 2011. Plans and specifications were not available for review.

Discussion of Findings

The general quality of this project is good. The primary area of concern is in the chlorination building.

Field Observations

1. Corrosion of paint and concrete in chlorination room (photos 1, 2, 3)
2. Wall penetration lacks sealing or escutcheon (photo 4)
3. Line from chlorination room is corroding and leaking (photos 4, 5)

Isolated Deficiencies

1. Wall penetration lacks sealing or escutcheon. Moisture can enter into walls where penetrations have not been properly weatherproofed

Systematic Deficiencies

1. Corrosion of paint and concrete in chlorination room. Chlorine is leaking and damaging the paint and concrete floor.

2. Line from chlorination room is corroding and leaking. Concerning the piping systems in general, including fasteners, there appears to a systemic problem with addressing dissimilar metals. These corrosion problems become exacerbated in water treatment facilities.

Recommendations

1. Ensure all lines and fittings are designed and installed with methods and materials intended for chlorination systems. Provide sufficient ventilation for chlorination areas. Paints should be selected appropriately for use.
2. Ensure work, such as waterproofing and the installation of escutcheons is complete and meets quality standards prior to acceptance.
3. Better care in the both the design, selection and ultimate installation of the appropriate material for the application is warranted. Care in recognizing the overall corrosion control concerns will provide longer facility life, improve reliability and reduced maintenance cost. The use of dielectric connectors in the design and installation when faced with dissimilar metal issues along with the correct selection and application of coatings to combat corrosion related concerns.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Well Station Rehabilitation Project – JWC 4

Program: INP I

Description: This project entails replacing the existing well pumps with new ones, repairing VFD, switchgear and panels, replacing existing booster pumps with new ones, installing surge tanks and a protection system, replacing existing chlorination system with a new system, repairing and commissioning the electrical systems, and installing a new soft starter.

Description of Structure

The structures on this project are cast-in-place concrete frame with masonry walls.

Background

This project was completed in October 2011. CADD drawings were provided for review.

Discussion of Findings

The general quality of this project is good.

Field Observations

1. Missing ventilation fan motor in Chlorination Room (Photo 1)

Isolated Deficiencies

1. Missing ventilation fan. Proper ventilation is needed to address corrosion control in wet environments, not to mention the health safety concerns with keeping the breathing air within the space at acceptable levels.

Systematic Deficiencies

1. None observed.

Recommendations

1. Ensure equipment is designed for intended used and installed according to plans and specifications.

Inspection Date: 3 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Wadi Al Nar Road (Segment V)

Program: INP II

Description: This project involved the milling and Overlay of 1.082 km of the Wadi Al Nar (Segment V) Road in addition to safety enhancement (milling and road marking) for 0.83 km. The road is a two-lane regional road that connects the Northern districts of the West Bank to the Southern ones. The road serves as the primary road for all commercial and residential traffic travelling between the Northern and Southern West Bank. Roadwork is sited in Area B.

Description of Road

The project included milling the existing asphalt layer and overlay of a fresh asphalt layer on specified sections of the roadway. Work also included road widening, slope cut, excavation works, embankment filling, pavement layer construction for the widened area and/or patching and leveling, installation and/or rehabilitation of storm water drainage systems, sewerage works, retaining gravity walls, installation of safety features, landscaping, and any works needed to complete this project as specified. Safety features included road marking, guardrails, cat eyes and traffic signs. The work also included roadway lighting using solar panels with battery packs.

Background

This project was completed in October 2013. As-built drawings were provided for review.

Discussion of Findings

The quality of this project was very high. The ride on the road was smooth and all features appeared to be built with good quality materials and constructed in a workmanlike manner.

Field Observations

1. Road quality is good, holding up well (photos 1, 2)
2. Broken sign posts (photo 3)
3. Rebar protruding from the surface of the concrete shoulder (photo 4)
4. Erosion in planter areas (photo 5)

Isolated Deficiencies

1. Broken sign posts. This is not necessarily a deficiency, but since posts are embedded in the concrete paving it would be expensive to replace. In areas where posts have a high probability of being damaged by traffic, a break-away post would offer easier, cheaper and quicker maintenance.
2. Rebar protruding from concrete shoulder. Rebar is not embedded in concrete appropriately.
3. Erosion in planter areas. There are wash ruts in soil from rainfall due to site grading.

Systematic Deficiencies

1. None observed.

Recommendations

1. Consider break-away posts (see detail "E" on sheet 28 of the Sinjil Road plans for an example).
2. Ensure wire mesh is installed in accordance with plans.
3. Ensure drainage is considered in slopes, grading and erosion prevention measures

Inspection Date: 4 February 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Northwestern Division
[redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Construction of a Secondary Boys school in Hindaza and Bureid'a

Program: LGI

Description: Cast in place reinforced concrete frame with unreinforced CMU infill shear walls.

Description of Structure

The design of the Secondary Boys School in Hindaza and Bureid'a is an older type of building construction that consists of a frame assembly of cast in place concrete beams and columns with walls that consist of unreinforced concrete block with no anchors to tie into the columns or beams (see photos 1-3). The floor and roof diaphragms consist of reinforced cast in place concrete.

Background

Questions were asked regarding design and use of building codes. An inspection of the construction site followed afterwards. There were no calculations, plans or specifications provided for this project.

Discussion of Findings

The Secondary Boys School in Hindaza and Bureid'a is designed and constructed with a roof and floor diaphragm that consists of a reinforced concrete slab.

In buildings, infill walls are used to help resist lateral loads due to heavy wind and seismic loading. The frame and infill wall should be connected to behave like a shear wall and serve as a diagonal compression strut between the intersections of the frame members. The infill walls of the Secondary Boys School in Hindaza and Bureid'a are not reinforced or anchored into the frame, therefore the members will not fully engage the framing and the capacity of the diagonal compression struts will not be developed. This also means that there is not sufficient shear strength and ductility of the concrete columns to resist racking of the unreinforced infill, and that there is a strong risk for collapse of the infill walls during a small to moderate seismic event.

Field Observations

4. There was no observed horizontal reinforcing steel in the construction of the building and retaining wall (see photos 4-5).
5. There is limited, minimal trowel finishing on the floor (see photo 6).
6. The placement of reinforcing, lap splices, ties and stirrups appear correct, however there are some areas where the rebar spacing is out of tolerance (see photo 7).
7. The design and construction of scaffolding on site does not meet any standard for requirements for erection, anchorage, maximum load, repair of damage, material requirements, span

restrictions, connections, safe ladder loads, minimum lumber size, guardrail requirements, bracing, etc (see photo 8).
8. There is no protection of the bituminous coating on concrete below grade (see photos 9, 11, 12).
9. Large rubble is mixed with backfill on sides of the building.
10. Pipe sleeves in concrete are deforming (see photo 10).

Isolated Deficiencies

1. Spacing of rebar. To ensure the structural integrity of the element, rebar needs to be kept within spacing tolerances.

Systematic Deficiencies

2. Inadequate design of infill masonry. Infill walls do not meet 1997 UBC, Chapter 16, Section 1611.4 requirements for anchorage of concrete and masonry walls.
3. No horizontal reinforcement in the retaining wall per American Concrete Institute ACI 318, Building Code Requirements for Structural Concrete, Section 14.3.3.
4. Inadequate design and construction of scaffolding per accepted code or standard.
5. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.
6. No protection of bituminous waterproofing. There is no protection of the bituminous coating from scratches by rocks, etc., permitting moisture to penetrate. Unsuitable backfill. Large rocks and rubble will prevent compaction, create voids or damage the waterproofing membrane.
7. Pipe sleeves deforming. Buried conduit and pipe sleeves through concrete which are not designed for this purpose can easily and unknowingly be crushed during concrete placement and soil compaction.

Recommendations

1. Re-evaluate the new and existing building structure and if necessary, retrofit the diaphragm and infill masonry wall designs per ASCE 41-13 requirements, to insure adequate transfer of seismic forces into cords, collectors, and shear walls.
2. Require that all design and construction scaffolding meet or exceed some standard similar to OSHA Standard 29 CFR, Section 1910. This should include but not be limited to requirements for erection, anchorage, maximum load, repair of damage, material requirements, span restrictions, connections, safe ladder loads, minimum lumber size, guardrail requirements, bracing, etc.
3. Ensure a suitable rigid insulation barrier is designed and installed between the waterproofing and the backfill material
4. Use only acceptable materials for backfill. Ensure work is compacted in accordance with building standards and completed to final grade.
5. Ensure appropriate grade and strength buried conduit and pipe sleeves are designed and constructed
6. Inspect rebar, falsework and form ties prior to concrete placement to ensure they are installed per the contract requirements and within tolerance.

Inspection Date: 4 Feb 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Northwestern Division
[redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem

Project: Holy Family Hospital

Program: EWAS II

Description: Renovation of the Postnatal Section at the Holy Family Hospital

Description of Structure

This work included renovation, plumbing, wiring, floor work, installation of windows and AC units for the Postnatal Section at the Holy Family Hospital (see photos 1-2).

Background

This work was completed in 2012. No plans were made available for this project.

Discussion of Findings

The rooms that were unoccupied were inspected. The floors and trim work were holding up adequately. There are sections of peeling paint on the walls.

Field Observations

3. The floors and trim work were holding up adequately.
4. There are sections of peeling paint on the walls.
5. There are bathroom fixtures that are showing premature wear, including soap dispensers, shower door, shower bar, grab bar, bidet hose, and toilet paper dispensers (see photos 3, 5-7, 9-10).
6. No seismic upgrade of building.
7. No seismic anchors on server cabinets, monitors or computers.
8. Ceiling tiles show water stains in one room (see photo 8).
9. Escutcheons not sealed (see photo 4).

Isolated Deficiencies

1. Peeling paint
2. The water stain on ceiling tile appears to be from the A/C duct.

Systematic Deficiencies

1. Inadequate quality of bathroom fixtures. Public facilities require industrial grade and medical facilities require sanitary grade fixtures and appurtenances.
2. No seismic upgrade of building.
3. No seismic anchors on server cabinets, monitors or computers.

4. Escutcheons not sealed. Non-sealed escutcheons can permit moisture to enter walls and allow mold and bacteria to grow in areas that cannot be sanitized.

Recommendations

1. Replace all inferior quality bathroom fixtures. Ensure plans and specs for hospitals and clinics specify the appropriate level of quality and ensure the contractor installs per the plans and specifications.
2. Paint sections of wall where it is needed. Select appropriate paints and ensure walls have been prepped appropriately before applying paint.
3. Upgrade the building for seismic loads per ASCE 41-13, Seismic Evaluation and Retrofit of Existing Buildings.
4. Install seismic anchors on server cabinets, monitors and computers.
5. Ensure all escutions and other wall penetrations are sealed.

Inspection Date: 4 Feb 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Northwestern Division
[redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem Governorate

Project: Construction of Bethlehem Old Market

Program: PCID

Description: Cast in place reinforced concrete manholes, inlet boxes and cast iron grates.

Description of Structure

This work includes the following:

Stage 1-Rehabilitation of the lower market and construction of additional floor. This phase includes design and construction of structural steel umbrellas.
Stage 2, Rehabilitation of upper market, construction of garbage compactor and finish work of additional floor.
Stage 3- Rehabilitation of Al-Najajreh Street.
Stage 4-Rehabilitation of the market connections and connections to existing infrastructure.

Background

This work is in early stage 1 construction (see photos 1-4). No plans, schedule, as builts or utility location maps were available for review for this project.

Discussion of Findings

2. Since there were no plans submitted for this project, the audit team cannot determine if there is any compliance with design, specifications codes or standards.

Field Observations

1. There is an extensive amount of excavation around the existing buildings, up to 2 meters deep in some areas. The excavation and removal of fill around 2 foundation walls of the middle building (see photo 5) have exposed the foundations and if allowed to weather or get wet, could cause the building walls to collapse due to overloading. There is a large pile of embankment stored against the wall of another building that can cause damage to the door and walls (see photo 6).
2. There is a large pile of trash on the jobsite (see photo 7).
3. The footings for the steel umbrellas appear to be inordinately large and deep (see photo 8).
4. Several questions were asked regarding the steel, welding, fabrication, finish and installation requirements of the umbrellas. Both the Engineer and Contractor had little or no knowledge of design and construction of steel structures.
5. Cracking due to inadequate curing and drying was observed in the newly cast concrete columns. Dry burlap was draped over the columns (see photos 9-11).
6. Some of the columns are not straight and bowing is visible (see photos 9-10).

7. The corners of the columns are not chamfered (see photos 9-10).

Isolated Deficiencies

1. Trash on jobsite.

Systematic Deficiencies

1. No as-builts or utility location maps available for this project.
2. Little or no control on construction activities for excavation and storage of fill. Inadequate oversight of construction activities per 1997 UBC, Section 106.3.5 requirements.
3. Excessively large foundation for steel umbrellas.
4. No knowledge of steel design or fabrication.
5. Lack of sufficient curing of concrete. Shrinkage and drying cracks are typically the result of temperature differentials in the concrete or moisture loss during curing. Moisture loss can be controlled by using appropriate curing methods.
6. Bowed column sides due to formwork bowing.
7. Column corners not chamfered. If the columns are an integral part of a wall, this is OK. If they are to be exposed, they should be chamfered

Recommendations

1. Shore the middle building immediately to prevent collapse or damage.
2. Validate the excavation and construction methods to determine whether the extensive volume of excavation is necessary to accomplish the stated scope and intended purposes of the project.
3. Remove the fill from the building fronts to prevent damage.
4. Remove the trash immediately from the jobsite and keep it clean.
5. Assign an Engineer, or other responsible qualified individual, to inspect the site daily and order the Contractor to remove all trash, provide safe egress to all workers and private property owners, require correct sloping and benching of excavation, and insure that the site is safe.
6. Require the Contractor to have a set of plans, specifications and as-builts on site at all times.
7. Require the Engineer to demonstrate, by providing sufficient calculations, that the footings are correctly sized and meet the load requirements outlined in UBC 1997, Chapter 16. This should also include knowledge of design and code requirements for steel design, design of structural fasteners and anchors, and design of weldments.
8. Require the Contractor/and or Contractor's representative to demonstrate the knowledge necessary to construct and install the structural steel umbrellas. This needs to include but not be limited to the following:
    a. An understanding of cutting, punching, drilling and bolt installation for steel construction.
    b. Identifying basic weld symbols.
    c. Understand the requirements in the welding code.
    d. Know the pre-qualified welding procedure specifications.
    e. Specify the correct preheat and interpass temperature requirements.
    f. Identify what electrode consumables are required and how to store them.
    g. Meet the qualifications of being able to make a tack, fillet, groove, partial or full penetration weld per AWS D1.1 or the equivalent.
9. Use approved and effective curing methods. For example, it is difficult to control moisture loss in vertical concrete structural elements by using water curing methods alone.

10. Ensure formwork is designed by qualified and competent personnel. Inspect rebar, formwork, chamfer strips, falsework and form ties prior to concrete placement to ensure they are installed per the contract requirements and within tolerance.
11. Use chamfers on corners of exposed structural features such as columns.

Inspection Date: 4 Feb 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Northwestern Division
[redacted], P.E., US Army Corps of Engineers, Fort Worth District

Location: Bethlehem Governorate

Project: Construction of Storm Water Drainage System at Al Doha Town

Program: PCID

Description: Cast in place reinforced concrete manholes, inlet boxes and cast iron grates.

Description of Structure

This work included supply and installation of 787 m of pipe, manholes and inlets. Work also included repair of pavement from excavation (see photos 1-2).

Background

This work was completed in 2014. No plans were made available for this project.

Discussion of Findings

1. No manholes could be opened and inspected. The grating was visually inspected for correct placement of drainage pipe (see photo 3).

Field Observations

2. The audit team is unable to determine if the design and construction was done according to any plan, code or standard.

Isolated Deficiencies

1. None observed

Systematic Deficiencies

2. None observed

Recommendations

1. None

Review Date: 3 March 2015

Inspectors: [redacted], P.E., US Army Corps of Engineers, Northwestern Division District

Location: Aqqaba is 9.3 mi (15 km) Northeast of Jenin.

Project: Construction of Secondary Girls School in Aqqaba

Tender No: 24043-15-NW-SA001

Description: Plans and Calculations for Structural Details for Steel Pergola

Description of Structure

This work includes design, supply, fabrication and installation of footings along with square and rectangular structural steel tubing for a pergola.

Background

Plans and calculations were provided for this project by the USAID review team (see Exhibit A).

Discussion of Findings

Two (2) references were cited for the calculations. The first, a method of analysis used for analyzing the truss section based on guidelines from a circular published by the Tubular Structures, 11th international Symposium in 2006.

The second, "Structures V", edited by M.G. Coutie and G. Davies, shows various methods for analyzing truss sections based on guidelines from a circular published by the Tubular Structures, 5th international Symposium in 1993.

These collections vary in content and subject matter. They contain articles ranging from experimental investigations and methods for determining cord member yield capacity failures due to axial load and bending moment at the joint locations to column behavior of rectangular hollow sections to stability of axially compressed tubes and concrete filled hollow rectangular sections. They do not cover basis steel design requirements and do not meet any recognized international code or standard.

Isolated Deficiencies

1. None observed

Systematic Deficiencies

1. This design is incomplete. The design calculations provided appears to address cord member yield capacity due to axial load and bending moment at the joint location only.
2. There is no analysis shown that determines tension, compression, bending and shear based on methods of basic structural analysis.
3. There is no reference to determining member axial, bending and shear capacity, deflection and no calculations showing local and global stability is adequate.

4. There is no reference to material callouts, to any design codes or load requirements nor is there any information showing that any design of welds was made.
5. There is a reference note for weld callouts on the plan sheets that reads “All welds are fillet weld 5mm thick”. There are several sections where fillet weld connections cannot be made.
6. All of the fillet weld symbols shown on the plans are incorrect.
7. There is no reference to the design of the footings. This includes no reinforcing shown in the footing base.
8. There is no information on correctly sizing the base plate anchors.

Recommendations

1. Redesign the Steel Pergola and footings. At a minimum, the new design needs to include the following:
    a. References to applicable building codes. The recommended building codes are as follows:
        1. IBC/American Society of Civil Engineers, ASCE 7-10, Minimum Design Loads for Buildings and Other Structures
        2. ANSI/AISC 360, Specification for Structural Steel Buildings, by American Institute of Steel Construction. 2010.
        3. American Welding Society (AWS) AWS D1.1, Structural Welding Code - Steel
        4. AISC 341, Seismic Provisions for Structural Steel Buildings
        5. American Concrete Institute (ACI) ACI 318, Building Code Requirements for Structural Concrete

2. Show a free body diagram of the truss layout. Label all members, show all assumptions for boundary conditions and show all loads and their combinations based on code requirements.
3. Show all member reactions and behaviors.
4. Verify the capacities of all members to resist the required axial compression and tension loads, bending and shear loads.
5. Size all welds according to member reactions.
6. Initial all calculations with the name of the designer.
7. Show the correct weld symbols and sizes on the plans.
8. Show the paint requirements on the plans.
9. Size all footings based on loads and allowable bearing capacity of the soils.
10. Show the correct reinforcing details for both footing stem and base.

Review Date: 3 March 2015

Projects: Ramallah Citizen Service Center
Area C Schools
Nablus Sports Hall

Description: Plans and Calculations for Structural Details of Steel Members

Description of Structure

This work includes design, supply, fabrication and installation of structural steel for various projects.

Background

Plans and calculations were provided for this project by the USAID review team.

Discussion of Findings

No references cited for the calculations.

Isolated Deficiencies

1. None observed

Systematic Deficiencies

1. There is no analysis shown that determines tension, compression, bending and shear based on methods of basic structural analysis.
2. There is no reference to determining member axial, bending and shear capacity, deflection and no calculations showing local and global stability is adequate.
3. There is no reference to material callouts, to any design codes or load requirements nor is there any information showing that any design of welds was made.
4. All of the weld symbols shown on the plans are incorrect.

Recommendations

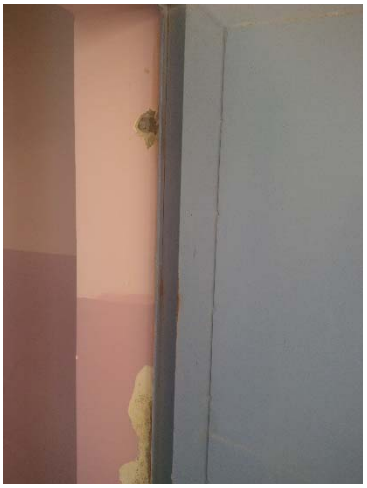
1. All new designs and plans need to include the following:
    a. References to applicable building codes. The recommended building codes are as follows:
        1. IBC/American Society of Civil Engineers, ASCE 7-10, Minimum Design Loads for Buildings and Other Structures
        2. ANSI/AISC 360, Specification for Structural Steel Buildings, by American Institute of Steel Construction. 2010.
        3. American Welding Society (AWS) AWS D1.1, Structural Welding Code - Steel
        4. AISC 341, Seismic Provisions for Structural Steel Buildings
        5. American Concrete Institute (ACI) ACI 318, Building Code Requirements for Structural Concrete

2. Show free body diagrams for all building layouts. Label all members, show all assumptions for boundary conditions and show all loads and their combinations based on code requirements.

3. Show all member reactions and behaviors.
4. Verify the capacities of all members to resist the required axial compression and tension loads, bending and shear loads.
5. Size all welds according to member reactions.
6. Initial all calculations with the name of the designer.
7. Show the correct weld symbols and sizes on the plans.
8. Show the paint requirements on the plans.

APPENDIX A
PHOTOGRAPHS

26 January 2015, Anab Al-Kabir Co-educational School



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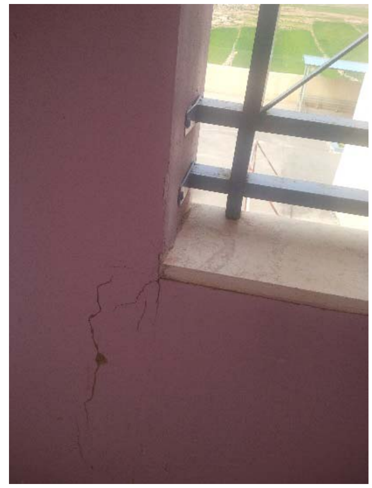


Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

26 January 2015, Anab Al-Kabir Co-educational School

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

26 January 2015, Anab Al-Kabir Co-educational School

Photo 13

Photo 14

26 January 2015, Khursa Secondary Boys School

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

26 January 2015, Luqman Al-Hakim Elementary Co-educational School


Photo 1


Photo 2

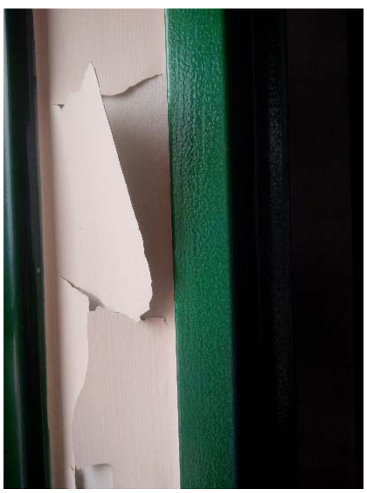


Photo 3


Photo 4


Photo 5


Photo 6

26 January 2015, Luqman Al-Hakim Elementary Co-educational School

Photo 7

Photo 8

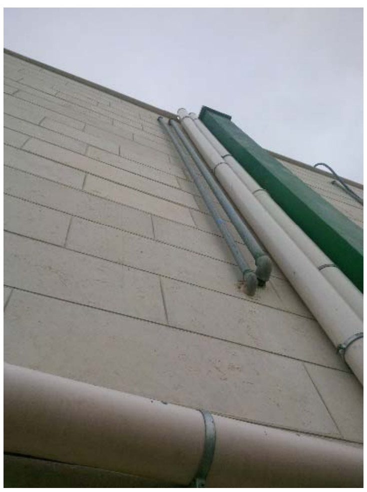


Photo 9

Photo 10

Photo 11

Photo 12

26 January 2015, Luqman Al-Hakim Elementary Co-educational School

Photo 13

Photo 14

Photo 15

Photo 16

Photo 17

26 January 2015, Awwa and Al Kom Water Distribution

Photo 1

Photo 2

Photo 3

Photo 4

27 January 2015, Sanur Well Pump Station

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

27 January 2015, Sanur Well Pump Station

Photo 7

27 January 2015, Mirka-Al Jarba Road

Photo 1

Photo 2

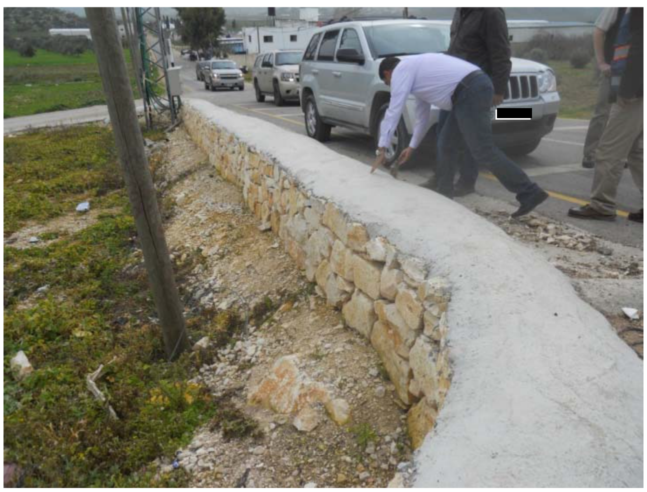


Photo 3

Photo 4

Photo 5

27 January 2015, Al Zababida-Raba-American University Road

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

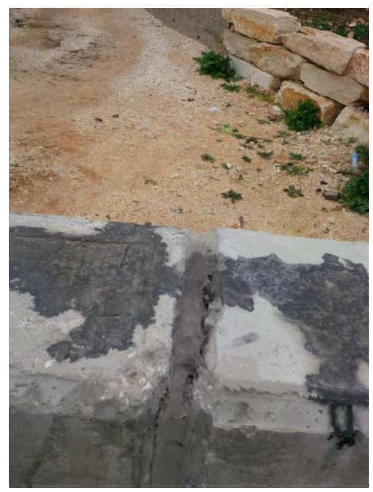
Photo 6

27 January 2015, Al Zababida-Raba-American University Road

Photo 7

Photo 8

Photo 9



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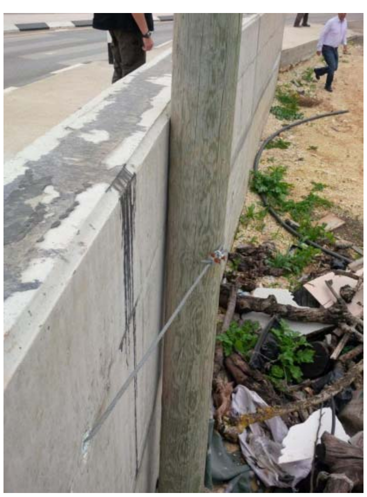


Photo 11

Photo 12

27 January 2015, Al Zababida-Raba-American University Road

Photo 13

Photo 14

27 January 2015, Storm Water Drainage System at Qabatia Township

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

27 January 2015, Storm Water Drainage System at Qabatia Township

Photo 7

Photo 8

27 January 2015, Construction of Multipurpose Hall in Al Yamun

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

27 January 2015, Construction of Multipurpose Hall in Al Yamun

Photo 7

Photo 8

28 January 2015, Qalqiliya Girls Secondary School

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

28 January 2015, Qalqiliya Girls Secondary School

Photo 7

Photo 8

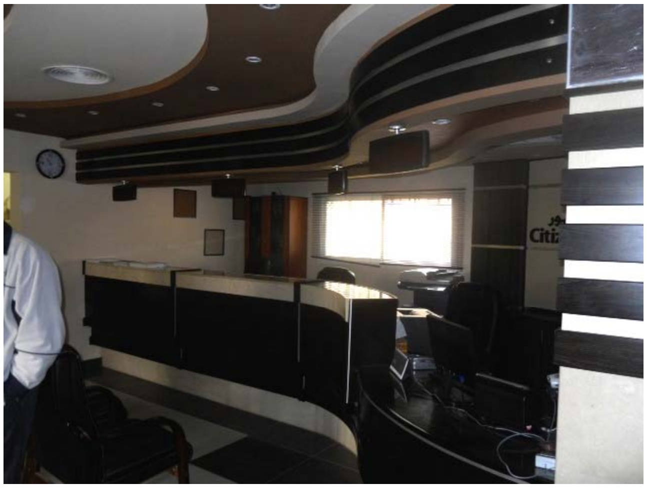
Photo 9

28 January 2015, Habla Secondary Sewage Collection Network and House Connections

Photo 1

Photo 2

28 January 2015, Citizen Service Center for Kafr Thulth Municipality



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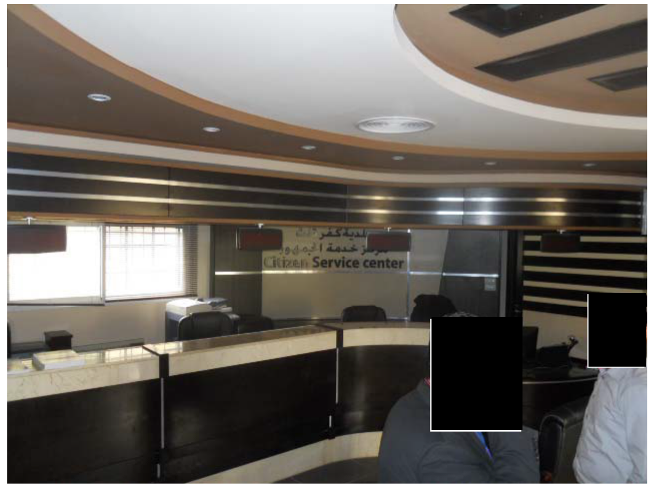

Photo 2

Photo 3

Photo 4

Photo 5

28 January 2015, Beit Iba-Deir Sharaf Tulkarem Road

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

28 January 2015, Beit Iba - Qusin - Beit Wazan Road

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

28 January 2015, Connecting Roads for Baqa Ash Sharqiya:
Phase 2: An Nazla Al Gharbiya

Photo 1

Photo 2

Photo 3

Photo 4

28 January 2015, Deir Debwan - Ramoun - Al Taybeh Road-

Photo 1

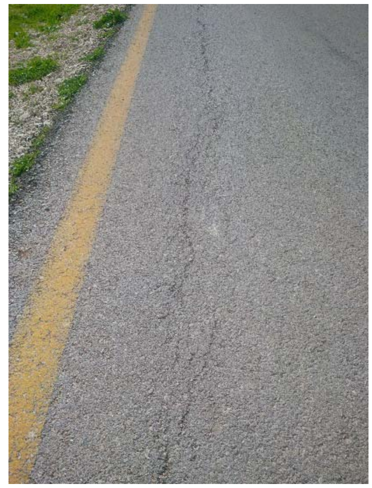

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

28 January 2015, Ein Yabroud - Deir Jareer Road


Photo 1


Photo 2


Photo 3

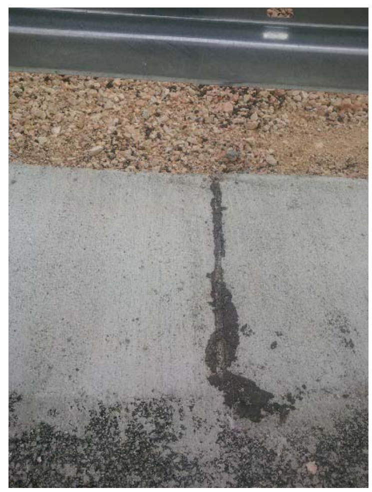
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Photo 5


Photo 6

28 January 2015, Ein Yabroud - Deir Jareer Road

Photo 7

Photo 8

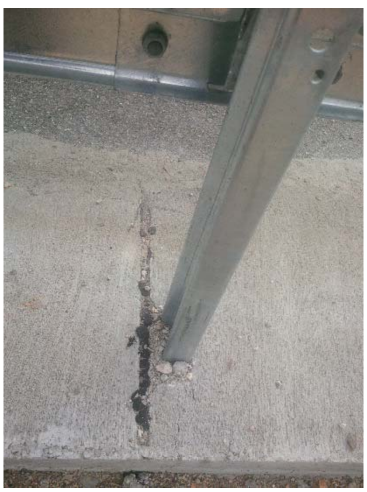


Photo 9

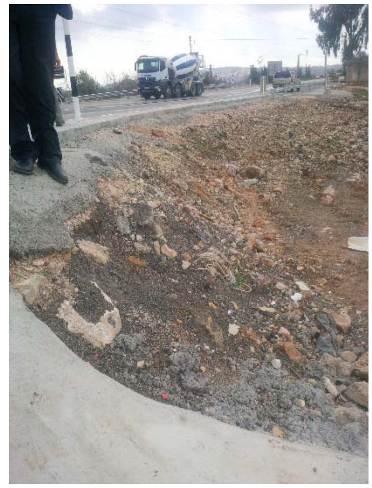
Photo 10

Photo 11

Photo 12

28 January 2015, Ein Yabroud - Deir Jareer Road

Photo 13



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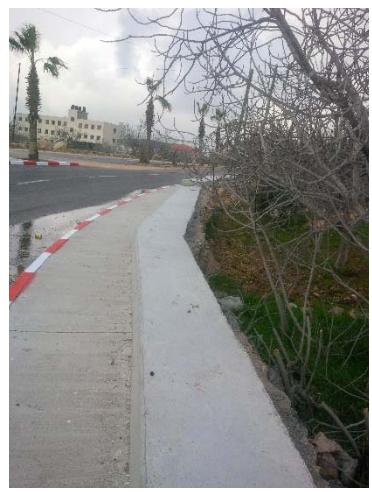

Photo 16

Photo 17

28 January 2015, Sinjil Community Center

Photo 1

Photo 2

Photo 3

28 January 2015, Sinjil Rehabilitation of Internal Roads Phase 1

Photo 1

29 January 2015, Addition to Al-Buweib Coeducational School

Photo 1

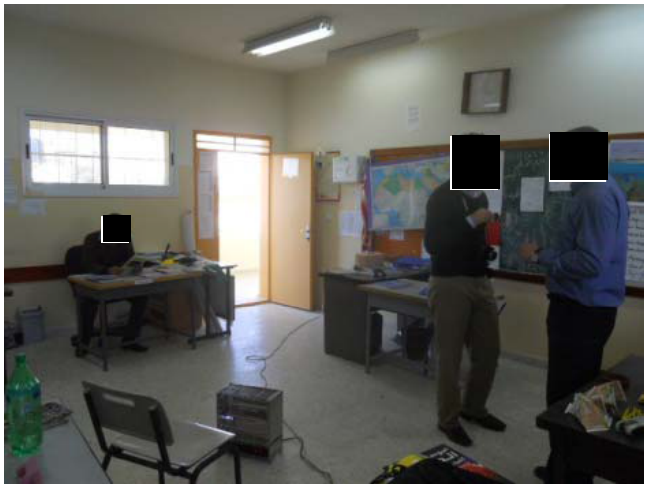

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

29 January 2015, Addition to Al-Buweib Coeducational School


Photo 7


Photo 8


Photo 9

29 January 2015, Water Reservoir Project - Dura-Sinjir

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

29 January 2015, Water Reservoir Project - Dura-Sinjir

Photo 7

29 January 2015, 'Arab ar Rashayida Road

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

29 January 2015, 'Arab ar Rashayida Road


Photo 7


Photo 8

29 January 2015, Construction of HWY 60
Sa’ir - Tekoa Road (Segment A)

Photo 1

Photo 2

Photo 3

Photo 4

29 January 2015, Bureen - Asira Al Quiblyia - Urif Road

Photo 1

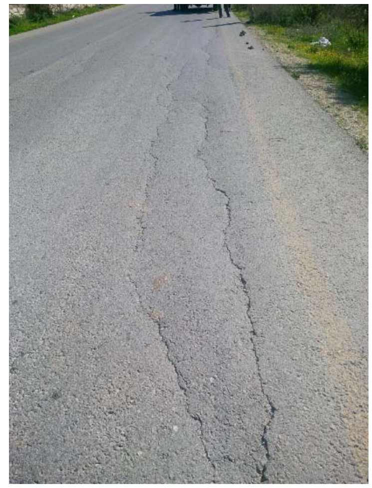

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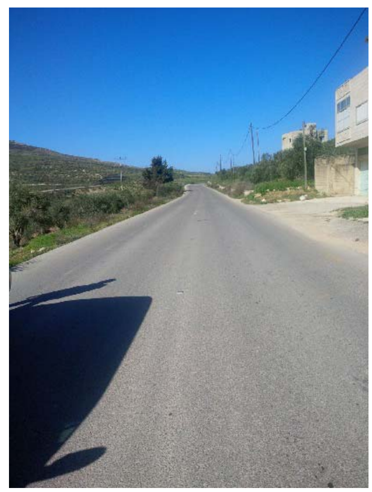
Photo 3



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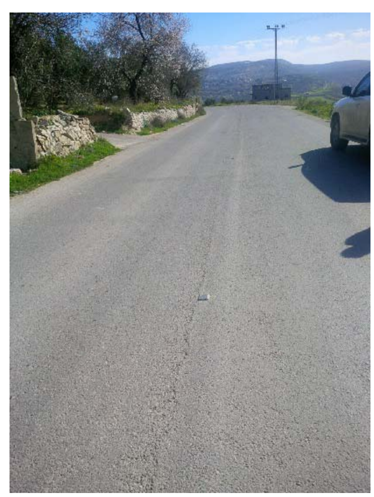


Photo 6

29 January 2015, Mount Jerzim Water Network Replacement

Photo 1

Photo 2

29 January 2015, Milling & Resurfacing HWY 57 from Salem - Beit Dajan

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

29 January 2015, Milling & Resurfacing HWY 57 from Salem - Beit Dajan

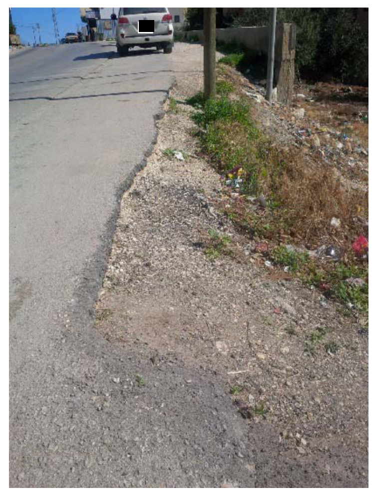
Photo 7

29 January 2015, Badhan Main Road (Segment 1)

Photo 1

Photo 2

Photo 3



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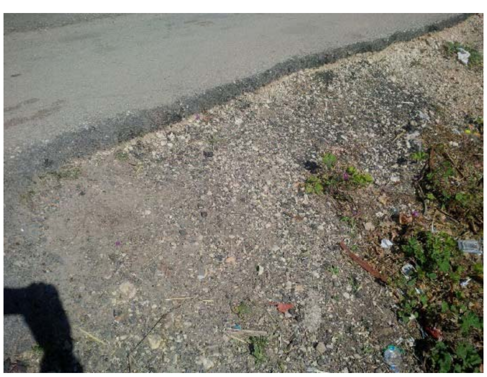


Photo 5

Photo 6

1 February 2015, Construction of Yasul-Iskaka Secondary School


Photo 1


Photo 2


Photo 3

1 February, Finishing Works for Qira Primary Co-ed School


Photo 1


Photo 2


Photo 3

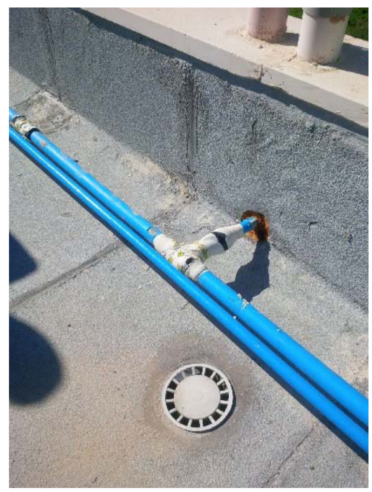


Photo 4


Photo 5


Photo 6

1 February 2015, Finishing Works for Qira Primary Co-ed School

Photo 7

Photo 8

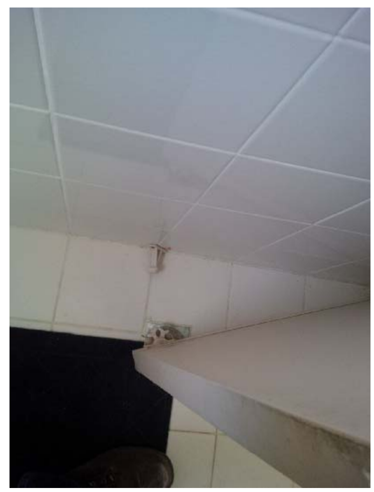
Photo 9

1 February 2015, Rehabilitation of Clinic in Hares

Photo 1

Photo 2

Photo 3



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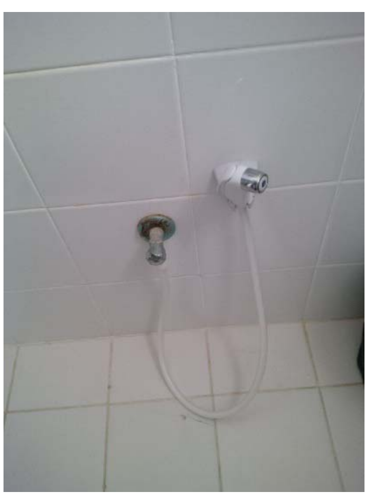

Photo 5

Photo 6

1 February 2015, Rehabilitation of Clinic in Hares

Photo 7

Photo 8

Photo 9

Photo 10

1 February 2015, Main Entrances-East Salfit Cluster–Phase IV Kifl Haris

Photo 1

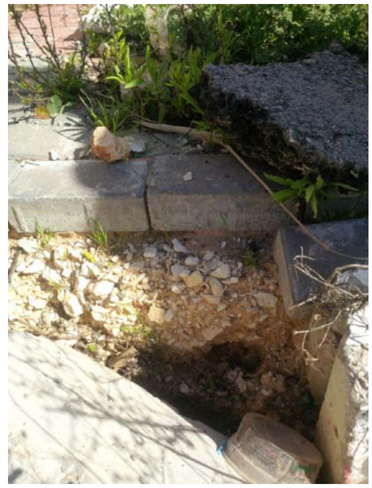

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Photo 4

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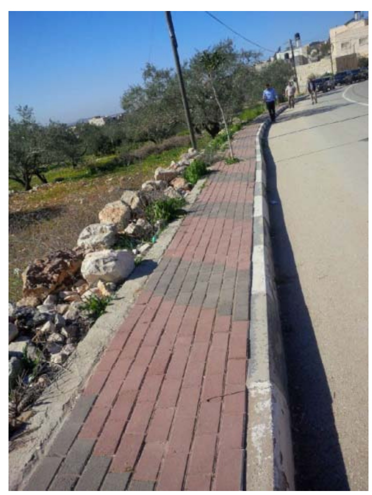


Photo 6

1 February 2015, Main Entrances-East Salfit Cluster–Phase IV Kifl Haris


Photo 7


Photo 8

2 February 2015, 8 Classrooms at El Ezzariah Girls High School

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

2 February 2015, 8 Classrooms at El Ezzariah Girls High School

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

2 February 2015, 8 Classrooms at El Ezzariah Girls High School

Photo 13

Photo 14

Photo 15

Photo 16

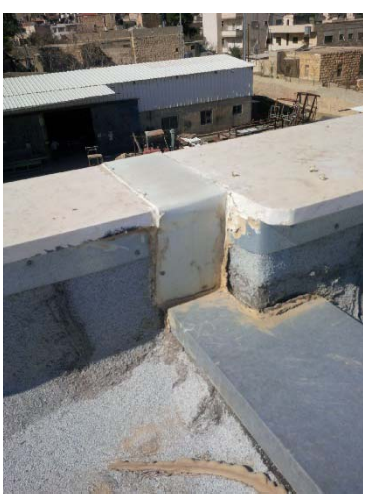


Photo 17

Photo 18

2 February 2015, 8 Classrooms at El Ezzariah Girls High School

Photo 19

Photo 20

2 February 2015, Construction of Ash Sheikh Sa'd Health Center

Photo 1

Photo 2

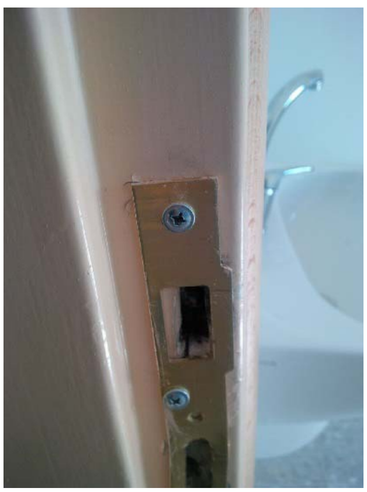


Photo 3

Photo 4

Photo 5

Photo 6

2 February 2015, Jericho A-Aqabet jaber Refugee Camp
Internal Roads & Water

Photo 1

Photo 2

3 February 2015, Bil'in Water Reservoir Project

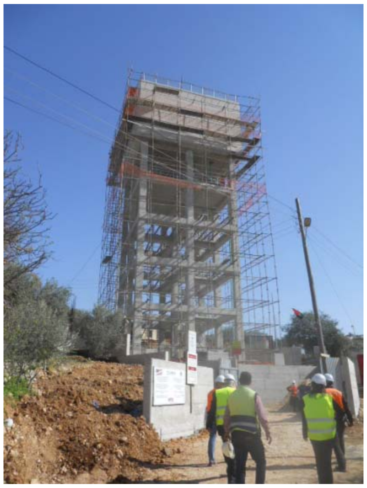
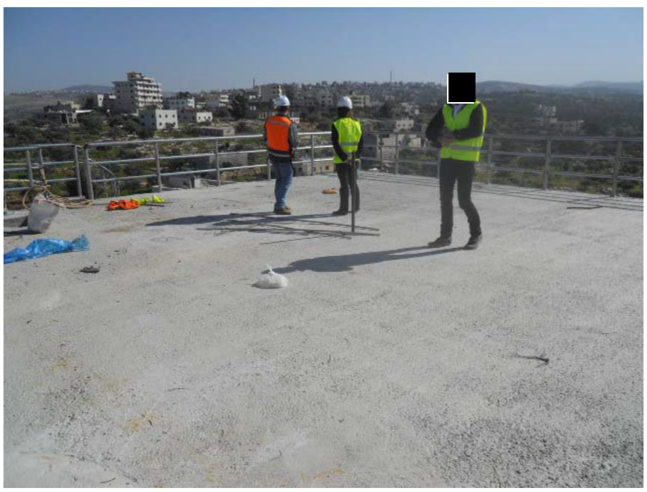


Photo 1

Photo 2



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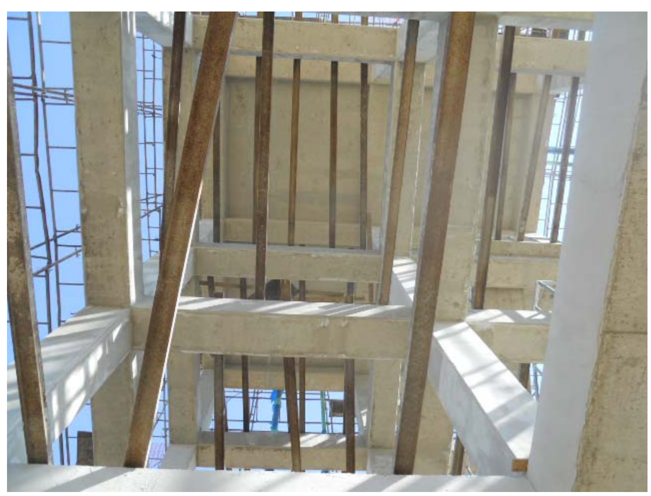

Photo 6

3 February 2015, Bil'in Water Reservoir Project

Photo 7

3 February 2015, Aboud Main Road

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

3 February 2015, Aboud Main Road

Photo 7

Photo 8

3 February 2015, Ein Sinya-Wadi Albalat Road

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

3 February 2015, Ein Sinya-Wadi Albalat Road

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

3 February 2015, Training and Commissioning
West Bank Water Department

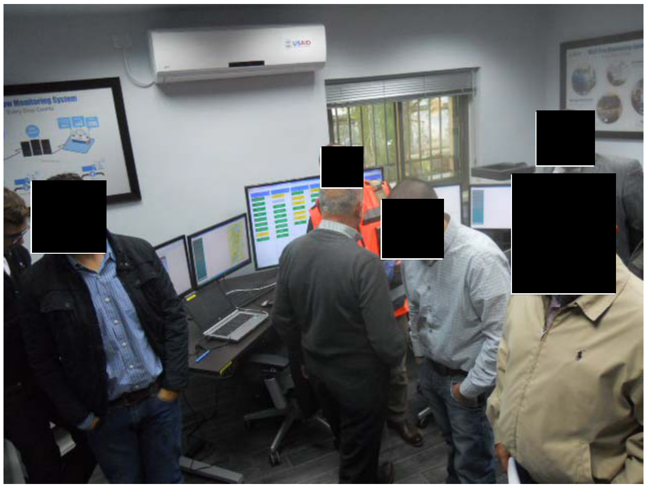

Photo 1

Photo 2

Photo 3

3 February 2015, Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School

Photo 1

Photo 2

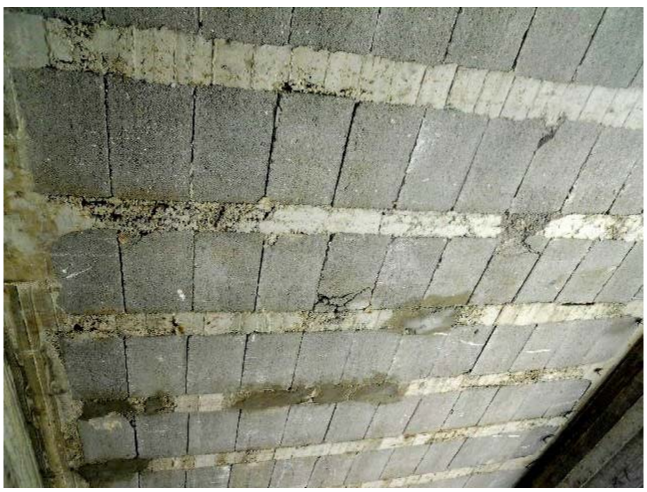

Photo 3

Photo 4

Photo 5

Photo 6

3 February 2015, Additional Educational Rooms and External works at Deir Qeddis Elementary Girls School

Photo 7

3 February 2015, Rehabilitation of Um Salamunah Water Network

Photo 1

Photo 2

Photo 3

Photo 4

3 February 2015, Construction of Marah Rabah Health Clinic

Photo 1

Photo 2

Photo 3

3 February 2015, Well Station Rehabilitation Project – PWA 1

Photo 1

3 February 2015, Well Station Rehabilitation Project – PWA 3


Photo 1

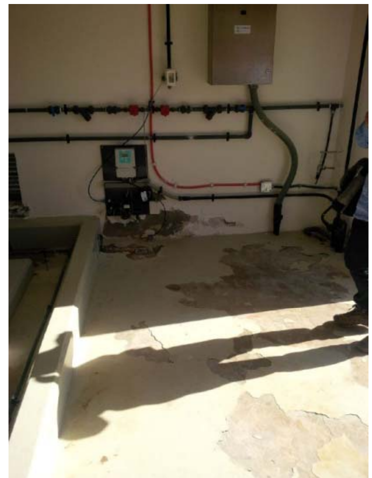
Photo 2


Photo 3

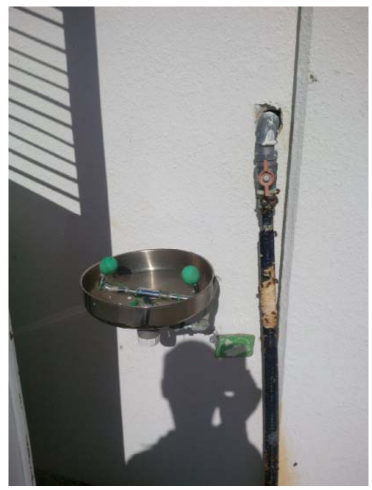
Photo 4


Photo 5

3 February 2015, JWC 4 Well Station Rehabilitation

Photo 1

3 February 2015, Wadi Al Nar Road (Segment V)

Photo 1

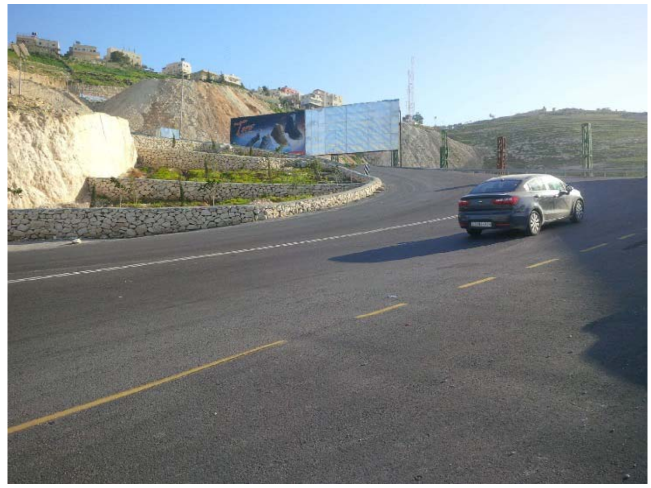

Photo 2

Photo 3

Photo 4

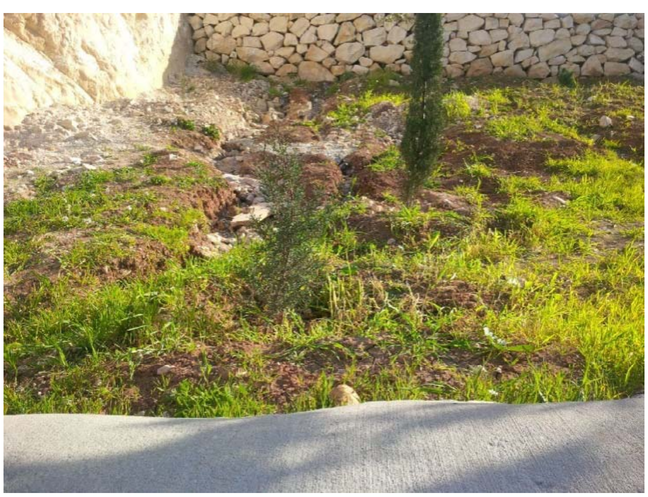

Photo 5

4 February 2015, Secondary Boys school in Hindaza and Bureid'a

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

4 February 2015, Secondary Boys school in Hindaza and Bureid'a


Photo 7

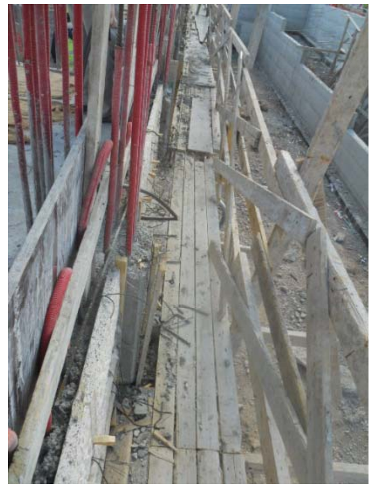
Photo 8


Photo 9


Photo 10


Photo 11

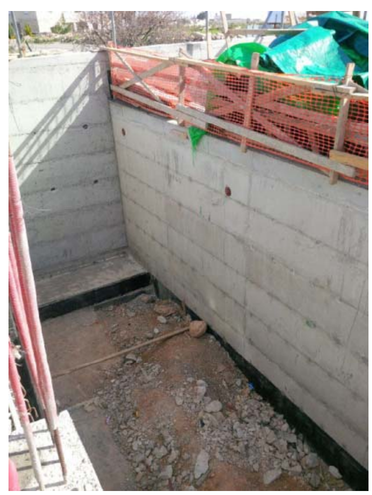
Photo 12

4 February 2015, Holy Family Hospital

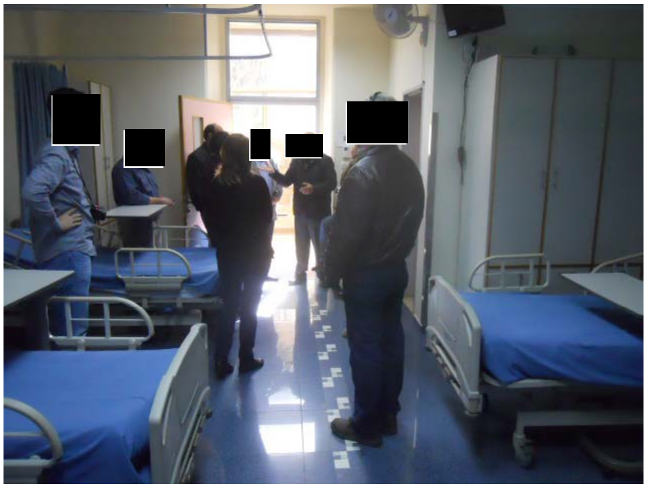
Photo 1


Photo 2


Photo 3


Photo 4


Photo 5


Photo 6

4 February 2015, Holy Family Hospital

Photo 7

Photo 8

Photo 9

Photo 10

4 February 2015, Construction of Bethlehem Old Market

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

4 February 2015, Construction of Bethlehem Old Market

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

4 February 2015, Storm Water Drainage System at Al Doha Town

Photo 1

Photo 2

Photo 3

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