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Sandia National Laboratories




Facilities Operations and Projects Overview

Rocky Lioce, Senior Manager

Facilities Management & Operations Center

Sandia National Laboratories

January 15, 2015

U.S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

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Operations and Projects - Overview

Sandia National Laboratories

- Group houses 5 departments and approximately 104 staff.
- Provides Operations, Engineering, Project Management, and Construction Management for all of Sandia's Facilities and Infrastructure in New Mexico, the Tonapah Test Range, and the Kauai Test Facility.
- Line organization customer interface support, coordination of planned construction and maintenance activities, and response to facility and infrastructure operational issues.
- Project requirements development, project execution planning, project controls, design management, construction management, inspection, commissioning support, and final acceptance.
- Site utility management, permits, outage management, GIS, and CADD support. Engineered Safety is incorporated into all aspects of the work executed.
- Leverages developed and documented processes to execute the required work, and is actively engaged in continuous improvement activities to increase efficiency and overall delivery of services.

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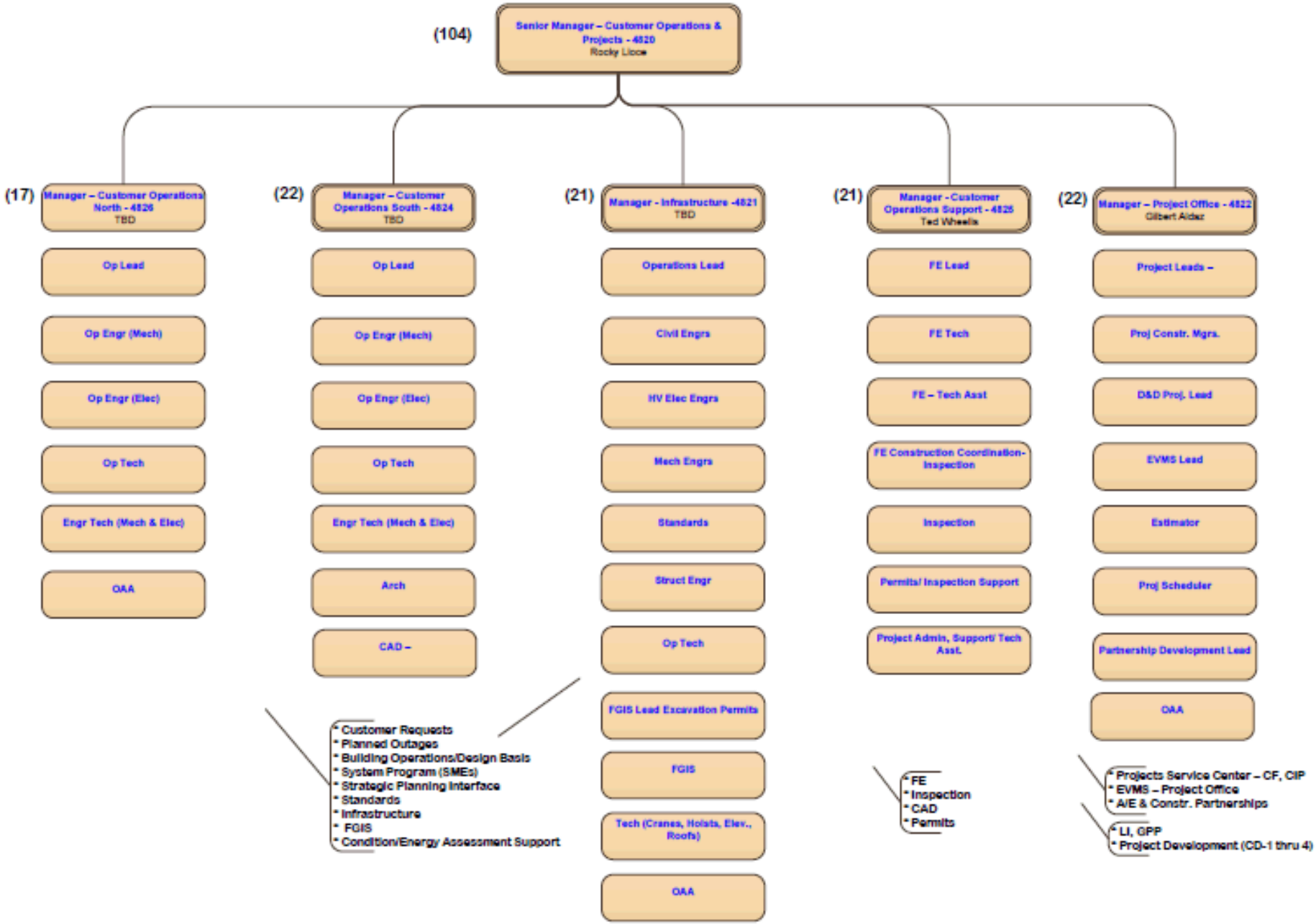
(104)
Senior Manager – Customer Operations & Projects - 4820
Rocky Lioce
(17)
Manager – Customer Operations North - 4826
TBD
Op Lead
Op Engr (Mech)
Op Engr (Elec)
Op Tech
Engr Tech (Mech & Elec)
OAA
(22)
Manager – Customer Operations South - 4824
TBD
Op Lead
Op Engr (Mech)
Op Engr (Elec)
Op Tech
Engr Tech (Mech & Elec)
Arch
CAD –
* Customer Requests
* Planned Outages
* Building Operations/Design Basis
* System Program (SMEs)
* Strategic Planning Interface
* Standards
* Infrastructure
* FGIS
* Condition/Energy Assessment Support
(21)
Manager - Infrastructure -4821
TBD
Operations Lead
Civil Engrs
HV Elec Engrs
Mech Engrs
Standards
Struct Engr
Op Tech
FGIS Lead Excavation Permits
FGIS
Tech (Cranes, Hoists, Elev., Roofs)
OAA
(21)
Manager - Customer Operations Support - 4825
Ted Wheelis
FE Lead
FE Tech
FE – Tech Asst
FE Construction Coordination-Inspection
Inspection
Permits/ Inspection Support
Project Admin, Support/ Tech Asst.
* FE
* Inspection
* CAD
* Permits
(22)
Manager – Project Office - 4822
Gilbert Aldaz
Project Leads –
Proj Constr. Mgrs.
D&D Proj. Lead
EVMS Lead
Estimator
Proj Scheduler
Partnership Development Lead
OAA
* Projects Service Center – CF, CIP
* EVMS – Project Office
* A/E & Constr. Partnerships
* LI, GPP
* Project Development (CD-1 thru 4)

Infrastructure Department Overview

- Oversees service delivery and ensures process compliance for infrastructure operations.
- Ensures SNL/NM infrastructure systems are fit for mission support, promote operational safety, develop maintenance plans and requirements, provide resource management (energy and water) resource use data, manage risk and optimize performance.
- Maintains the Facilities Geographic Information System
- Manages excavation and penetration permitting activities for SNL/NM.
- Provides SME support to several remote sites including Tonopah Test Range and KTF on an as need bases.
- Pavement Management System and Maintenance Plan
- Roads and Grounds Maintenance Planning
- Cranes and Hoist – Inspection and Maintenance Program
- Operations Engineering includes Civil, Structural, Gas, Water, and High Voltage Electrical systems

Infrastructure Department Scope

- The SNL New Mexico site includes:
  - 2,937 acres of DOE-owned land, 5633 acres of permitted land (8,570 acres)
  - 49 miles of paved roads, 38 miles of unpaved roads, 206 acres of roads and walkways
- Utilities include:
  - High voltage: 115kV-7.5 miles, 46kV-9.7 miles, 5kV/15kV underground distribution 55 miles, Four 600kW emergency generators
  - Water: 70 miles, Approx. 1000 gate valves, 300 PIVs and 235 fire hydrants.
  - Sanitary Sewer: 46 miles of U/G pipe
  - Chilled Water: Approx. 17,670 tons of cooling and 10 miles of U/G pipe
  - Natural Gas: 23 miles of distribution line and 250 valves
  - Communications: 33 miles of duct bank and 257 manholes
  - Storm Drains: 21 miles of pipe and channel, 275 manholes, 560 catch basins, 7 detention basins

- Current replacement plant value of the 8 primary infrastructure systems is $842,000,000
- Annual Utility Costs are approximately $13,500,000

Infrastructure Department FGIS/GPS/GPR

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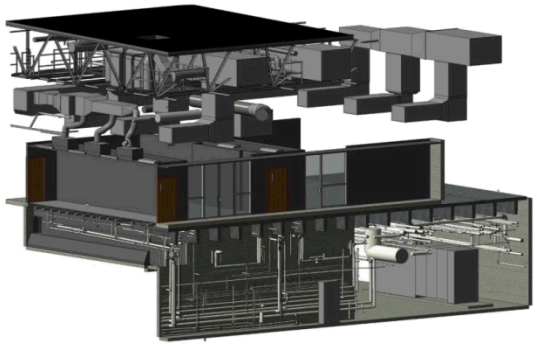
- FGIS: Approximately 32 GIS System Files are managed and stored in Bentley ProjectWise.
  - GPS Survey Data is collected real time and system information updated within 5 days for collection.
  - The team also maintains approximately 50 CAD files in support of system and site mapping.



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- Excavation and Penetration Permitting - Average of 325 permits are processed annually.
- GPR: utilized to support penetration activities
  - Does not introduce site hazards or require work areas to be closed off as with radiography (X-Ray).
  - Our process minimizes penetration risks and allows for informed decisions prior to scheduling full building outages.

Facilities Operations/Engineering Staffing

Position	4824	4826
Manager	1	1
Ops. Lead	2	2
Mech. Engineer	3	4
Elec. Engineer	3	3
Architect	2	0
Eng. Tech.	2	2
Ops. Tech.	5	4
CADD Tech.	4	0
Administrative	0	1
Total	22	17

Facilities Operations/Engineering Mission

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- Engage with customers to address facilities service requests – maintenance & projects
- Engage directly with maintenance planning for repairs & project support coordination
- Engage with project teams to enable execution – initiation, execution (design & construction), close-out, start of operations
- Provide O&M engineering service request support
- Execute condition assessments for every building every 5 years
- Execute energy/RC audits for specific buildings every 4 years
- Develop initial SOW and cost estimates for Capital Investment Project (CIP) "opportunities"
- Provide design SOW and design review support
- Manage and coordinate utility and building outages
- Execute engineering studies (capacity analysis, arc flash, system optimization, cost savings, customer program equipment)
- Develop system sustainability programs to ensure comprehensive, long-term plans for specific focus areas (elevators, roofs, chillers, etc.)
- Provide integrated CADD services and solutions to all FMOC and multiple line organizations
- Create site maps, surveys, and overview graphics for FMOC and multiple line organizations
- Interface with ES&H, security, utility providers, and KAFB

Facilities Operations/Engineering

- <u>Volume of work managed in 2014:</u>
- 2200 Services Requests processed per month
  - Maintenance, Project, Engineering, or other
- 90 Facility Outages planned and executed each month
  - enables building maintenance and construction work
- 215 Condition Assessment Audits completed
- 52 Resource Conservation Audits completed
- 288 New Restoration Project Opportunities developed

New Atmos Furnaces in Building 858

Process Overview & Deliverables
Projects & Construction Management

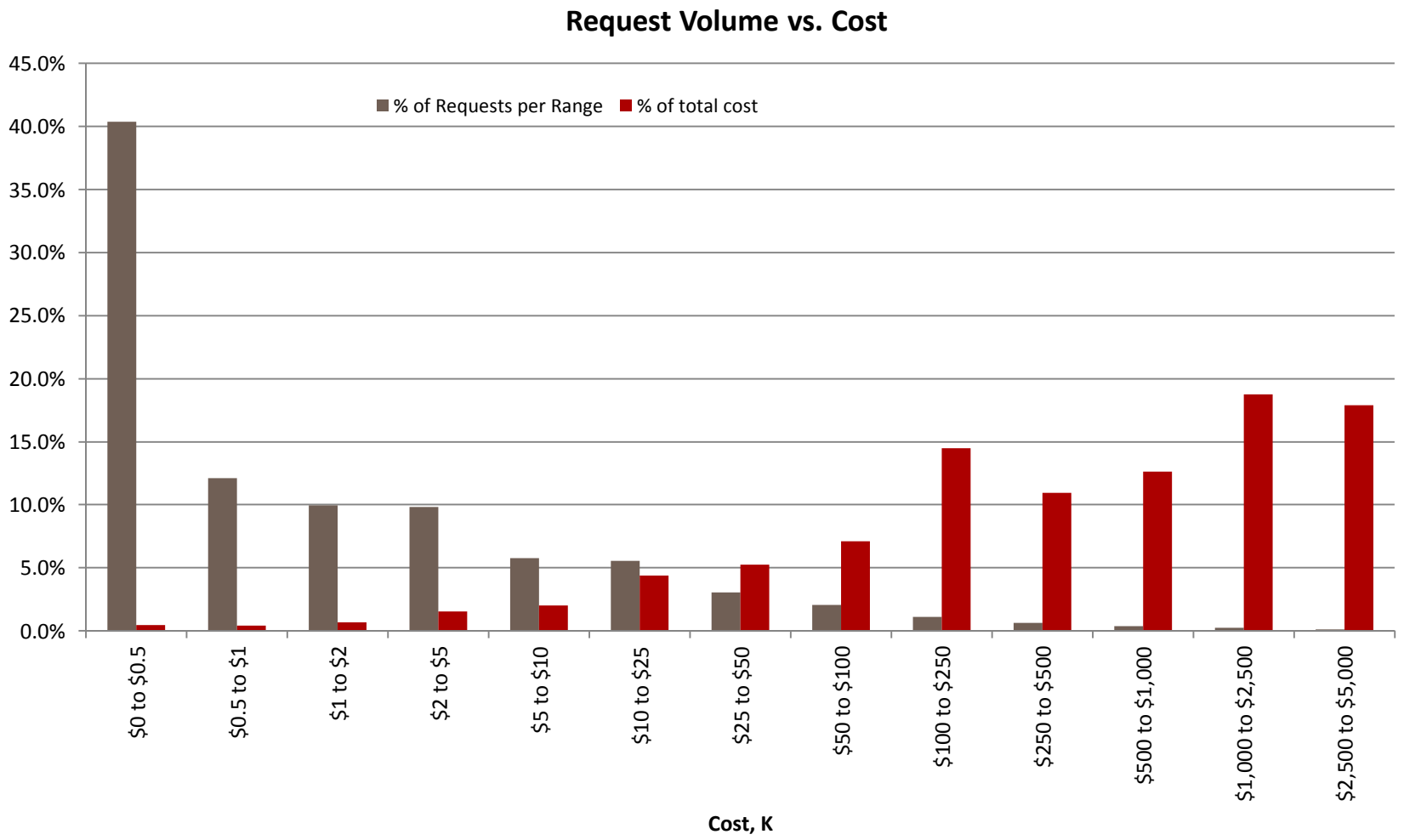
- Provide project and construction management support for new construction, infrastructure projects, line-item projects, and major renovation.

Summary of Project Requests

Sandia National Laboratories

Cost Range, K	Avg. Requests per year	% Requests	Cumulative	% of total cost	Cumulative
$0 to $0.5	1,562	40.3%	49.2%	0.4%	0.4%
$0.5 to $1	469	12.1%	61.3%	0.4%	0.9%
$1 to $2	385	9.9%	71.3%	0.7%	1.6%
$2 to $5	381	9.8%	81.1%	1.5%	3.1%
$5 to $10	223	5.8%	86.9%	2.0%	5.1%
$10 to $25	215	5.6%	92.4%	4.4%	9.5%
$25 to $50	118	3.0%	95.5%	5.3%	14.7%
$50 to $100	79	2.0%	97.5%	7.1%	21.8%
$100 to $250	43	1.1%	98.6%	14.5%	36.3%
$250 to $500	25	0.6%	99.3%	10.9%	47.3%
$500 to $1,000	14	0.4%	99.6%	12.6%	59.9%
$1,000 to $2,500	9	0.2%	99.9%	18.8%	78.7%
$2,500 to $5,000	4	0.1%	100.0%	17.9%	96.6%
$5,000 to $10,000	0.4	0.01%	100.0%	3.4%	100.0%
	3,871				

Summary of Project Requests



Project Types and Actual Costs

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- 5-Year Summary of Projects

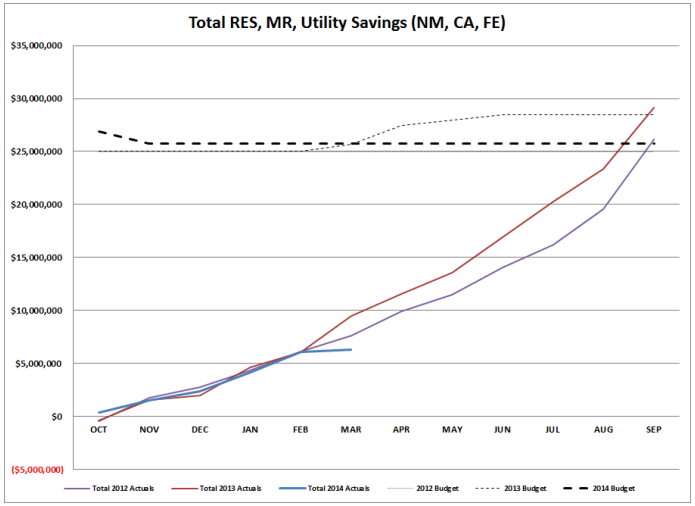
Totals	FY11	FY12	FY13	FY14	FY15 Budget	
Line Items	$ 10,437,415	$ 11,546,727	$ 20,694,192	$ 1,836,524	$ 1,474,000	
GPPs	$ 5,408,046	$ 8,186,282	$ 3,837,790	$ 8,551,500	$ 11,810,000	
Facility Express	$ 13,732,534	$ 12,759,953	$ 15,880,761	$ 19,590,072	$ 13,934,000	
Service Contracts	$ 283,473	$ 40,815	$ 57,016	$ 5,377	$ -	
Customer Funded	$ 47,703,868	$ 53,995,659	$ 40,589,634	$ 60,674,492	$ 55,000,000	estimate
D&D	$ 390,308	$ 1,604,337	$ 325,772	$ -	$ -	
Institutional GPPs	$ 2,536,975	$ 5,187,247	$ 16,635,071	$ 15,031,337	$ 24,160,000	
Maj. Rnv., M&R	$ -	$ -	$ -	$ -	$ -	
	$ 80,492,618	**$ 93,321,019**	**$ 98,020,236**	**$ 105,689,302**	**$ 106,378,000**	
Facility Investments (included above)						
Major Renovation	$ 4,529,850	$ 3,571,094	$ 6,933,131	$ 6,482,878	$ 5,500,000	
DM/Restoration	$ 12,728,128	$ 13,412,903	$ 16,457,547	$ 19,216,039	$ 16,000,000	
Utility Savings	$ 529,352	$ 3,284,716	$ 5,731,294	$ 5,250,000	$ 5,000,000	
	$ 17,787,330	$ 20,268,713	$ 29,121,972	$ 30,948,917	$ 26,500,000	

Project Types and Cost, FY15

- LTD Summary of FY15 New Mexico projects (projects > $250k)

Funding Source	# of Projects				Est FY Cost (K$)			
	Active	Pending	Closed	Total	Active	Pending	Closed	Total
Customer Funded	18	0	7	**25**	$11,454	$0	$5,467	**$16,921**
Major Renovation	9	0	2	**11**	$4,452	$0	$1	**$4,453**
DM & Restoration	23	2	4	**29**	$10,154	$340	$7	**$10,501**
Utility Savings	5	1	0	**6**	$1,102	$50	$0	**$1,152**
RTBF	7	2	0	**9**	$10,989	$1,100	$0	**$12,089**
Investments	4	2	0	**6**	$15,700	-$555	$0	**$15,145**
Split Funded	4	0	0	**4**	$1,238	$0	$0	**$1,238**
TOTAL SNL NM	**70**	**7**	**13**	**90**	**$55,089**	**$935**	**$5,475**	**$61,499**

Historical Spending Curve



Project Costing, % of Total Cost

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	% of Total Project Cost			
Projects > $250K	Design	Construction	Inspection, Testing, Escorts, Title III	Project - Construction Management
FY10	7.34%	79.67%	8.79%	4.20%
FY11	9.62%	78.63%	8.06%	3.68%
FY12	8.00%	81.06%	7.36%	3.57%
FY13	6.78%	81.95%	8.08%	3.19%
FY14	6.67%	83.17%	7.19%	2.97%
Five Year Average	**7.68%**	**80.90%**	**7.90%**	**3.53%**

Project Elements

% of Total Project	Project Element Averages - Past 3 Years $50K-$250K	$250K-$10M	FY 12	FY13	FY14	FY08-FY12	Line Items Past 10 Years w/o sp. equip.	LI incl. sp. equip.
Design	12.9%	7.2%	8.0%	6.8%	6.7%	8.1%	8.5%	6.7%
Construction	71.8%	76.1%	75.9%	73.1%	79.1%	73.2%	74.1%	61.6%
Equipment	3.8%	5.8%	5.1%	8.8%	4.0%	6.6%	4.6%	21.5%
Inspection	2.1%	1.6%	1.7%	1.6%	1.5%	1.8%	3.2%	2.5%
Commissioning	0.3%	0.5%	0.6%	0.3%	0.4%	0.5%	incl. in inspect	incl. in inspect
Escorts	1.4%	2.3%	1.7%	3.3%	2.1%	2.5%	0.0%	0.0%
Title III	2.2%	2.5%	2.7%	2.4%	2.5%	2.6%	2.6%	2.3%
Testing	0.5%	0.6%	0.6%	0.6%	0.7%	0.6%	incl. in inspect	incl. in inspect
Sandia/PO Labor	5.0%	3.3%	3.6%	3.2%	3.0%	4.1%	7.0%	5.4%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Schedule Duration Averages								
Service Order Start to Design Start (days)	36	32	32	38	28	54		
Design Start to Design Complete (months)	3.0	5.4	5.7	3.8	5.0	4.8		
Design Complete to Const Award (days)	29	66	75	57	60	75		
Const Award to Const Complete(months)	4.0	8.0	8.6	6.9	7.5	7.9		
Const Complete to SO Closeout (months)	5.0	5.4	5.4	6.1	4.8	6.0		
SO Start to SO Close (months)	14.0	22.0	23.3	19.8	20.5	23.0		
Average Project Size, K	$126	$1,318	$1,303	$1,060	$1,774	$959		

Average Project Costing

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Project Type	AVG. GSF	$/GSF (FY14 $s)	$/GSF excl. special equipment
IGPPs (14)	19,054	$354	NA
GPPs (11)	11,307	$435	NA
Line Items (19)	100,000	$711	$503

Notes: IGPPs/GPPS are capped by $10M threshold

IGPPs have typically been office buildings with minimal lab areas

Customer Operations Support Department

The Customer Operations Support Department (Dept 4825) provides expedited and rapid turnaround engineering design and construction support (referred to as Facilities Express (FE)) for small projects (typically ranging from $0.1K to $150K) that are identified and funded by Sandia line organizations.

The department also provides inspection, safety, and work acceptance support for all construction projects performed at Sandia to ensure construction code compliance.

The projects selected for the FE program are generally low rigor, low risk projects that do not gain a large benefit by going through a formal fixed price procurement process.

Facilities Express FY14 Details:

Standing T&M Support Construction Contractors:	- 2 Generals - 3 Electricals - 2 Mechanicals - 1 AE for design
Standing Unit Priced Support Contractors:	- 2 Furniture - 1 Flooring and Carpet
Standing T&M Support Communications Contractors:	- 3 Electrical

Grand Totals:	PO Amount	$18.8M
	Total Number of PO's Issued	3800
	Nominal Cost Range of Projects	$100.00 to $150,000.00
	Average Cost per PO	$4,900.00
	Average Job Length	5 to 10 days

Inspection Overview

Sandia utilizes in-house or contract inspectors that are International Code Council (ICC) certified inspectors in A/C/S, Electrical, and Mechanical/Plumbing to ensure contractors work meets the International Building Codes (IBC), NEC, NFPA 70E codes as well as Sandia mandated specifications. In addition, inspectors perform a key safety function by observing, coaching, and if necessary issuing safety deficiencies to partner contractors working in the field. In general they serve as the eyes and ears in the field for FMOC construction projects.

Total # Inspectors: 10

- **Sandia Inspectors:**
  - 2 A/C/S *
  - 2 Electrical
  - 1 Mechanical

  * Also Mobil Crane and Rigging Equipment Certified (crane safety)
- **Contract Inspectors:** (PO Contractor: Clover Leaf)
  - 2 A/C/S
  - 1 Electrical
  - 2 Mechanical

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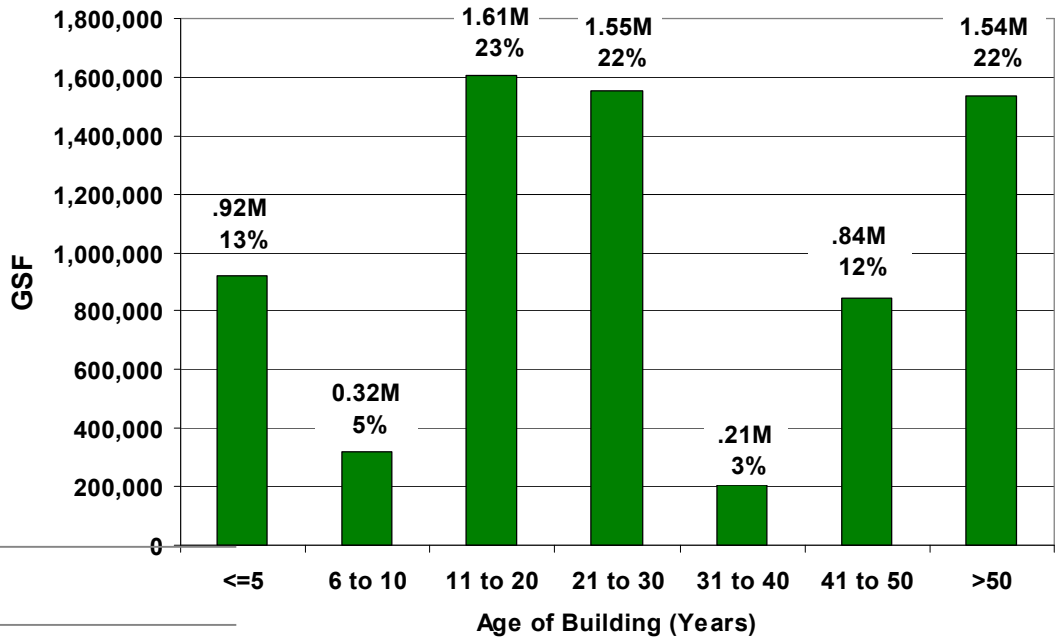
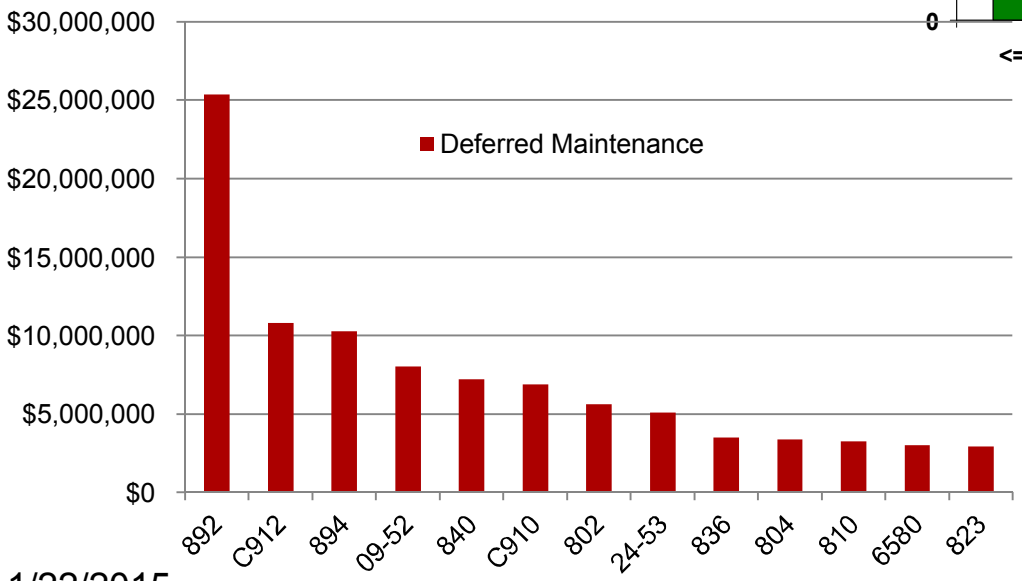
SUPPLEMENTAL DETAIL

Facilities faces major issues for our infrastructure related to *age and the associated increase in required maintenance*

In the absence of a "re-build" funding base through Line Item construction, refurbishment and re-use are critical





Buildings with greatest Deferred Maintenance at NM and CA sites

Good Stewardship

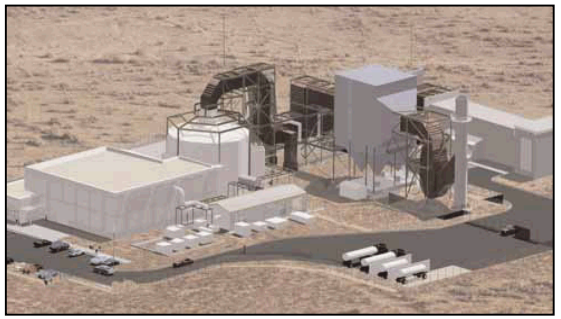
- Balance between
  - Capital improvements
  - Maintenance and repair
  - Operational costs
- Needs always greater than funding
- Continual priority evaluation essential
- Upper management support critical
  - Resolve conflict among competing needs
  - Headquarters support for line items/major program investments

Line Item: JCEL Building 899

Facilities and Infrastructure History for Past 10 Years

Type	Amount	Average Gross Square Feet (GSF)
Line Items	$965M	
IGPPs	$68M	18,000
GPPs	$35M	11,000
Additions	$25M	
Renovations	$31M	
D&D	$25M	

Line Item: MESA WIF Building 898



Line Item: TCR Phase I, 6539 Thermal Text Complex

D&D: Building 806

FE Process Overview

The following basic steps are followed to execute and monitor FE projects:

- **Customer submits request (with cost estimate)**
- **Reviewed by Operations Staff to determine if FE work**
- **FE Project Managers (PM) (2 total – Registered Professional Engineers (PE), 60+ total years of construction experience) process the request and:**
  - **Assess if customer funding adequate**
  - **Select best T&M contractor to do the work**
  - **If not a simple job, request cost estimate from T&M contractor selected. Evaluate reasonableness of estimate. Utilize AE design support if required.**
  - **If estimate exceeds customer funding authorization, go back to customer, get their concurrence to increase project ceiling price (formally documented)**
- **Generate PO for the project through the Business Office. Authorizes contractor work.**
- **Code/Specification Inspection performed if required (ICC certified inspectors in all three disciplines support FE work)**
- **Close out project when complete**

FE Process Overview (continued)

The following checks and balances are in place to contain costs:

- **FE PM's (based on their experience) verify and validate reasonableness of contractor cost estimates**
- **FE PM's are "delegated buyers" (trained in procurement policy and processes)**
- **If a project exceeds $25K, FE PM must obtain SCR concurrence to proceed**
- **Full time FE inspectors ensure work done to code, work performed safely, verify contractor working**
- **T&M contractors provide weekly project completion status. Starts 60 day clock to financially close out a project**
- **Limit number of FE "delegated buyers"**
- **Each job is authorized by a PO: each PO has a ceiling price limit (average PO amount = $4.9K**

FE Process Overview (continued)

Sandia realizes the following advantages by having contracting partners under long term T&M contracts:

T&M Contract Provides:

- **Partners trained and that adhere to DOE/Sandia Safety Standards**
- **Badged, so partners can work in Limited Areas unescorted (w/o clearances, escort costs add $250.00/day to every project – saves a minimum of $1M/year ($250.00 x ~ 4000 projects))**
- **Partners are real time responsive to feedback because they have a vested interest in performing well in the Safety / Security / Quality /Cost areas to keep their contracts.**
- **Partners help Identify and solve safety issues as they perform field work**

FE T&M work is almost exclusively conducted in "occupied spaces". Much different than most firm fixed price construction jobs that are typically done in un-occupied spaces. Contractors used to working in this environment have to have a different mindset in completing their work, must concentrate on being responsive and building positive relationships with customers, leave positive impressions.

4821 - Infrastructure Department
FGIS / GPS Example

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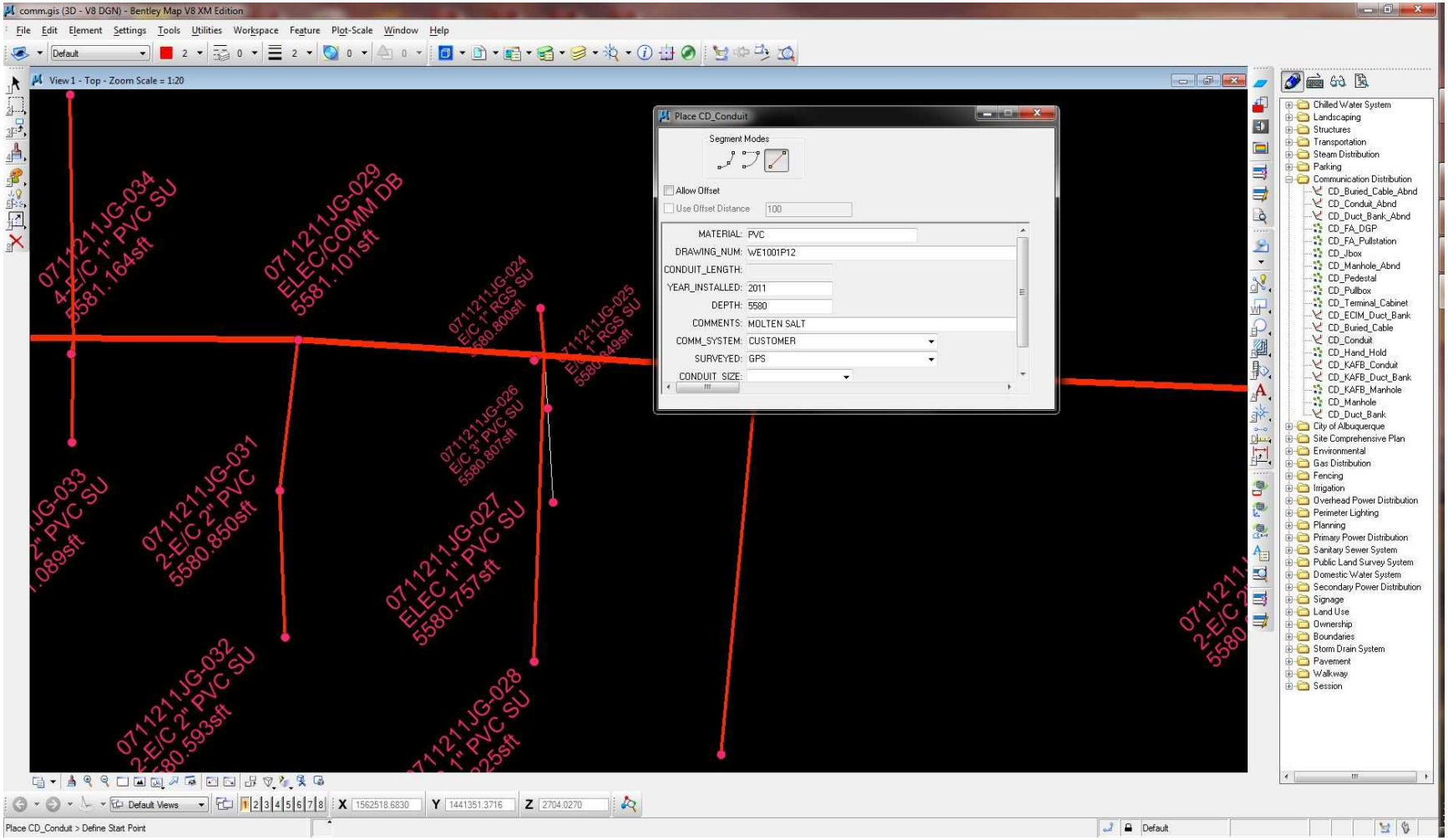

4821 - Infrastructure Department
GPR Example

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