

## **KEY FACTORS FOR SUCCESSFUL IMPLEMENTATION OF SEISMIC MITIGATION FOR SCHOOLS\***

## Identification, Funding, Staffing & Project Implementation

By

Gary Carver & Laura Kelly Alaska Seismic Hazards Safety Commission School Committee Sept., 2007

## SPECIAL CREDIT TO

### KEY KODIAK ISLAND BOROUGH STAFF:

KEY CONSULTANTS:

- Charles (Bud) Cassidy, former Borough Engineer
- Ken Smith, PE, Acting Project Manager/Inspector
- Robert Tucker, Director of Maintenance, KIBSD

- William Lettis & Associates, William (Bill) Lettis
- G&E Engineering Systems Inc, John Eidinger
- Goettel & Associates, Ken Goettel

\*As Learned from the Kodiak Island Borough Seismic Vulnerability Assessment and Mitigation Projects

-Reports publicly available at http://www.kodiak.k12.ak.us/projects/index.html



- IDENTIFICATION
  - Recognition of Problem
  - Identification of Structures at Risk
  - Prioritization of Mitigation
  - Final Determination of Remediation Projects



- FUNDING
  - Federal
  - State
  - Local
  - Private



- STAFFING
  - Local Government
  - Municipal/School Building Managers
  - Private Contract



- PROJECT IMPLEMENTATION
  - Seismic Only
  - Combined with other Upgrades
  - Phased/Unphased
  - Unanticipated Issues



- Recognition of Problem
- Identification of Structures at Risk
- Prioritization of Mitigation
  - Final Determination of Remediation Project

## Recognition of Problem

- Grassroots
  - » Parents of children in buildings
  - Teachers working in unsafe buildings
  - » Upper grade level students
- Parent Teacher Associations
- Informed Citizens
- Professionals
  - » Geologists/Seismologists
  - » Engineers
  - » Facility Managers
- Local Government
  - » Owners/managers of buildings
  - » Superintendent & School Administrators
- Plan Set Review
- Damaging Earthquake Events



#### INFORMATION RELEASE

ALASKA EARTHQUAKE INFORMATION CENTER



December 6, 1999 3:31 pm

The Alaska Earthquake Information Center located a strong earthquake that occurred on Monday, December 6th at 2:12 PM AKST in the Kodiak Island region of Alaska. This earthquake had a preliminary magnitude of 6.8 and was located at a depth of about 22 miles (35 km). The magnitude and location may change slightly as additional data are received and processed. This event was felt strongly in Kodiak, Old Harbor, and surrounding communities Reports of minor damage have been received so far, with power and phone outages in Kodiak. Felt reports were received from as far away as Fairbanks.

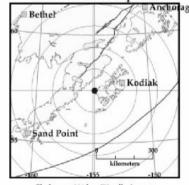
#### Distance to nearby locations:

29 km ( 18 miles) WSW of Karluk 55 km ( 34 miles) WSW of Larsen Bay 97 km ( 61 miles) WNW of Old Harbor 128 km ( 80 miles) WSW of Port Lions 151 km ( 94 miles) WSW of Modak 152 km ( 95 miles) WSW of Kodak 162 km ( 101 miles) E of Pilet Point 171 km ( 107 miles) ESE of Egejik

Preliminary earthquake parameters:

Origin Time (UT):	991206 23:12:34
Latitude: Longitude:	57 N 26' 154 W 52'
Depth:	35 km
Magnitude:	ML 6.8

Location of Earthquake



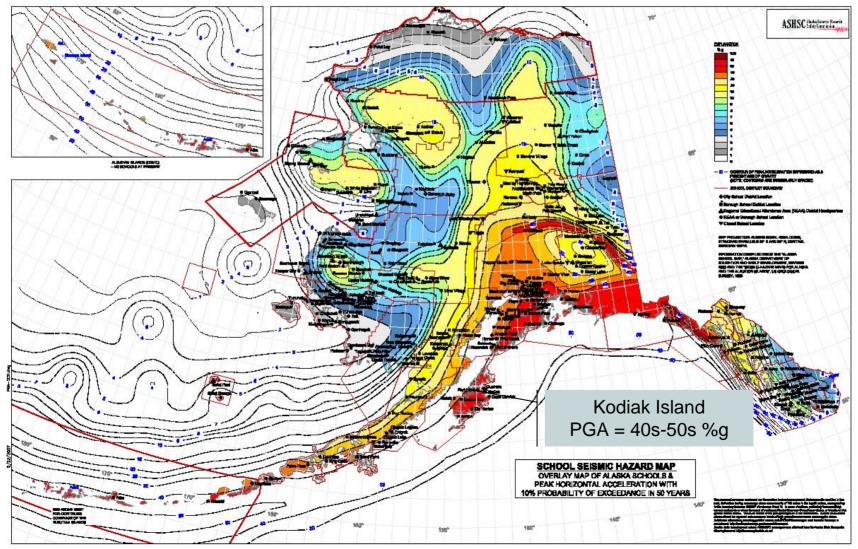
Circles are 111 km (70 miles) apart.

The location and magnitude for this earthquake may be updated as data from additional seismic stations are received. The Alaska Earthquake Information Center will continue to gather data and may issue additional releases as appropriate. With any moderate or large earthquake, aftershocks should be expected to occur.



- Recognition of Problem
- Identification of Structures at Risk
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  - Final Determination of Remediation Project

## (2000 IBC Seismic Risk/ Peak Ground Acceleration)



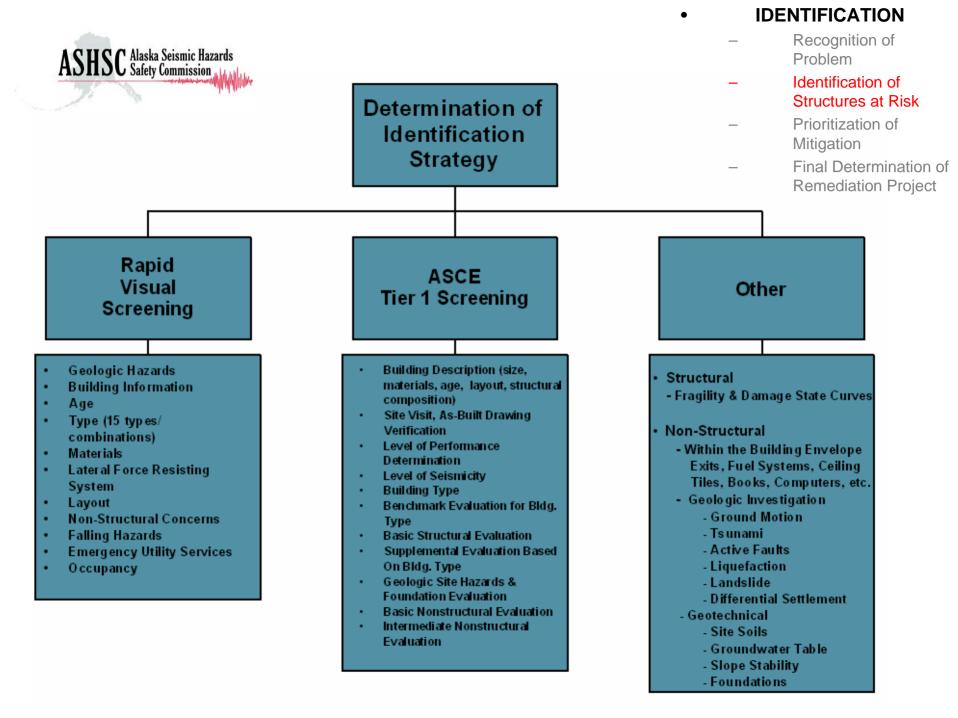


- Recognition of Problem
- Identification of Structures at Risk
- Prioritization of Mitigation
  - Final Determination of Remediation Project

## Preliminary Identification of Structures at Risk

- General Knowledge
  - Level of Seismicity
  - Age/type of structures
  - Prior/scheduled renovations
  - Building configuration/Number of stories/Square footage
  - Student Body Size
  - Other Uses (Emergency Shelter?)
    - » Life Safety
    - » Immediate Occupancy







- Recognition of Problem
- Identification of Structures at Risk
- Prioritization of Mitigation
- Final Determination of Remediation Project
- Geologic Investigation of Seismic Hazards

	Vil	lage S	Schoo	ls Haz	zard S	umm	ary
Note: Until 2000 IBC Code	KIB School	475-yr	Fault	Liquefac-	Tsunami	Landslide	Differential
change, PGA		PGA (g)	Rupture	tion	1.5 Million		Settlement
was 0.40g	Chiniak	0.65	Very Low	Very Low	Very Low	Very Low	Very Low
and no value exceeding	Old Harbor Gym	0.52	Very Low	Low	High	High	Moderate
0.56g appears on the IBC	Old Harbor Classrooms	0.52	Very Low	Low	Low	High	Moderate
Maps	Akhiok	0.47	Very Low	Low	Low	Very Low	Low
	Karluk	0.25	Very Low	Low	Very Low	Very Low	Low
	Larsen Bay	0.25	Very Low	Very Low	Very Low	Very Low	High
	Port Lions	0.28	Very Low	Very Low	Very Low	Very Low	Very Low
	Ouzinkie	0.32	Very Low	Very Low	Very Low	Very Low	Very Low



- Recognition of Problem
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- Final Determination of Remediation Project

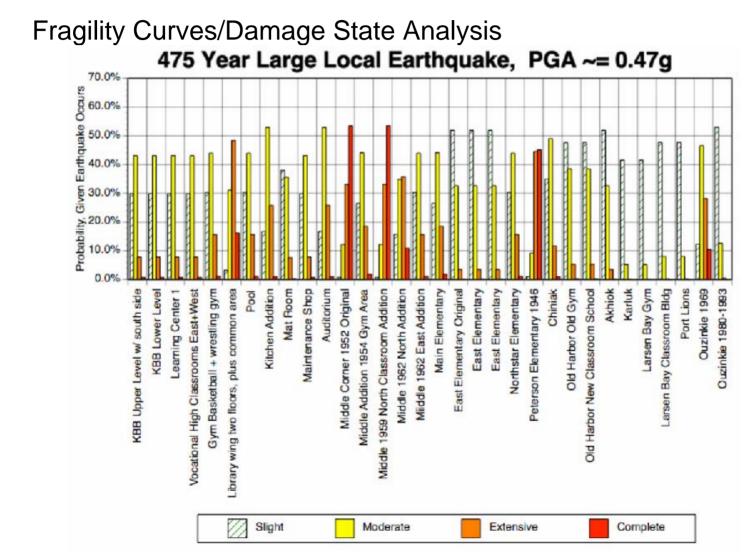
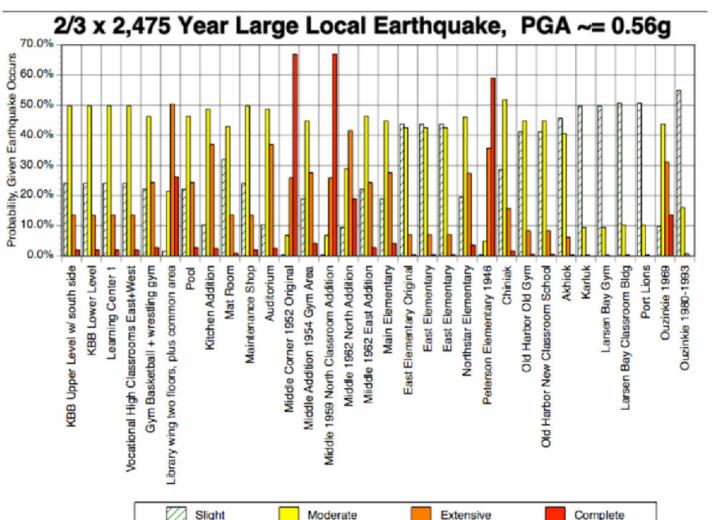


Figure 5-3. Building Performance: 475 Year Scenario Earthquake



- Recognition of Problem
- Identification of Structures at Risk
- Prioritization of Mitigation
- Final Determination of Remediation Project
- Fragility Curves/Damage State Analysis





- Recognition of Problem
- Identification of Structures at Risk
- Prioritization of Mitigation
  - Final Determination of Remediation Project

## Prioritization of Mitigation

- Risk
  - » Further Geologic Site Hazard Evaluation
  - » Full-Building Evaluation
- Cost
  - » RS Means
  - » Average Local Cost
  - » Professional
- Benefit/Cost Analysis
  - » Value of Existing Buildings
  - » # occupants/#days/#hrs per day
  - » FEMA Software



Risk

## **IDENTIFICATION**

- **Recognition of Problem**
- Identification of Structures at Risk
- **Prioritization of Mitigation**
- Final Determination of Remediation Project \_

Life	e Safet	Life Safety Risk							
Hazard	Deaths per 1,000,000 people	Statistical Average Deaths Per Year	Hazard	US Deaths per Year	Deaths per 1,000,000 people		Middle school (old wi Earthquake Life Safety		
Vehicle Accident	186		Tornado Lightning	90	0.18		School day occupancy Statistical Deaths per Year		
Middle School	469	0.100	Flood	97	0.39		Deaths per 1,000,000	469	
Peterson School	400	0.021	Assault by kni		8				
Ouzinkie School	293	0.010	Fire Assault by fire	3,380 earn 11,829	14 47		About 2.5 times vehicle dea	ath rate	
KHS Library	238	0.053	Falls	16,257	65				
KHS Gym	30	0.001	Vehicle Accide	ent 46,466	186				

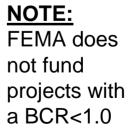


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## Benefit / Cost Ratio (FEMA Benefit Cost Toolkit 2.0, 2005)

Key Findings						
School	Cost	Benefits	BCR			
Middle	\$1,192,000	\$8,010,000	6.72			
Ouzinkie	\$149,000	\$975,000	7-55			
Peterson	\$509,000	\$1,862,000	3.66			
HS Library	\$465,000	\$4,453,000	9.59			
HS Gym	\$410,000	\$417,000	1.02			
Non-Structural	\$363,000	-				
Total	\$3,088,000	\$15,717,000	5.09			

BENEFITS = Reduction in losses due to damage, casualties, & economic impacts





- Recognition of Problem
- Identification of Structures at Risk
- Prioritization of Mitigation
- Final Determination of Remediation Project
- Final Determination of Remediation Projects
  - Federal
    - » FEMA Guidelines
    - » Funding/Lending Rules
  - State Government
  - Local Government
  - Professionals
  - Advisory Boards
  - Owners of Buildings
  - School Board
  - Occupants (Teachers, Students)
  - Parents
  - Voters
  - Others

Emergency Responders, Planners, (You), etc.

## **REMEMBER:**

Public Schools are Public Buildings

Key Findings

Total	\$3,088,000	\$15,717,000	5.09
Non-Structural	\$363,000	-	
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School	Cost	Benefits	BCR



### Federal

- FEMA Hazard Mitigation Grant Program (HMGP) - Post Disaster

Federal HMGP funds made available following a disaster can provide a federal share of up to 75% of the costs of an approved project. The remaining 25% must be met through non-federal funds such as local government funds, community development block grants, etc.

- FEMA Pre-Disaster Mitigation Program (PDM)
  - » Mitigation planning: \$1M cap on Federal share, not to exceed 3 years
  - » Mitigation projects: \$3M cap on Federal share, not to exceed 3 years
  - » Information dissemination activities not to exceed 10%, must directly relate to planning or project sub-application
  - » Applicant management costs not to exceed 10%
  - » Sub-applicant management costs not to exceed 5%
- US Senators
- US Representatives

## • State

- School Facilities Capital Improvement Project Grant (Dept. of Education)
- State Capital Projects
  - » State Senators
  - » State Representatives
- Governor

## Local

- Bonds
- Maintenance
- Special Capital Projects/Special Funds (Sale of Shuyak Island)
- General Fund (Mill Rate/Property Taxes/Severance Taxes/Intergovernmental Sources)
- Local Government Representatives
- Local Government Employees
- Private (In-Kind Donations)
  - Services
  - Materials/Supplies
  - Benefactors



Contrack F4 2008 - 06

Project Litle:	Earthquake E	Evaluation Stud	y.		Project Num	ber: 05002	1					ILITARY AND VETERANS AFFAIRS ON OF HOMELAND SECUR(TY
Project Description.	Evaluate sch	ool facilities al	ility to	) withstar	d strong grou	ind motion						EMERGENCY MANAGEMENT
			<u> </u>				1				Ob	ligating Award Document for
Expenditure Category	Estimated	Prior Years	P	roject							2006 PreDisaster N	litigation Competitive, Planning Activities
	Total Cost	Expenditures	Ba	alance	2006-07	2007-03	2008-0	)9	2009-10	2010-11		Grant
Admin	\$ 100,000	\$ 93,519	\$	6,481	\$ -	\$ -	\$	- 3	s -	\$	Ph US D	e-Disaster Mitigation Grant EPT OF HOMELAND SECURITY
Equipment	-	1,384	1	(1,384)	-	-		-	-		Federal	Emergency Management Agency
Engineering Services	400,000	169,465		230,535	217,945		1				2006 Federal	I Grant No. FDMC-10 AK-2005 CFDA No. 97.017
Other	-	17,687	1	(17,687)	-	-	1	-	-		A. Agreement No. 2, Recipient 66PDM-GR34015 Kodiak Island Borough	3: Award Amendmant 4. Employer, Tax ID #
Totals	\$ 500,000	\$ 282,055	\$ 3	217,945	\$ 217,945	\$-	\$	- 3	\$-	\$	5. Rocipient Address	Amendment# 92-0030845 6. issuing Office and Address
				1			1					Copartment of Military and Veterada Affairs
Cost Beyond 5-year proc	iram None										Kudiak Island Barangh 710 Mili Buy Roed	Division of Homeland Security and Emergency Visnegement P O. Box 6/80
Source of Funding: 2004	·										Kadvak: AK 99615	Fort Richardson, Alaska 99505-5760 Www.ek-preuered.com/grants htm
Operating Budget Effect.											7. Effective Date of This Action June 1, 2007	18. DH\$&EM Project Phono: 907-428-7016 Manager: Fax: 907-428-7099
optimity below							1			1	S. Method of Payment:	R. Scott Simmons Scott Simmons@alaska.gov
											Electronic 10. Grant Award and Terms and Conditions: (see attach	
<b>Ф</b> ГОО О		ام ما									Total Awarded Amount:	\$1,251,510.00
\$500,0	100 RO	na				_		. –			Federa Share:	\$936.032 GC \$312 877 5C
Drojoot t		unto					EMA	٩F	עוטי	1		
Project te	0 Evai	uale							. 1			
13 Sch	oole C	oet					Gr	an	IT		Grant program guidelines and Fedoral, State, and post-	ot to be construed as expenditure authorizations or approvals. comracting and producement compliance requirements apply.
		031					Prov	id	ad		For State Use Only: CC # 09296301	5. (see attached Grant Requirements, Assurances and Agreements)
\$28	2,000							viu	eu		1.50 Soceptance of a grant from the United States oreales a least dr.	ik on the part of the overlee to use the fursis or proporty made everyold up
ΨΖΟ	2,000					(	\$938	2 6	32		12. Special Conditions: Grant sunds cannot be expended f2. Special Conditions: Grant sunds cannot be expended	jular and Standards for Federal Agencies. Chapter 2, Berlinn 16 0(c) d unt <sup>2</sup> these conditions have been roc.
						•	<b>PSO</b>	5,0			Return Contoleted and Signed Contact Sheet	
Alaska Divis	ion of Ho	moland	<b>S</b> ~~		and Em	oraona	w Mai	220	omon	•	17 · · · · · · · ·	· · · · ·
						leigent	y wa	lay	emen	L	Issuing Address in block 6, within 30 days from the da	py of this dosynteent with the terms and conditions to the
Hazard Mitig		ant Progi	am								14. Signature of Jurisdiction Project Manager	6-29-07
Project Appl											· Malution	C Pione: 907-486-9340
Applicant <u>k</u>	<u>Kodiak Isla</u>	nd Borou	igh			_					Printed Name: Walle Koning 15. Signature of Jurisdiction Chief Financial Officer v	5.3 Emails wkoning@kib.co.kodiak.ak.us Digte: 7-2-07
Project Locat	ion 821	Mill Bay	Roa	ad Ko	diak, Ala	iska					· Bailton that now	Phone: 907-466-9320
, (street, city)					1						Printed Name: Karleton Short	A Fax: 907-466-9399
Project Title (	•	,		hrərv	Wina S	oismic	Potro	fit E	Droipa	<b>`</b> #	15. Signature of Jurisdiction Signatory Official	Date: 7/6/07
						CISINIC	Neuo		10/00	<i>,</i> L	- Canter Gamer Q. A.	0 - Fax: 907-486-2300 Fax: 907-486-9374
Estimated Pr	Uject Cost		φ41	0,110	)	-					Printed Name and Title: Rick Gifford, Manager Annual 17. DHS&EM Signatory Official (Name and Title)	25574 7172. Effizit: rgifford@kib.co.kodisk.sk.us
											(tel 11/2	Mart 4/25/3247
											John W. Madden, Director	man approver



## STAFFING

- Local Government
  - Credentials
  - Time Commitment
  - Specialized Hire Considerations
  - Points of Contact
    - » Finance
    - » Blueprints (digital?)
    - » Building Access
    - » Public Meetings & Outreach
    - » Project Management (Identification, Mitigation Grants, Construction)

#### Municipal/School Building Managers

- Engineers (Large Districts)
- Architects (Large Districts)
- Finance
- Maintenance

#### Private Contract

- Evaluation
  - » Geologic
  - » Geotechnical
  - » Structural
- Grant Application
- Design
- Construction
- Inspection



#### **PROJECT IMPLEMENTATION**

- Seismic Only
- Combined
  - Maintenance Upgrade (Roof, Mechanical, Electrical)
  - Energy Efficiency
  - Expansion
- Phased/Unphased
- Unanticipated Issues
  - Existing Conditions
    - » Lead (paint, plumbing, etc.)
    - Asbestos (flooring, insulation, roofing, etc.)
    - » Non-Code Compliant Electric, Plumbing, Fire, Fuel/Heat
    - Unknown Existing Conditions (Structural/Non-Structural)
  - Funding Difficulties
    - » Long Stretches of Time between Identification & Construction
    - » Multiple Agencies
    - » Rising Construction Costs
    - » Unaccounted Local Cost Factors

Kodiak Island Borough

AGENDA STATEMENT

Meeting of: September 21, 2006

Contract No. FY 2007- 11

ITEM NO. 12.A

RFP# 1 Architectural and Engineering Services for KMS Seismic Upgrade, KHS Library Seismic Upgrade, KHS Gym Seismic Upgrade, KHS/KMS Complex IRMA Roof Upgrade, KHS Learning Center, KHS Exterior Insulation and Window Replacement, KHS Vocational Center Renovation & KHS Pool Reclamation.

#### THIS AGENDA ITEM WAS POSTPONED FROM THE LAST MEETING.

Kodiak Island 3.16.020 "Limitation on Manager's Authority" states that a contract exceeding \$25,000 requires Assembly approval.

The Architectural/Engineering Review Board [ARB], through an RFP process, has selected the firm of Jensen Yorba Lott Inc. of Juneau, Alaska to perform the Services specified in RFP# 1.

Funds are in place through voter approved Bonds in the amount of \$7,141,648 to accomplish the KHS/KMS Complex IRMA Roof Upgrade, Renovation of the KHS Learning Center, KHS Insulation and Window Replacement, and the KHS Voc-Ed Renovation and Pool Reclamation Projects. The Legislature approved \$910,000 for Seismic Upgrades. Grant funds are also pending from FEMA in the amount of \$1,000,000 for a PDM-C grant to fund the KMS Seismic Upgrade and \$478,000 from an Alaska HMGP award to fund the KHS Library Seismic Upgrade.

The Borough Engineering and Facilities Department's Bond Projects Office has negotiated an AIA Standard Form of Agreement Between Owner and Architect for Architectural and Engineering Services in the amount of <u>\$733,484</u> for the above work with an estimated Total Value of \$9,268,000.

The Borough Engineering and Facilities Department recommends awarding the A&E Design Services contract to Jensen Yorba Lott Inc.

FISCAL NOTES	ACCOUNT NO. 420 515 452 140 05013 5, 420 515 452 140 05014 5, 420 500 452 140 05015 5, 420 515 452 140 05017
[[]] N/A	5, 410 523 452 140 05022 4 Expenditure \$ 733,484.00 Amount

APPROVAL FOR AGENDA:



RECOMMENDED MOTION: Move to authorize the manager to execute Contract No. FY 2007-11 to Jensen Yorba Lott of Juneau, Alaska in an amount not to exceed \$733,484.00.



Item No. 3.B

#### **PROJECT IMPLEMENTATION**

- Seismic Only
- Combined
  - Maintenance Upgrade (Roof, Mechanical, Electrical)
  - Energy Efficiency
  - Expansion
- Phased/Unphased
- Unanticipated Issues
  - Existing Conditions
    - » Lead (paint, plumbing, etc.)
    - » Asbestos (flooring, insulation, roofing, etc.)
    - » Non-Code Compliant Electric, Plumbing, Fire, Fuel/Heat
    - » Unknown Existing Conditions (Structural/Non-Structural)
  - Funding Difficulties
    - » Long Stretches of Time between Identification & Construction
    - » Multiple Agencies
    - » Rising Construction Costs
    - » Unaccounted Local Cost Factors

Kodiak Island Borough

#### AGENDA STATEMENT

Special Meeting of June 26, 2007

Contract No. FY2007-50

Authorizing the Manager to Execute Contract No. FY2008-01 for Phase I of the Seismic Upgrades to the Kodiak Middle School.

Kodiak Island 3.16.020 "Limitation on Manager's Authority" states that a contract exceeding \$25,000 requires Assembly approval.

This Contract is for work at the Kodiak Middle School shown on the construction documents prepared by Jensen Yorba Lott, Inc. titled "Kodiak Middle School Seismic Upgrade", dated April 27, 2007, and includes structural, mechanical, electrical, and architectural work. The construction documents, bid documents and associated addendum are available for review on the KIB website. The work will be phased over two (2) years.

The Project is funded in part by monies from a FEMA PDM-c Grant; Bond Projects for Floor Covering Replacement and KHS/KMS Roof Upgrade; and Legislative funds. Additional funding sources are to be identified.

Bids received in response to KIB's Invitation to Bid dated April 2007 are:

	Base Bid Phase 1	Alt Bid 1 Phase 2	Total	
Brechan Enterprises	\$2,340,000	\$3,175,000	\$5,515,000	
F & W Construction	\$2,469,667	\$3,011,917	\$5,481,584	
Engineers Estimate % Difference			\$3,465,000 58%	0

The E/F Department has reviewed the bids and, as both bids received are substantially higher than the engineers estimate, recommends that a Contract for Seismic Upgrades at the Kodiak Middle School be awarded to <u>Brechan Enterprises</u>, Inc. in an amount not to exceed <u>\$2,340,000</u> for Phase 1 work only. Phase 2 is to be re-bid at a later date.

Einschhlute	T-T-T-T-T-T-T-T-T-T-T-T-T-T-T-T-T-T-T-	
Fiscal Notes:	n/a	Acct No. 420 515 452 150 05014 6
	_	410 523 452 150 05022 5
F		410 531 452 150 07015 6
Expenditure Required: \$	n/a	Amount Budgeted: n/a
	the second se	

APPROVAL FOR AGENDA:

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Recommended motion: Move to authorize the manager to execute Contract No. FY2007-50 with Brechan Enterprises, Inc of Kodiak in an amount not to exceed \$2,340,000.



## **KEY FACTORS FOR SUCCESSFUL IMPLEMENTATION OF SEISMIC MITIGATION FOR SCHOOLS\***

Identification	1999-	New 2000 IBC, new local faults identified.			
	2005	Oct. 2002 – USCG blueprint w/ fatal design flaw for Peterson EI. identified by Structural Engineer.			
Funding	2004- present	2004 - 1 <sup>s⊤</sup> Bond for Vulnerability Study (passed by only 11 votes)			
		2006 - PDM Application made, Rec'd 06/2007			
		2006 - State Legislature approves \$910,000			
Staffing	2005- present	(4 consultants hired, 1 presently retained, 1 new Borough Employee hired)			
Project Implementation	2006- present	09/2006 A/E firm hired for final engineering/drawings 06/2007 1 <sup>st</sup> Construction Contract			

\*As Learned from the Kodiak Island Borough Seismic Vulnerability Assessment and Mitigation Projects

-Reports publicly available at http://www.kodiak.k12.ak.us/projects/index.html

-Other publicly available information for budgets, contracts, etc. at http://www.kodiakak.us/ or http://records.kodiakak.us/