

# **Geotechnical Engineering Division**

Athar Khan, P.E., Director

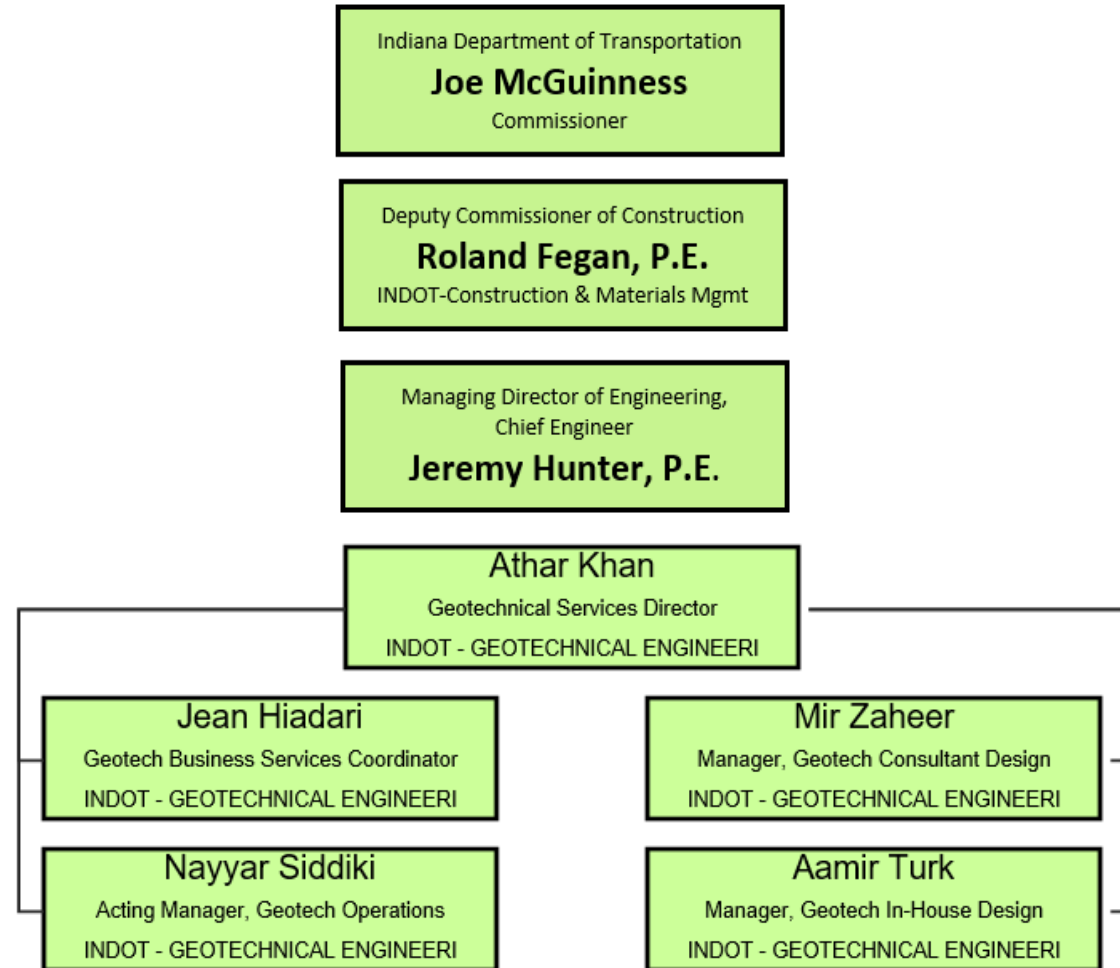
February 24, 2020

# Mission Statement

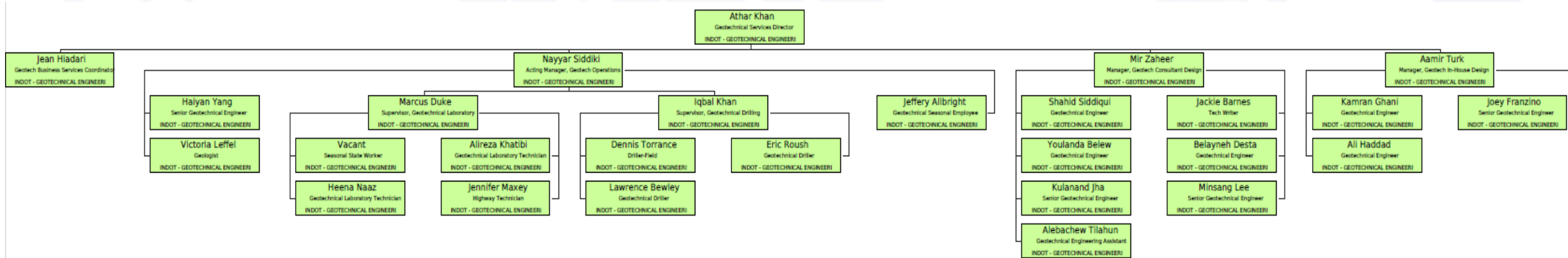
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“The primary mission of the Geotechnical Engineering Division is to deliver our customers the most accurate and cost-effective Geotechnical recommendations for the design of Hoosier highways and bridges, in a timely manner.”

# INDOT Organizational Chart



# Geotechnical Division Organizational Chart



# Geotechnical Engineering Division

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## Responsible for Providing the following:

- Geotechnical Field Drilling & Testing
- Geotechnical Field Instrumentation & Monitoring
- Pavement Coring
- Geotechnical Laboratory Testing
- Geotechnical Engineering Services
- Geotechnical Construction & Technical Support
- Retaining Structures Assessment & Collecting Inventory
- Landslides Assessment & Monitoring Services
- Implement JTRP & Other Innovations





# Geotechnical Engineering Division

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**Primarily provides the foundation design recommendations for the following INDOT Features:**

- Roadways
- Bridge Structures
- Pavements
- Retaining Structures
- Traffic Sign, Wire Rope Barrier & Communication Towers
- Drainage Structures
- Landslide Corrections

# Our Customers/Partners

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- Division of Planning
- Division of Bridge Engineering
- Division of Highway Engineering
- Pavement Engineering
- Traffic Design
- District Design
- District Maintenance
- District Construction
- Toll Road
- Other State agencies such as DNR, IDEM, State Police, etc....
- Local Agencies

# Geotechnical Engineering Tracking System

Geotechnical - Internet Explorer

1400234 - Maintenance

## Project Header

Des / Alt #: 1400234	Contract: R-36689	Designed By: Crawfordsville District	Status: Active
Project Manager: <a href="#">McMullen, Kenneth</a>	County: White	District: Crawfordsville	RFC Date: 01/03/2018
Road: I 65	Work Type: Small Structure Replacement	From To: 193+040 193+040	How many days until you reach 60%: 0
Location: 0.01 mi N of US 231		Letting Fiscal Year: 2018	Letting Date: 03/14/2018
Geotechnical Subsurface Status:	Soil Investigation Status:	Pavement Design Finish Date:	<a href="#">Design Finish Status:</a> Design Analyses Complete



Geotechnical - 1400234

[EDIT]

- ▼ Project(A)
  - ▼ Documents (2)
    - ▼ **Geotechnical Engineering Report (A)**
      - ▶ Purchase Order
      - ▶ Activities (4)
      - ▶ Field Work (1)
      - ▶ Laboratory Work (9)
      - ▶ Construction Support (A)

### Documents

Filter: AND

Document Type	Initiation Date	Completion Date	Project Engineer	Consultant	Design Consultant	Contractor	Status	
Geotechnical Engineering Report	06/15/2017	10/05/2017	Belew, Youlanda	INDOT Geotechnical Engineering	Michael Baker International, Inc.		Active	

Showing 1-1 of 1

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\* This color background fields are mandatory.



# Workload

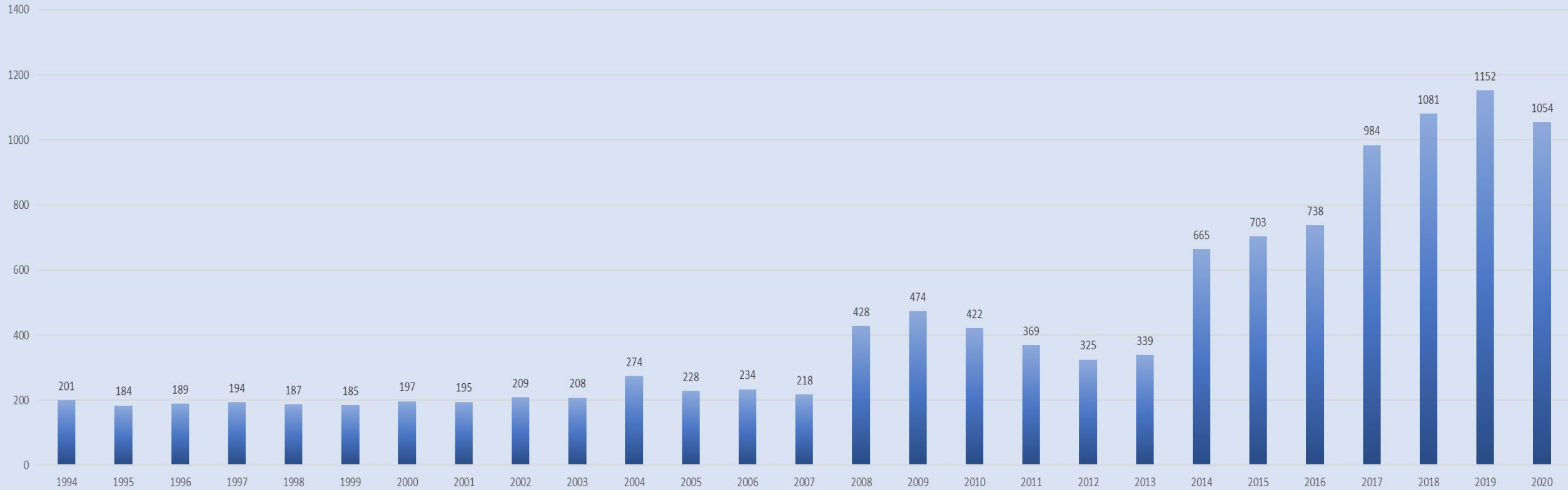
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- Historically: 350 to 400 projects per year
- Recently: 1000 to 1250 projects per year
- Division's In-House Capability: 100 to 150 projects per year
- Geotechnical Consultants are used for most state and LPA projects



# Historical Annual Production 1994-2020

Historical Annual Production 1994 - 2020



Project Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
In-House	78	93	111	112	111	112	106	85	107	66	95	89	79	80	120	99	68	89	67	66	65	84	75	73	158	167	114
OEA	20	16	6	18	19	41	42	61	51	73	115	64	84	65	198	172	220	131	37	36	36	18	69	238	326	371	181
LPA	88	75	72	64	57	32	49	49	51	69	64	75	71	73	101	85	57	62	60	61	51	85	75	94	44	3	0
Geotech-Design															8	49	4	20	94	23	52	68	113	147	172	164	259
Addendums																							106	36	18	0	63
Soils Waiver															1	69	73	67	67	153	461	448	300	396	363	447	437
<b>Total Projects</b>	<b>186</b>	<b>184</b>	<b>189</b>	<b>194</b>	<b>187</b>	<b>185</b>	<b>197</b>	<b>195</b>	<b>209</b>	<b>208</b>	<b>274</b>	<b>228</b>	<b>234</b>	<b>218</b>	<b>428</b>	<b>474</b>	<b>422</b>	<b>369</b>	<b>325</b>	<b>339</b>	<b>665</b>	<b>703</b>	<b>738</b>	<b>984</b>	<b>1081</b>	<b>1152</b>	<b>1054</b>

# Projects Management

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- Since In-House capability is not enough, we depend on consultants for about 90% of geotechnical work
- Type of geotechnical contracts: Unit price-based/hourly rate contracts
- Open end Contracts (OEA) Currently 13 active contracts (12 + 1)
- Geotech consultant works as a sub to a design consultant

# Future Workload

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- INDOT Construction budget for FY 2021 \$1,861,000,000.00
- INDOT Construction Budget for FY 2022 \$1,865,000,000.00
- INDOT Construction Budget for FY 2023 \$1,604,000,000.00
- INDOT Construction Budget for FY 2024 \$1,730,000,000.00
- INDOT Construction Budget for FY 2025 \$1,278,000,000.00

# Duration for Geotechnical Investigation

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- **Total time needed:** 120 calendar days
- **Field work:** 50 calendar days  
(which includes POs, coordination with property owners, utilities, field checks, marking borings, scope approval, and actual drilling)
- **Laboratory Testing:** 20 calendar days
- **Engineering:** 50 calendar days  
(which includes INDOT review time)



# Construction Support

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- Compaction Control using DCP & LWD
- Mix Design for Chemical Modification
- MSE Wall Design Review
- Review & Approve Pile Driving System
- Perform Pile Load Tests
- Drilled Shaft Construction Inspection
- Instrumentation



# Technical Support

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- Develop New guidelines
- Develop New Specification
- Develop Unique Special Provisions (USP)
- Develop Indiana Test Method (ITM)
- Revise Geotechnical manual
- Revise Contract Documents ( Appendix “A” & “D”)
- Revise Frequency Manual
- Review & Approve New Consultants & Laboratories
- Review & Approve New Materials & Systems



# Utilization of Recycled Material

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- Coal Ash
- Foundry Sand
- Tire Shreds
- Crushed Glass
- Lime Kiln Dust
- Steel Slag



# Innovation

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- Geofam-Expanded Polystyrene (EPS)
- Open Ended Large Diameter Pile
- Utilization of LWD
- Utilization of DCP
- Microwave Moisture
- QC/QA for Embankment & Subgrade
- Soil Stabilization Using Cement
- Geophysical Application
- Use of Geosynthetics
- Intelligent Compaction



# Future Plan for Next 24 months

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1. Complete Statewide Retrofit of Problem MSE Walls
2. Complete Landslide Inventory Statewide
3. Develop Geotechnical Asset Management Plan
4. Explore QC/QA application on other geotech work
5. Update our existing manuals and guidelines to reflect the latest changes
6. To prepare training materials for Geotechnical personnel
7. To continue the development of GIS based Geotechnical Data base.



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