What to Consider When Evaluating Sites for Expansion

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Introduction

- Overview of GEAPS Courses written and presented by Fred Fairchild

- GEAPS 550 – Materials Handling I (Material Flow/ Spouting, Screw Conveyors)
- GEAPS 551 – Materials Handling II (Conveying Equipment)
- GEAPS 552 – Materials Handling III (Liquid Systems)
- GEAPS 510 – Grain Facilities Planning and Design I (Basic Design Requirements and Simple Facility Design)
- GEAPS 511 - Grain Facilities Planning and Design II (Expanding Existing Facilities)
Overview of GEAPS 511
Grain Facilities Planning and Design II

- Lesson 1 – Site Requirements
- Lesson 2 – Rail Planning and Track Layout
- Lesson 3 – Selection and Application of Sensing Units
- Lesson 4 – How to Use and Manage Sensor Information
- Lesson 5 - Designing for Safety
Overview of GEAPS 511 Grain Facilities Planning and Design II

• Lesson 6 – Designing for Security
• Lesson 7 – Planning for Retrofit and Expansion
• Lesson 8 - Roofing Design, Waterproofing and Coatings
• Lesson 9 – Temporary Storage
• Lesson 10 - Utilities
Overview of GEAPS 511
Lesson I – Site Requirements

• Objectives:
  o Allowable uses and regulations
  o Physical characteristics and limitations
  o Proposed use and purpose
  o Required function and area
  o Topography and neighbors
  o Future additions
Governments control of physical development of land and the allowable uses for each individual property.
Allowable Land Uses Zoning

- Most frequently-used zoning groups:
  - Agricultural
  - Residential
  - Commercial
  - Industrial

- Variances may be obtained in some cases
Allowable Land Uses

Required Permits

- Building permit
- Utility hookup permits
- Air quality permits (construction/operating)
- Storm water runoff permits
- Utility hookup fees
- Other
Allowable Land Uses
Building Codes

• Building Codes
  o Laws that regulate the design and construction of buildings
  o Grain elevators included

• Use and Occupancy Classifications:
  o Grain handling facilities classified as “Hazardous” due to presence of grain dust and have special requirements
Allowable Land Uses
Easements and Restrictions
Allowable Land Uses

Site Restrictions

- Setbacks
- Controlled access
- Utility easements
- Adjacent property access
Allowable Land Uses

Site Restrictions

Location:
1235 Elevator Road
Anywhere, USA

Legal Description:
SE ¼, Sec. 1, T 19
N, R 20 W.
Allowable Land Uses

Height Restrictions

Airport Approach Patterns

Neighborhood Height Restrictions
Site Topography/Conditions

Terrain

Drainage

Storm Water Retention Pond
Soil Characteristics

- Soil Characteristics:
- Sand/Clay
- Rock
- Subterranean Conditions
- Fill
- Ground Water
- Bearing Capacity

Site Analysis Process

Site Analysis Overlay
Soil Testing

Soil Test Boring Rig
Soil Test Information

- Soil reports provide:
  - Bearing capacity of soil
  - Foundation design recommendations
  - Compaction of soil
  - Lateral strength (active, passive, and coefficient of friction)
  - Permeability
  - Frost depth
Soil Pressures

- Pressures of foundations cause soil pressures to great depths.
- Soil must have needed strength throughout depth to support applied foundation loads.

Footing Influence Zones
Problem Soil Conditions

- Organic soils
- Clays
- Silt clays
- Loose silts
- Fine water-bearing sand
- High water table
- Rock close to surface
- Land fills, dumps, unconsolidated fills
- Evidence of earth movement
Soil Modifications

- Remove Unacceptable Soil
- Over Excavate and Backfill
- Matt Foundations
- Pilings or Piers
Allowable Types of Construction

- Soil strength, condition and available modifications determine maximum allowable load the soil will bear.
- Weak soil conditions will influence whether concrete or steel storage may be used.
- Taller bins add greater pressure on the soil unless larger footing imprints are used.
Types of Foundation Footings

- Mat or Raft
- Spread Footing
- Continuous Footing
Overcoming Poor Soil Condition(s)

Soil Modifications

Excavate and Compacted Backfill

Augered Piling Hole

Concrete Piling

Auger-cast Piling
Overcoming Poor Soil Condition(s)

Soil Modifications
Piling Types

Piling Materials: Concrete, Steel Beams, Pipe, Wooden Poles

Friction Piling
Bearing Piling
Normal Soil Preparation

Site Ready

Over-excavation
Piling Foundation Support

Installing Pilings

Foundation Supported By Piling
Space Requirements
Initial Space Requirements

- Bin Area
- Truck Receiving/Load Out Areas
- Offices/Ancillary Buildings
- Vehicle Staging Areas
- Rail Receiving/Loading Areas
- Vehicle Parking
Additional Space Requirements

- Adequate Parking
  - Employee Parking
  - Customer Parking
  - Elevator Equipment
  - Truck Staging
Road Access

• Choose locations with:
  o Well built local roads
  o Good access to major highways
  o No city traffic
Railroad Access

- Locate on major rail line
- Required siding lengths
- Shipment sizes to be handled
- Allowable Loading/Unloading Times
- Property Leases
- Owner of Track
Future Space Requirements

AgMark Co-Op Concordia, KS 4.75 million Bushels = 120,656 mt storage capacity
Future Space Requirements

Allow room for future storage bins and associated systems and equipment to receive, handle and ship grains.
Cost Considerations

- Purchase of land
- Permits
- Soil testing
- Site prep/grading
- Soil modifications
- Utilities installation
- Roads to and on site
- Rail installation
- Layout and design engineering
Summary

• Many things affect site selection for new facilities and future expansion.

• Each site must be investigated thoroughly to determine its suitability for the intended initial use and future additions.

• The total cost of building any additional structure or facility capacity upgrade includes many factors.
Questions?
&
Discussion