Building the Next-Gen University

Responding to Rapid Growth at UT Dallas

August 13, 2015 - UT Dallas – Project Management Symposium
Vince Yauger, AIA, PMP

UT Dallas has experienced rapid growth over the last eight years, with enrollment increasing at a rate of 7% to 10% per year. A shift in demographics is transforming what used to be a commuter campus into a more traditional university environment where students both live and learn. At the same time, an explosion in available new technology is fundamentally changing the way that we teach at the university level. As a consequence, the architecture of the campus is also changing to respond to the new opportunities afforded by improved teaching tools and technologies.

UTD is also actively pursuing “Tier One” status – a measure of a robust research base, high college rankings, and faculty and student excellence. Attracting top talent requires having state-of-the-art research facilities in place. Meeting these recruiting challenges is also contributing to the pace of new construction on campus as we design and build the needed research facilities.

With rapid growth also comes increased risk. How do we maintain the necessary accelerated rate of construction while minimizing the impact of the associated risk? In this presentation, we will look at several case studies, review some tough “lessons learned”, and communicate PM process changes implemented to improve construction safety.
Learning Objectives

• Overview of the UT System Office of Facilities Planning & Construction
• Walk Through a Brief History of UT Dallas
• Explore Factors Driving the Current Rapid Growth at UT Dallas
• 2007-2014 – Review of Completed Construction Projects
• Lessons Learned from Past Construction Projects
• Status of Current Construction Projects
• Survey of Future Projects

UT System Office of Facilities Planning & Construction

**BOR/UTS Services**
- Provide System-wide oversight / risk management of design and construction procurement and reporting on behalf of System Admin and the Board

**Project Management Services**
- Provide “conception-to-birth” project management services for large-scale capital construction (i.e. – CIP). Services are comprehensive from pre-project planning through post warranty

**Value-Added Services**
- Provide a variety of specialized facility-related services on an as-needed basis
OFPC Organization and Philosophy

- Organized around **regional** project delivery teams
- Teams have defined institutions that they serve (i.e. UT Dallas)
- Project delivery philosophy:
  - *Provide project management from pre-project planning through post warranty*
  - *Provide project information to campus throughout life of project*
  - *Integrate variety of project specialists*
  - *OFPC PM staff are typically Architects, Engineers or Construction Managers by formal education and professional registration*

Capital Improvement Program (CIP)

- Current CIP (2015 - 2020):
  - **92 Projects**
  - **$5.4 Billion**
  - Most New Construction and Renovations greater than $4M are procured and managed centrally by System Administration (OFPC)
  - Projects below thresholds or those so delegated are procured and managed by institutions within their respective facility departments (i.e. UTD FM)
OFPC Basic Project Management Services

- General Project Management
- Project Budgeting and Administration
- Project Cost and Schedule Control
- Project Compliance and Risk Mitigation
- Construction Inspection / Code Compliance
- Interior & Equipment Planning and Procurement
- Project Close-out and Warranty Services
- Delivery methods aligned with PMI PMBOK framework

The University of Texas System Institutions

OFPC – Office of Facility Planning & Construction – Major Offices in:
- Austin
- Galveston
- San Antonio

Construction Offices at Every Institution excl. MDACC, SWMC
How has the University of Texas System OFPC Adapted PMBOK Framework to Projects?

- OFPC uses **CENTRALIZED** Program Management and **LOCALIZED** Project Management
- OFPC has adapted PMI Processes from the PMBOK Guide to our Project Management Office
- OFPC utilizes Project Charters / Scope Change Requests
- OFPC uses a Risk Mitigation and Monitoring Process
- OFPC conducts “**Lessons Learned**” presentations to share experience across all UT System Institutions

Southwest Center for Advanced Studies Campus

*...in the beginning...*

**The TI Founders**
Cecil Green, J. Erik Jonsson, Eugene McDermott
SCAS was Chartered in February 1961 and originally housed on the SMU Campus

**The First Building on the Southwest Center for Advanced Studies Campus in 1964 is...** "The Laboratory for Earth and Planetary Science"  
The building was designed by highly regarded Texas Architect O'Neil Ford.

Slide used by permission of the author, Tom Lord / OFPC
The Graduate Research Center of the Southwest (to become The University of Texas at Dallas), first facility. The Laboratory of Earth and Planetary Science (later named the Founders Building), opened on the grounds of the present-day UTD campus in 1964.

June 13, 1969 Gov. Preston Smith signed the bill adding the Southwest Center for Advanced Studies to the University of Texas System creating The University of Texas at Dallas!

• September 18, 1969 first students enrolled and UTD classes began.

1971 the Oglesby Group completed the First Campus Master Plan

Enrollment Statistics at UT Dallas

• 1969-1975 – Only graduate students allowed to enroll
• 1974 – enrollment at 700 students
• 1975 – College Juniors and Seniors admitted – enrollment up to 3,333
• 1980 enrollment – 6,369 students
• 1992 enrollment – 8,980
• 2000 enrollment – 11,000
• 2004 enrollment – 14,000
• 2010 enrollment – 17,128
• 2011 enrollment – 18,972
• 2014 enrollment – 23,090
• 2015 Fall enrollment projection – 25,300

Since 2007, enrollment at UT Dallas has been rising at the rate of 7% to 10% every year

Source: research by Tom Lund, Senior Project Manager, OFPC and UTD FM Staff interviews
1964 to 1979 – The first 15 Years

Art Barn 1977
Founders Annex 1970
CEP 1972
Berkner Hall 1971
Hoblitzelle Hall 1973
Conference Center 1976
North Lab 1971
Jonsson Center 1972
Founders North 1972
Theater 1972
Green Hall 1972
Founders Building 1964
McDermott Library 1972
Physical Instruction Building 1972
Student Union 1979

1964-2005
41 years to build the first 19 buildings
Half of the Current Campus

Slide used by permission of the author, Tom Lund / OFPC
### Number of Buildings and Projects

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Bldgs</th>
<th>No. of Projects</th>
<th>Total GSF (includes New &amp; Renovations)</th>
<th>TPC</th>
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### Engineering Building ($110M TPC)
- 2015 (TRB) August 2015 BOR
- For CIP Approval?

### Science Building ($95M TPC)
- 2015 (PUF) August 2015 BOR
- For CIP Approval?

### Alumni Center ($15M TPC)
- Gifts
- BOR DD Approval 5/13/15

### Brain Performance Institute ($33.1M TPC)
- Gifts
- BOR DD Approval 2/12/15

### From July 2004 (NSERL GMP), through the present, OFPC and UT Dallas FM have more than doubled the number of buildings on Campus adding 26 buildings at 3.3 million gsf of space with a value of $894M.
What is Driving Growth at UT Dallas?

- High-quality education
- 2009 economic downturn - *boosted* college enrollment state-wide
- **Quest for Tier One status…**
- Commuter school evolving into a more traditional University campus
- **Classroom of the Future - Changing teaching pedagogies**
- “If you build it they will come…”

*Source: Microsoft Office Clip Art*
The Quest for Tier One Status

“UT Dallas is poised at the beginning of a new era, positioned to become the national research university of our founders’ vision. Our success is critical to the economic vitality and competitiveness of the region and Texas.” – www.utdallas.edu/tier-one/our-vision/

Tier One – Our Plan

- Increase endowments to $400,000,000.00
- Hire more tenured and tenure-track faculty
- Attract more research funds – expend more than $100,000,000.00 per year
- Produce more Doctoral graduates
- External Recognition of Scholarly Attainment

Source: www.utdallas.edu
Classroom of the Future – Changing Pedagogies

Continually Changing Methods

• Flipped Classroom
• SCALE-UP
• Group activities
• Active Learning
• Team-based Learning
• Competency Based Curriculum
• Subject matter experts – bridging the gap between theory and practice

Technology Driven Change

• Advanced technology
• Online Learning
• Peer-to-peer and collaborative learning
• Project Based Learning
• Employers seeking leaders as well as technically skilled graduates

Source: Classroom of the Future – OFPC 2015 Conference – Marc Kimball & Deborah Carruth

Classroom of the Future – Next-Gen Learning

 SCALE-UP

Student Centered Active Learning Environment- for Undergraduate Programs

The ALC Space

Source: Classroom of the Future – OFPC 2015 Conference – Marc Kimball & Deborah Carruth
Classroom of the Future – How Much Do You Retain?

- 90% Use or teach
- 75% Practice
- 50% Discussion
- 30% Demonstration
- 20% Audio visual
- 10% Reading
- 5% Lecture

Source: NTL Institute

Classroom of the Future – Where People Learn

Where people learn

Where Do You Learn Best?
- At home: 59.6%
- At work: 23%
- In transit: 12.6%
- 5.9%

What Are The Attributes of Those Places?
- Nature: 30.3%
- Comfort: 29.7%
- Quiet: 20.9%
- Space: 12.7%

Source: Classroom of the Future – OFPC 2015 Conference – Marc Kimball & Deborah Carruth
Classroom of the Future – Where People Learn

Huddle Spaces
Active Learning
Computer Labs

Classroom of the Future – Flexible Spaces

Source: Classroom of the Future – OFPC 2015 Conference – Marc Kimball & Deborah Canolt

32 students at computers
32 students at computers - alternate front of room
32 students in back and groups with computers
2007-2010 – Completed Projects

- 302-120 Founders Building Renovation – Phase III
- 302-192 Natural Sciences & Engineering Lab
- 302-244 Campus Landscape Enhancement Project – Phase I
- 302-261 Vivarium
- 302-280 Math Science & Engineering Building (now Science Learning Center)
- 302-323 Student Services Building
- 302-332 Center for Brain Health – 2nd Floor

2011-2014 – Completed Projects

- 302-120 Founders Third Floor Renovation
- 302-392A Arts & Technology Building
- 302-392C Utility Infrastructure Improvements
- 302-485 Campus Services & Bookstore
- 302-680 Parking Structure I
- 302-642 School of Management – Phase II
- 302-718 Parking Structure III
2011-2014 – Completed Projects (Housing)

- 302-325 Student Housing Living/Learning Center – Phase I (includes SU Dining Hall) 400 Beds
- 302-556 Student Housing Living/Learning Center – Phase II 400 Beds
- 302-640 Student Housing Living/Learning Center – Phase III 400 Beds
- 302-678 Student Housing Living/Learning Center – Phase IV (includes Dining & Rec) 600 Beds
- 302-718 Student Housing Living/Learning Center – Phase V 400 Beds

Total Added in 5-years = 2,200 Beds

Student Housing Phases I through V (2009 to 2014)
Lessons Learned from Past Projects

Risk management is a huge part of managing risk on construction projects. OFPC is committed to exceeding OSHA safety requirements, and maintains a robust safety program and rolling owner controlled insurance program (ROCIP).

Incidents on construction projects may still occur despite our best efforts, but we continually strive to improve safety. Over the past 8 years, we had several incidents involving damage to University infrastructure. One incident on the ATEC building even resulted in the loss of life of contractor personnel.

Case Studies

- **302-280 MSET** – during foundation work, a pier-drilling rig penetrated a buried medium-voltage duct bank, knocking out power to (15) buildings. Fortunately, no one was hurt.

- **302-556 SH2** – another pier-drilling incident knocked out power (3) buildings, including the CEP, effectively shutting down the campus. No injuries were reported.

- **302-392A ATEC** – tower crane collapsed during dismantling operations resulting in (2) fatalities.

Student Housing – Phase II Site

- As-built drawings indicated duct bank (yellow) to be 5’ east of building footprint
- Actual duct bank location (red) was under east wall of the Classroom wing and intersected with (2) pier locations
Duct Bank Damage Photos

Pier-drilling Damage to Infrastructure

**Contributing Factors:**
- S.U.E. for project did not include use of Ground Penetrating Radar (note to Civil drawing added later)
- As-built records were inaccurate – new duct bank was located 5’ west of abandoned duct bank – this placed the duct bank in direct conflict with (2) pier locations
- Contractor may have confused abandoned duct bank with new one (active bank located 5’ west of old)
- Active duct bank did not run straight between manholes, but veered west towards the new building footprint

**Lessons Learned:**
- Require use of ground-penetrating radar surveying of utilities
- Where feasible, in lieu of pot-holing, completely expose duct banks where they are in close proximity to planned building structures
- For S.U.E. – require "locating "of utilities in three dimensions (Level A)
- Ensure adequate supervision during drilling operations
Pier-drilling Damage to Infrastructure

**OFPC / UTD FM Response**
- Initiated Emergency Response Plan
- UTD FM ordered emergency generators for (3) affected buildings
- Loads on undamaged feeder were shed, allowing switchover of the Central Plant and restoration of cooling capacity to the campus
- Managed contractor repair process
- Provided daily reports with photos to UTD FM upper management
- Interfaced with Office of Risk Management (General Liability Claim)
- Conducted investigation and reported findings

**Contractor Response**
- Kept workers safe
- Exposed damaged duct bank
- Salvaged feeders / returned $ to UTD
- Repaired duct bank within 48-hours
- Installed (3) new 750 MCM cables
- Power restored within 6-days
- Maintained progress of construction – no delays to housing project delivery

Tower Crane Collapse at Arts & Technology Building

- **7/7/2012 Saturday** - Harrison Crane Company dismantling crew begin Series 4 tower crane dismantling in the early morning
- Boom and turntable safely removed by mid afternoon
- At 3:20 pm, Tower section collapses during 45+ mph wind storm
- Tower section falls due west landing entirely on the ATEC roof
- (2) Harrison crane workers are killed
- 3:25 pm – first responders on site / cordon off site allowing no access
- 5:30 pm – OSHA inspector arrives
- 7:00 pm – EMS completes recovery
- 7:40 pm to dark – OFPC conducts initial investigation
Preliminary Findings

- Harrison intended to remove (2) 20’ tall vertical sections at a time
- 6 of the 8 bolts between every other section had been removed all the way down to ground level, leaving only 1 bolt on diagonal opposite corners holding the sections in place
- The remaining bolt on the east side could not resist the wind gust load and sheared during the wind event, resulting in the subsequent crane collapse

Damage Photos – ATEC Tower Crane Collapse – 7/8/2012
OSHA Inspection Results

- Harrison Crane (Harrison Hoist, Inc.) was initially cited with six serious safety violations
- Hunt Construction, the CMAR was not held at fault
- OFPC was also not held at fault, as all OSHA required safeguards and standards were observed

Tower Crane Collapse at Arts & Technology Building

Contributing Factors
- The reviewed and approved JHA (Job Hazard Assessment) noted that bolts would be loosened during dismantling, but did NOT indicate that bolts would be removed except as each section was removed
- The dismantling crew members were the "subject matter experts" and deemed to know best how to dismantle the equipment
- Normalization of deviation — the early bolt removal practice, although dangerous, had become the "normal" way of dismantling

Lessons Learned
- In addition to review and approval of JHAs, OFPC’s safety staff now know to look for these kind of "short-cut" practices and head them off early
- OFPC now employs a third-party crane inspection service to supervise the erection (and dismantling) of all cranes on OFPC-managed jobs
- Our staff has shared the lessons learned from this incident state-wide to ensure it never happens again
Current Construction Projects

In Construction:

- 302-679 Bioengineering & Sciences Building
- 302-764 Callier Richardson Expansion
- 300-765 Campus Landscape Enhancements
- 302-784 Student Services Building Addition

Slated to begin Construction soon:

- 302-766 Brain Performance Institute
- 302-842 Davidson-Gundy Alumni Center

302-679 BSB – Bioengineering & Sciences Building

Rendering courtesy of Page Architects
New building will house research laboratories, faculty and teaching assistant offices, computational infrastructure and various research space. The facility will bring together interdisciplinary groups of scientists and engineers from multiple fields. The building will interconnect to the NSERL building via a basement level connector and 2nd and 3rd level pedestrian bridges.

TPC = $113,000,000.00
GSF = 222,651
Substantial Completion: 10/15/2015

302-679 BSB – Bioengineering & Sciences Building
Phased build-out of additional landscape upgrades and utility modernization in the area north of the CLEP Phase I mall project extending from the Plaza Core to the Administration Building, Rutford Promenade, and east-west pedestrian corridors. This project is 50% funded by donor gifts.

TPC = $20,000,000.00
GSF = 575,000
Substantial Completion: 1/30/2016

302-765 CLEP2 – Campus Landscape Enhancement Project – Phase II

Construction progress photography by Vince Yauger
New addition to the Callier Center for Communication Disorders facility to accommodate the rapid student growth in the School of Behavioral and Brain Sciences. The building will house state-of-the-art clinical facilities to train the next generation of practitioners and researchers in speech language pathology, audiology, and early childhood disorders such as autism.

TPC = $22,650,000.00
GSF = 53,037
Substantial Completion: 6/27/2016
This project will add a new expansion to the Student Services Building, including office space for student services and support staff, individual and group study space, meeting rooms, a 550-seat multi-use lecture hall and flexible programming space for student programs.

TPC = $26,000,000.00
GSF = 68,700
Substantial Completion: 11/15/2016
New parking structure in the heart of campus adding 1,200 parking spaces. This five story, cast-in-place concrete structure will accommodate parking for students, faculty, staff, and event parking.

TPC = $25,500,000.00  GSF = 392,000  SC: 8/19/2016

Upcoming Construction Projects

- 302-766 - Brain Performance Institute
- 302-842 - Davidson-Gundy Alumni Center
- 302-905 - Engineering Building
- 302-906 - Science Building (Funding TBD)
- 302-933 - Campus Infrastructure & Road Improvements (Programming only)
- 302-934 – Student Housing – Phase VI
Construction of the national headquarters building for the Brain Performance Institute adjacent to the UTD Center for Brain Health. Conceived to address diminishing cognitive brainpower across the lifespan that affects every sector of society.

302-766 BPI – Brain Performance Institute
302-842 DGAC – Davidson-Gundy Alumni Center
- This proposed project will provide a meeting and event space for UTD departments, student groups, alumni and community organization. This project is completely funded by gifts.

- TPC = $10,000,000.00
- GSF = 29,900
- Substantial Completion: 3/31/2017

302-905 EB – Engineering Building
- This planned Engineering building project is currently in programming, but has not yet been added to the CIP. Funding sources have yet to be determined.

- TPC = $110,000,000.00
- GSF = 200,000
- Substantial Completion: 7/6/2018

302-906 SB – Science Building
- This planned Science building project is currently in programming, but has not yet been added to the CIP. Funding sources have yet to be determined.

- TPC = $95,000,000.00
- GSF = 175,000
- Substantial Completion: TBD

302-934 SH6 – Student Housing – Phase VI
- Apartment-style residence hall will contain a mix of efficiency, one-bedroom and two-bedroom apartments for at total of 400 beds.

- TPC = $46,000,000.00
- GSF = 206,000
- Substantial Completion: 7/28/2017
## Future Projects (Not yet on C.I.P. - Capital Improvement Program)

### New Buildings
- New Student Union Building
- Art Laboratory and Exposition Building
- Business Services Building
- Natural Sciences & Research Lab – Phase II
- IRIS - 3D Visualization Lab
- Event Center
- Engineering Building II
- Natural Sciences & Research Lab – Phase III

### Existing Building Renovations
- McDermott Library Renovation
- Green Hall Renovation
- Callier Richardson South Renovation
- Infrastructure Improvements
- Central Energy Plant Upgrades

## Summary
- OFPC will continue to respond to rapid growth at UT Dallas by providing high quality planning and construction management services, and by providing the needed facilities to meet the growing needs of the students, staff and faculty.

- Application of “lessons learned” will ensure that construction safety is continually improved, not just at UT Dallas, but across the State of Texas.

- UT Dallas will continue to pursue Tier One status while providing the best in higher education.
RESOURCES

• For information on upcoming UT System Business Opportunities, including RFO’s for design professionals, and RFP’s for Contractors, visit OFPC’s website: https://apps.utsystem.edu/spo/DisplaySPO.aspx

• For more details on UT Dallas construction projects, both OFPC and UTD FM managed, visit UTD FM’s website: http://www.utdallas.edu/facilities/. Note: there are separate links for UTD managed projects, OFPC managed projects, information on standards, and the “Pardon Our Progress” button gives you information about navigating through the campus around active construction projects.

  - For more information about the Project Management Institute (PMI) and the Project Management Body of Knowledge Guide (PMBOK): www.pmi.org

Questions (and Answers?)
Speaker Bio

Vince Yauger has over 30-years of experience in project management in architecture and construction fields in both government and private industry.

His education background includes a Bachelor of Environmental Design (Architecture) from Texas A&M University and graduate level coursework in Architecture / Management. He holds multiple professional certifications, among them: project management professional (PMP), registered architect (Texas), certified construction contract administrator (CCCA), and is a LEED Accredited Professional (LEED AP).

Vince currently works as a Resident Construction Manager / Project Manager II for the University of Texas System Office of Facilities Planning and Construction, managing new construction projects on the University of Texas at Dallas campus, and lives in Plano, Texas. He also has an obsession with squirrels, a critter that UT Dallas has no shortage of...

Thank you for attending the 2015 Project Management Symposium!