Bexley City Schools

Cassingham Campus

Vertical Expansion Feasibility Study

By

Korda/Nemeth Engineering

Moody Nolan | Perkins & Will

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VERTICAL EXPANSION FEASIBILITY STUDY

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I. Introduction

The purpose of this report is to summarize the existing structural systems at the Bexley Schools Cassingham Campus and to offer an objective review regarding the structural feasibility of vertical expansion. Our task includes the evaluation of specific areas identified in the reference key plan identified as follows:

- 1953 Cassingham Addition
- 1970 Junior and Senior High Addition
- 1992 High and Middle Science Addition
- 1993 Multi-Purpose Media Addition
- 2001 Cassingham Addition.]

Our study is solely based on the information shown in the existing drawings supplied by Bexley Schools. The intent of the report is to evaluate the practicality of vertical structural expansion, primarily assessing the capacity of the existing structural framing, foundation, and lateral systems. Our study focuses on typical framing in each area to determine general capacity and is not a comprehensive evaluation of all structural systems. Our goal is to evaluate the typical systems and to offer a reasonable understanding of vertical expansion capacity. Where the structural capacity of framing is inadequate, we may offer a general description of remediation options, but the development of detailed reinforcement methods to accommodate vertical expansion is excluded from the scope of this report.

II. Executive Summary

The Bexley Cassingham Complex is a compilation of various construction projects over its lifetime. The original Junior High and Senior High structures were once separate buildings that have been connected with additions through many years of construction projects. Our study focused on the structural potential for vertical expansion above a number of these additions, specifically the 1953, 1970, 1992, 1993, & 2001 additions.

None of the areas within the limits of our study were specifically designed to accommodate vertical expansion. Some areas have light steel framed roofs and many of the areas have sloped roofs. The sloping configuration is not conducive to be used as a floor. Furthermore, the existing roof structure and most foundations do not have capacity to support the proposed additional floor loading without remediation. There was clearly no consideration for future expansion at the time these structures were originally designed.

Korda has identified all areas as **impractical and cost prohibitive** to expand vertically except for portions of the 1953 addition. An expansion of the two-story Classroom Wing is **challenging but it is plausible** and a second-floor addition is **feasible** at the low roof area to the south of the 1953 addition. The term **impractical and cost prohibitive** does not mean that it is impossible to expand areas vertically, but it would require a complete retrofit of roof structure, vertical structure, and foundations that would be expensive and disruptive to the spaces below.

III. 1953 Cassingham Junior High & Elementary School Addition

A. Description of Existing Framing

The 1953 structure includes both two-story and single-story space. The two-story space consists of a classroom spine running north-south on the west edge of the building. It is wrapped to its south and east with single story structure. The existing drawings show a slate mansard roof over the single-story structure on the south.

The roof framing at the high roof over the second-floor classroom spine consists of 2-1/2" concrete slab over open web steel joists spaced at 33" o.c. The roof slope is formed with lightweight concrete fill over the 2-1/2" concrete slab. The joists are 14" deep (#146 S.J.) spanning 22' across the classroom and 8" deep (#81 S.J.) spanning 9'-0" across the corridor. The joists bear on 12" thick multi-wythe masonry at both the exterior and the corridor walls.

The roof framing at the low roof is similar construction to the high roof, except that the south wing supports a slate mansard roof. Joists are 12" deep (#126 S.J.) spanning 23' on the south wing, 8" deep (#81 S.J.) spanning 8'-8" across the corridor, and 16" deep (#167 S.J.) spanning 32'-0" on the east side. A portion of the low roof area, approximately 33'x28', was expanded to second floor space as part of the 1992 Middle School Science Addition.

The typical floor framing is a concrete pan joists system consisting of a 2-1/2" slab over 10" deep joist ribs for 12-1/2" total depth. The joists are 5" wide with 30" pans. The span of the floor system is 22' across the classrooms and 9' across the corridor, bearing on 12" thick multi-wythe masonry at both the exterior and the corridor walls.

The 12" thick multi-wythe masonry bearing walls are supported by 1'-10" wide continuous footings. Bearing capacity is listed at 2 Tons, or 4000 psf.

The lateral system consists of unreinforced masonry shear walls.

B. Vertical Expansion Feasibility

The proposed vertical **expansion of the two-story Classroom Wing is challenging but it is plausible**. Further description of the evaluation of specific components follows:

The roof construction consists of 2-1/2" concrete and lightweight concrete fill above the concrete to create the roof slope. The existing joists only have the capacity to support classroom loading (40 psf) if the existing lightweight concrete is removed. The removal will be a challenging process. Once removed, a self-leveling compound will be required to create a usable floor. The new third floor will be a relatively light structure so vibration will likely be a concern, but the vibration can be controlled with the addition of tuned mass dampers. The corridor joists do not have the capacity to support the code prescribed corridor floor loading (80 psf). Reinforcing of the joists across the corridor will be required.

The existing masonry walls and foundations have adequate gravity capacity to support the new third floor and added steel framed roof. The lateral system consisting of unreinforced masonry walls will likely require retrofit to meet current code requirements.

At the low roof area to the south, **a second-floor addition is feasible** using a similar approach to the 1992 Middle School Science Addition. The process will include the removal of the existing slate roof and construction of a new 2" lightweight concrete slab over tapered insulation supported by the existing structure.

IV. 1970 Junior and Senior High Addition

A. Description of Existing Framing

The 1970 structure is an addition that connected the Junior and Senior High buildings together. It includes the cafeteria and gymnasium at ground floor, a library and class rooms at second floor, and a penthouse on the western side of Level 3. A large section of the south wall of the cafeteria was removed as part of the 2001 renovation.

The roof framing above the mechanical penthouse consists of 1-1/2” metal deck over 10” deep steel joists spaced at approximately 5’-0” o.c.

The typical roof framing consists of 1-1/2" 20 ga. steel deck over 14H4 steel joist supported by sloping steel girders. On the west side of the addition above the dining area, 50" deep plate girder framing is used to provide approximately 62’ clear span. Roof framing above gymnasium consists of 1-1/2" deep acoustical steel deck supported by 44LH12 steel joists spaced at 7'-2" O.C. that span 82 ft and bear on 12" CMU walls. The typical penthouse floor framing consists of 3” concrete deck over 12” deep steel joists spaced at 2’-0” o.c.

The typical floor framing is 3" thick concrete over metal centering supported by 14J5 steel joists spaced at 2' o.c. and 24" deep steel beam girders spanning 34'.

The steel columns are founded on conventional shallow spread footings. Walls are typically founded on 24" wide continuous footings. Soil bearing capacity is 4000 psf typical and 8000 psf for foundations at basement.

The lateral system for the steel frame is not clearly defined, but it likely relies on a combination of new and existing masonry walls.

B. Vertical Expansion Feasibility

The proposed vertical expansion of the 1970 Junior and Senior High Addition is **impractical and cost prohibitive** because the existing framing, the existing steel columns, and existing foundations have inadequate capacity. Further description of the evaluation of specific components follows:

The existing steel framed roof structure is not designed for future vertical expansion. The roof deck is 1-1/2” metal roof deck and cannot be used to support floor load. Furthermore, the joists will be approximately 65% overstressed if used to support a classroom addition. It would be impractical to reinforce to meet the load requirements.

The existing steel columns and foundations are not designed to support a classroom expansion. Existing foundations will be approximately 40% overstressed if used to support additional classroom expansion. The steel columns would require reinforcing with addition of steel plates. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

V. 1992 High School and Middle School Science Addition

A. Description of Existing Framing

The 1992 High School Science Addition consisted of infilling the high school courtyard with a two-story addition to provide a library on the ground floor and classrooms on the second floor. Occupiable second floor science classroom space was also added above the current wrestling and tech rooms.

The high roof framing consists of a ballasted roof over sloping 12" hollow core concrete planks. The concrete planks clear span approximately 43' at the courtyard infill and approximately 34' at the eastern classroom block over the current wrestling/tech room. The precast planks slope approximately 8" to the interior corridor wall. The precast bears on unreinforced 8" CMU walls.

The floor framing at the courtyard infill consists of a 2" concrete topping over 8" hollow core plank that spans north-south approximately 21' and bears on 24" steel beams. The steel beams span 43' (east-west) and bear on unreinforced 8" CMU walls. The floor framing above the wrestling and tech rooms consists of LW concrete topping over pre-existing concrete roof structure original to the high school.

The typical foundations consist of existing concrete continuous footings that are original to the high school. No sizing information for existing foundation was provided in the 1992 drawings. New foundations on the west side of the addition are 2'-4" wide continuous concrete wall footings. The soil bearing capacity is 4000 psf.

The lateral system consists of unreinforced 8" CMU walls.

B. Vertical Expansion Feasibility

The proposed vertical expansion of the 1992 High School Science Addition is **impractical and cost prohibitive** because the existing framing and existing foundations do not have adequate capacity. Further description of the evaluation of specific components follows:

The existing roof structure is not designed for future vertical expansion. The sloping configuration of the 12" precast hollow core planks is not conducive for use as a floor. Furthermore, the hollow core planks will be approximately 20% overstressed if used to support new classroom loading. One option to increase capacity of the existing planks is to add new intermediate steel beams to reduce the clear span and new posts and new foundations. The installation of these items within a finished structure will be challenging and disruptive to the finished spaces at both levels below.

The existing 2'-4" wide continuous concrete foundation at the west edge of the courtyard infill will be approximately 30% overstressed if used to support additional classroom expansion. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

VI. 1993 Multi-Purpose Room and Media Addition

A. Description of Existing Framing

The multi-purpose addition in 1993 consists of a central single-story structure for the media center library adjacent to a two-story rectangular structure for music industrial arts rooms and second floor classrooms.

The high roof framing of the addition consists of a ballasted roof on tapered insulation over 12" hollow core concrete planks. The concrete planks span approximately 28' over the classroom and 6’ over the corridor. The planks bear on unreinforced 8" CMU walls.

The low roof framing above the media center library consists of tapered insulation over two spans of 8" hollow core plank; each span is approximately 21'. The planks are supported on 8” CMU walls at the east and west edge and an intermediate steel beam line at the middle of the space. The steel beams are supported by 4x4 steel posts spaced at approximately 17’ o.c.

The second-floor framing supporting the classroom area consists of 2” concrete topping over 10" hollow core plank that spans approximately 30'. The second-floor corridor framing consists of 2” concrete over 8” hollow core. The planks bear on 8” unreinforced CMU walls.

The typical foundations consist of continuous concrete foundations that support bearing CMU walls and conventional concrete spread footings that support steel columns.

The lateral system consists of unreinforced 8" CMU walls.

B. Vertical Expansion Feasibility

The proposed vertical expansion of the 1993 Multi-Purpose Room and Media Addition is **impractical and cost prohibitive** because the existing steel framing and existing foundations do not have adequate capacity. Further description of the evaluation of specific components follows:

At the two-story structure over the classrooms, the existing 12” hollow core roof structure can be justified to support a second-floor classroom addition (40 psf live load capacity) at the 28’ span and corridor loading (80 psf) at the 6’ span; however, the existing foundations will be overstressed by 30% based on the assumed bearing pressure of 3 ksf. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

At the single-story roof over the media library, the existing 8” hollow core roof structure can be justified to support a second-floor addition, but the existing steel framing will be overstressed and cannot be justified without reinforcement. The steel beams and columns will need to be reinforced with steel plates and channels if vertical expansion is considered. The individual spread footings also have insufficient capacity. In addition, Korda evaluated the existing 1’-4” wide wall foundation at the east edge of the media center considering only a second floor classroom addition over the media center and the foundation will be approximately 50% overstressed. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

VII. 2001 Cassingham Additions: Arts Wing two-story structure with partial basement

A. Existing Framing

The typical roof framing consists of 20 gauge 1-1/2" metal roof deck over sloped 28K9 steel joists spanning approximately 42' over classrooms with a 5' top-chord extension that cantilevers over the corridor walls to the ridge line. Joists are spaced at 6' o.c. and bear on unreinforced 8" CMU interior corridor walls and unreinforced 12" CMU perimeter walls.

The typical floor construction is normal weight concrete over 1-inch-deep centering deck with 6x6-W2.1xW2.1 WWF. Overall thickness is 4". Typical floor framing is 28LH09 steel joists spaced @ 4' O.C. that span 42' and bear on 8" CMU

The foundation system consists of conventional shallow foundations. The Arts Wing includes a 15' tall basement. Soil bearing is 3000 psf for footings below basement elevation 86'-0" and 2000 psf for footings above 86'-0".

The lateral system consists of unreinforced CMU walls.

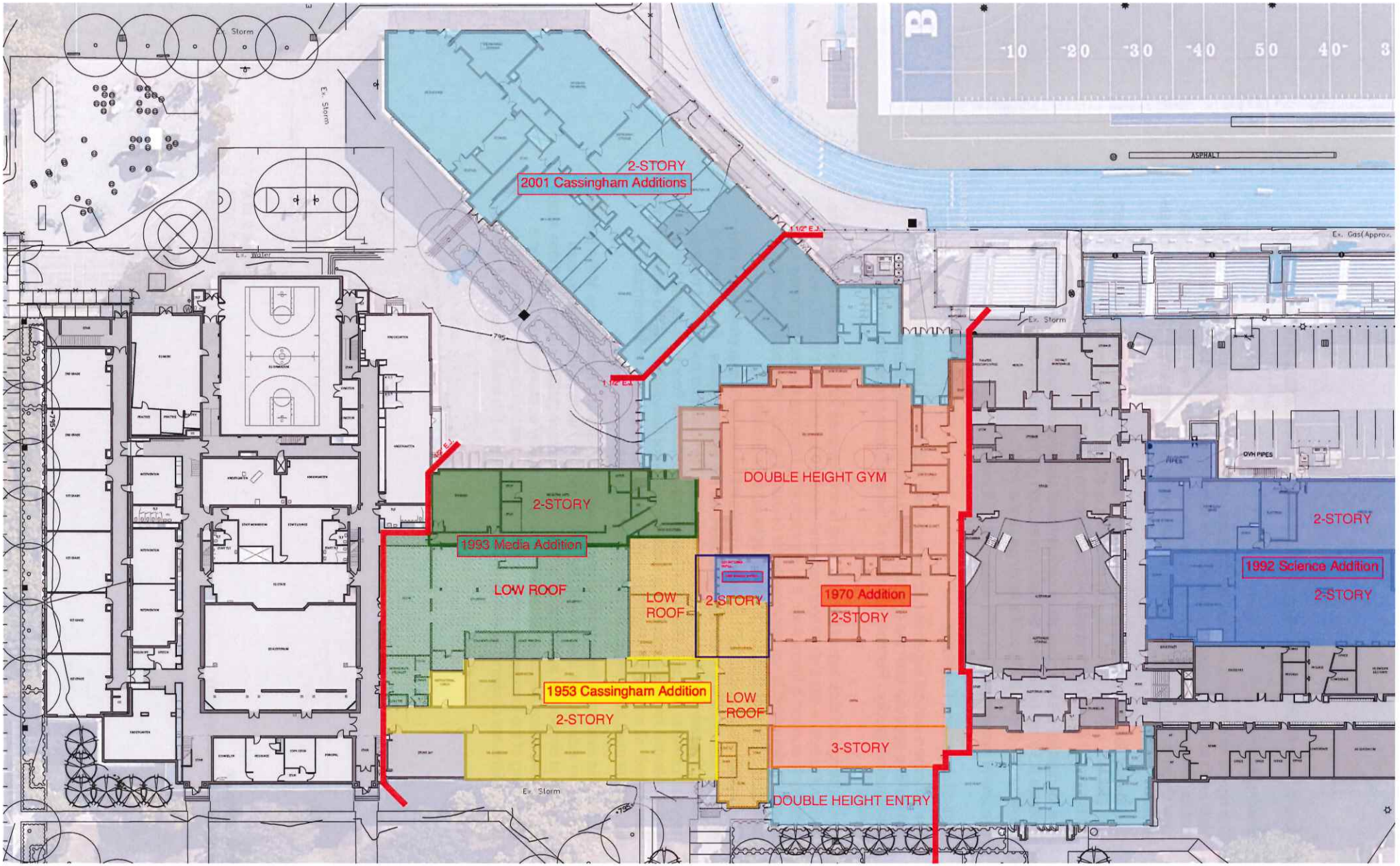
B. Vertical Expansion Feasibility

The proposed vertical expansion of the two-story Arts Wing is **impractical and cost prohibitive** because both the existing framing and the existing foundations have inadequate capacity. Further description of the evaluation of specific components follows:

The existing roof structure of the Arts Wing is not designed for future vertical expansion. The roof structure consists of roof deck and sloping roof joists that do not have the capacity to support a future floor. It is impractical to reinforce the existing joists and their sloped configuration is not appropriate for re-use as a floor. If vertical expansion is considered, the roof structure must be replaced in its entirety.

The replacement/removal of the existing roof system has additional challenges with regard to maintaining a water tight enclosure for the existing space. An approach to construct the new floor framing above the existing roof could be considered but this approach creates odd conditions that include a taller floor to floor from Level 2 to Level 3 and a potential interstitial zone if the existing roof is not demolished. If the existing roof is demolished, all architectural ceilings and suspended mechanical and electrical equipment must be resupported from the new structure.

Korda also evaluated the existing unreinforced CMU walls and foundations at the typical classroom exterior and interior corridor. While the CMU walls have adequate load capacity to support an additional floor, the continuous foundations supporting these walls do not have adequate capacity, overstressing the soil by approximately 15%. Some reinforcing of the foundations either with underpinning or helical piers is anticipated. Both options are challenging and potentially disruptive to the existing occupied spaces.



AREA REFERENCE PLAN

Bexley City Schools

Cassingham Campus

Vertical Expansion Feasibility Study

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The Bexley Cassingham Complex is a compilation of various construction projects over its lifetime. The original Junior High and Senior High structures were once separate buildings that have been connected with additions through many years of construction projects. Our study focused on the structural potential for vertical expansion above a number of these additions, specifically the 1953, 1970, 1992, 1993, & 2001 additions.

None of the areas within the limits of our study were specifically designed to accommodate vertical expansion. Some areas have light steel framed roofs and many of the areas have sloped roofs. The sloping configuration is not conducive to be used as a floor. Furthermore, the existing roof structure and most foundations do not have capacity to support the proposed additional floor loading without remediation. There was clearly no consideration for future expansion at the time these structures were originally designed.

Korda has identified all areas as **impractical and cost prohibitive** to expand vertically except for portions of the 1953 addition. An expansion of the two-story Classroom Wing is **challenging but it is plausible** and a second-floor addition is **feasible** at the low roof area to the south of the 1953 addition. The term **impractical and cost prohibitive** does not mean that it is impossible to expand areas vertically, but it would require a complete retrofit of roof structure, vertical structure, and foundations that would be expensive and disruptive to the spaces below.

III. 1953 Cassingham Junior High & Elementary School Addition

A. Description of Existing Framing

The 1953 structure includes both two-story and single-story space. The two-story space consists of a classroom spine running north-south on the west edge of the building. It is wrapped to its south and east with single story structure. The existing drawings show a slate mansard roof over the single-story structure on the south.

The roof framing at the high roof over the second-floor classroom spine consists of 2-1/2" concrete slab over open web steel joists spaced at 33" o.c. The roof slope is formed with lightweight concrete fill over the 2-1/2" concrete slab. The joists are 14" deep (#146 S.J.) spanning 22' across the classroom and 8" deep (#81 S.J.) spanning 9'-0" across the corridor. The joists bear on 12" thick multi-wythe masonry at both the exterior and the corridor walls.

The roof framing at the low roof is similar construction to the high roof, except that the south wing supports a slate mansard roof. Joists are 12" deep (#126 S.J.) spanning 23' on the south wing, 8" deep (#81 S.J.) spanning 8'-8" across the corridor, and 16" deep (#167 S.J.) spanning 32'-0" on the east side. A portion of the low roof area, approximately 33'x28', was expanded to second floor space as part of the 1992 Middle School Science Addition.

The typical floor framing is a concrete pan joists system consisting of a 2-1/2" slab over 10" deep joist ribs for 12-1/2" total depth. The joists are 5" wide with 30" pans. The span of the floor system is 22' across the classrooms and 9' across the corridor, bearing on 12" thick multi-wythe masonry at both the exterior and the corridor walls.

The 12" thick multi-wythe masonry bearing walls are supported by 1'-10" wide continuous footings. Bearing capacity is listed at 2 Tons, or 4000 psf.

The lateral system consists of unreinforced masonry shear walls.

B. Vertical Expansion Feasibility

The proposed vertical **expansion of the two-story Classroom Wing is challenging but it is plausible**. Further description of the evaluation of specific components follows:

The roof construction consists of 2-1/2" concrete and lightweight concrete fill above the concrete to create the roof slope. The existing joists only have the capacity to support classroom loading (40 psf) if the existing lightweight concrete is removed. The removal will be a challenging process. Once removed, a self-leveling compound will be required to create a usable floor. The new third floor will be a relatively light structure so vibration will likely be a concern, but the vibration can be controlled with the addition of tuned mass dampers. The corridor joists do not have the capacity to support the code prescribed corridor floor loading (80 psf). Reinforcing of the joists across the corridor will be required.

The existing masonry walls and foundations have adequate gravity capacity to support the new third floor and added steel framed roof. The lateral system consisting of unreinforced masonry walls will likely require retrofit to meet current code requirements.

At the low roof area to the south, **a second-floor addition is feasible** using a similar approach to the 1992 Middle School Science Addition. The process will include the removal of the existing slate roof and construction of a new 2" lightweight concrete slab over tapered insulation supported by the existing structure.

IV. 1970 Junior and Senior High Addition

A. Description of Existing Framing

The 1970 structure is an addition that connected the Junior and Senior High buildings together. It includes the cafeteria and gymnasium at ground floor, a library and class rooms at second floor, and a penthouse on the western side of Level 3. A large section of the south wall of the cafeteria was removed as part of the 2001 renovation.

The roof framing above the mechanical penthouse consists of 1-1/2" metal deck over 10" deep steel joists spaced at approximately 5'-0" o.c.

The typical roof framing consists of 1-1/2" 20 ga. steel deck over 14H4 steel joist supported by sloping steel girders. On the west side of the addition above the dining area, 50" deep plate girder framing is used to provide approximately 62' clear span. Roof framing above gymnasium consists of 1-1/2" deep acoustical steel deck supported by 44LH12 steel joists spaced at 7'-2" O.C. that span 82 ft and bear on 12" CMU walls. The typical penthouse floor framing consists of 3" concrete deck over 12" deep steel joists spaced at 2'-0" o.c.

The typical floor framing is 3" thick concrete over metal centering supported by 14J5 steel joists spaced at 2' o.c. and 24" deep steel beam girders spanning 34'.

The steel columns are founded on conventional shallow spread footings. Walls are typically founded on 24" wide continuous footings. Soil bearing capacity is 4000 psf typical and 8000 psf for foundations at basement.

The lateral system for the steel frame is not clearly defined, but it likely relies on a combination of new and existing masonry walls.

B. Vertical Expansion Feasibility

The proposed vertical expansion of the 1970 Junior and Senior High Addition is **impractical and cost prohibitive** because the existing framing, the existing steel columns, and existing foundations have inadequate capacity. Further description of the evaluation of specific components follows:

The existing steel framed roof structure is not designed for future vertical expansion. The roof deck is 1-1/2" metal roof deck and cannot be used to support floor load. Furthermore, the joists will be approximately 65% overstressed if used to support a classroom addition. It would be impractical to reinforce to meet the load requirements.

The existing steel columns and foundations are not designed to support a classroom expansion. Existing foundations will be approximately 40% overstressed if used to support additional classroom expansion. The steel columns would require reinforcing with addition of steel plates. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

V. 1992 High School and Middle School Science Addition

A. Description of Existing Framing

The 1992 High School Science Addition consisted of infilling the high school courtyard with a two-story addition to provide a library on the ground floor and classrooms on the second floor. Occupiable second floor science classroom space was also added above the current wrestling and tech rooms.

The high roof framing consists of a ballasted roof over sloping 12" hollow core concrete planks. The concrete planks clear span approximately 43' at the courtyard infill and approximately 34' at the eastern classroom block over the current wrestling/tech room. The precast planks slope approximately 8" to the interior corridor wall. The precast bears on unreinforced 8" CMU walls.

The floor framing at the courtyard infill consists of a 2" concrete topping over 8" hollow core plank that spans north-south approximately 21' and bears on 24" steel beams. The steel beams span 43' (east-west) and bear on unreinforced 8" CMU walls. The floor framing above the wrestling and tech rooms consists of LW concrete topping over pre-existing concrete roof structure original to the high school.

The typical foundations consist of existing concrete continuous footings that are original to the high school. No sizing information for existing foundation was provided in the 1992 drawings. New foundations on the west side of the addition are 2'-4" wide continuous concrete wall footings. The soil bearing capacity is 4000 psf.

The lateral system consists of unreinforced 8" CMU walls.

B. Vertical Expansion Feasibility

The proposed vertical expansion of the 1992 High School Science Addition is **impractical and cost prohibitive** because the existing framing and existing foundations do not have adequate capacity. Further description of the evaluation of specific components follows:

The existing roof structure is not designed for future vertical expansion. The sloping configuration of the 12" precast hollow core planks is not conducive for use as a floor. Furthermore, the hollow core planks will be approximately 20% overstressed if used to support new classroom loading. One option to increase capacity of the existing planks is to add new intermediate steel beams to reduce the clear span and new posts and new foundations. The installation of these items within a finished structure will be challenging and disruptive to the finished spaces at both levels below.

The existing 2'-4" wide continuous concrete foundation at the west edge of the courtyard infill will be approximately 30% overstressed if used to support additional classroom expansion. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

VI. 1993 Multi-Purpose Room and Media Addition

A. Description of Existing Framing

The multi-purpose addition in 1993 consists of a central single-story structure for the media center library adjacent to a two-story rectangular structure for music industrial arts rooms and second floor classrooms.

The high roof framing of the addition consists of a ballasted roof on tapered insulation over 12" hollow core concrete planks. The concrete planks span approximately 28' over the classroom and 6’ over the corridor. The planks bear on unreinforced 8" CMU walls.

The low roof framing above the media center library consists of tapered insulation over two spans of 8" hollow core plank; each span is approximately 21'. The planks are supported on 8” CMU walls at the east and west edge and an intermediate steel beam line at the middle of the space. The steel beams are supported by 4x4 steel posts spaced at approximately 17’ o.c.

The second-floor framing supporting the classroom area consists of 2” concrete topping over 10" hollow core plank that spans approximately 30'. The second-floor corridor framing consists of 2” concrete over 8” hollow core. The planks bear on 8” unreinforced CMU walls.

The typical foundations consist of continuous concrete foundations that support bearing CMU walls and conventional concrete spread footings that support steel columns.

The lateral system consists of unreinforced 8" CMU walls.

B. Vertical Expansion Feasibility

The proposed vertical expansion of the 1993 Multi-Purpose Room and Media Addition is **impractical and cost prohibitive** because the existing steel framing and existing foundations do not have adequate capacity. Further description of the evaluation of specific components follows:

At the two-story structure over the classrooms, the existing 12” hollow core roof structure can be justified to support a second-floor classroom addition (40 psf live load capacity) at the 28’ span and corridor loading (80 psf) at the 6’ span; however, the existing foundations will be overstressed by 30% based on the assumed bearing pressure of 3 ksf. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

At the single-story roof over the media library, the existing 8” hollow core roof structure can be justified to support a second-floor addition, but the existing steel framing will be overstressed and cannot be justified without reinforcement. The steel beams and columns will need to be reinforced with steel plates and channels if vertical expansion is considered. The individual spread footings also have insufficient capacity. In addition, Korda evaluated the existing 1’-4” wide wall foundation at the east edge of the media center considering only a second floor classroom addition over the media center and the foundation will be approximately 50% overstressed. The foundations would require underpinning or the addition of helical piers to meet capacity requirements of an addition.

VII. 2001 Cassingham Additions: Arts Wing two-story structure with partial basement

A. Existing Framing

The typical roof framing consists of 20 gauge 1-1/2" metal roof deck over sloped 28K9 steel joists spanning approximately 42' over classrooms with a 5' top-chord extension that cantilevers over the corridor walls to the ridge line. Joists are spaced at 6' o.c. and bear on unreinforced 8" CMU interior corridor walls and unreinforced 12" CMU perimeter walls.

The typical floor construction is normal weight concrete over 1-inch-deep centering deck with 6x6-W2.1xW2.1 WWF. Overall thickness is 4". Typical floor framing is 28LH09 steel joists spaced @ 4' O.C. that span 42' and bear on 8" CMU

The foundation system consists of conventional shallow foundations. The Arts Wing includes a 15' tall basement. Soil bearing is 3000 psf for footings below basement elevation 86'-0" and 2000 psf for footings above 86'-0".

The lateral system consists of unreinforced CMU walls.

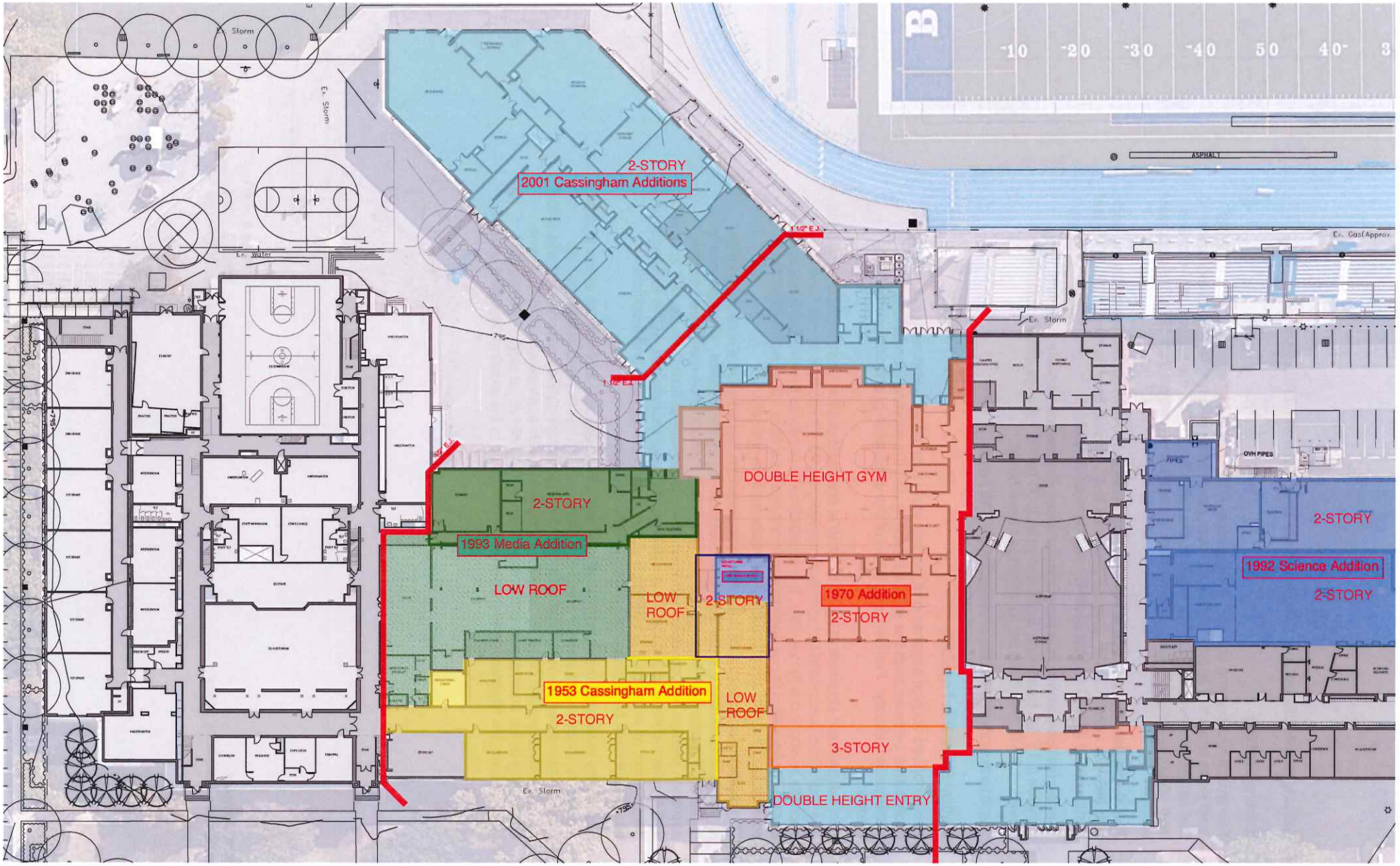
B. Vertical Expansion Feasibility

The proposed vertical expansion of the two-story Arts Wing is **impractical and cost prohibitive** because both the existing framing and the existing foundations have inadequate capacity. Further description of the evaluation of specific components follows:

The existing roof structure of the Arts Wing is not designed for future vertical expansion. The roof structure consists of roof deck and sloping roof joists that do not have the capacity to support a future floor. It is impractical to reinforce the existing joists and their sloped configuration is not appropriate for re-use as a floor. If vertical expansion is considered, the roof structure must be replaced in its entirety.

The replacement/removal of the existing roof system has additional challenges with regard to maintaining a water tight enclosure for the existing space. An approach to construct the new floor framing above the existing roof could be considered but this approach creates odd conditions that include a taller floor to floor from Level 2 to Level 3 and a potential interstitial zone if the existing roof is not demolished. If the existing roof is demolished, all architectural ceilings and suspended mechanical and electrical equipment must be resupported from the new structure.

Korda also evaluated the existing unreinforced CMU walls and foundations at the typical classroom exterior and interior corridor. While the CMU walls have adequate load capacity to support an additional floor, the continuous foundations supporting these walls do not have adequate capacity, overstressing the soil by approximately 15%. Some reinforcing of the foundations either with underpinning or helical piers is anticipated. Both options are challenging and potentially disruptive to the existing occupied spaces.



AREA REFERENCE PLAN

FutureThink
PLAN TO EMPOWER

ADDENDUM

Bexley City School District
By School Enrollment Projections
April 15, 2024

ADDENDUM

Bexley City School District

INTRODUCTION

Based on a request from the Bexley City School District, **FutureThink** was contracted to develop enrollment projections for each elementary school in compliance with the projections completed on behalf of the Ohio Facilities Construction Commission.

HISTORICAL ENROLLMENT

The following tables illustrate the K-5 enrollment by school from 2014-15 through 2023-24. Cassingham and Maryland increased in enrollment while Montrose experienced a decline.

Cassingham Elementary School

Historical Enrollment

Grade	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
K	67	67	66	65	80	88	55	85	71	70
1	60	66	72	67	69	90	81	77	90	80
2	66	58	69	71	71	73	86	88	80	90
3	71	73	54	68	79	71	65	90	90	81
4	69	73	75	58	66	86	73	71	88	93
5	67	70	79	74	60	70	82	78	68	86
Total	400	407	415	403	425	478	442	489	487	500

Source: Ohio Department of Education, EMIS; Bexley City School District

Maryland Elementary School

Historical Enrollment

Grade	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
K	51	43	57	49	63	51	52	51	43	46
1	45	57	48	58	48	60	54	56	58	57
2	35	44	55	48	56	48	60	56	60	56
3	64	39	45	56	50	55	45	59	56	58
4	46	70	42	45	55	51	56	48	61	58
5	49	44	72	40	44	53	51	58	47	58
Total	290	297	319	296	316	318	318	328	325	333

Source: Ohio Department of Education, EMIS; Bexley City School District

Montrose Elementary School

Historical Enrollment

Grade	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
K	62	68	54	65	55	57	48	55	54	54
1	68	64	70	57	66	52	54	55	65	49
2	59	64	65	68	61	68	46	54	55	57
3	56	56	63	70	74	60	64	48	58	59
4	51	58	58	65	70	63	55	54	47	56
5	45	48	67	60	68	74	59	54	55	53
Total	341	48	377	385	394	374	326	320	334	328

Source: Ohio Department of Education, EMIS; Bexley City School District

please note in 2014-15 through 2016-17, 6th grade was housed at the elementary schools.

ENROLLMENT PROJECTION

Enrollment projections were developed after analyzing the data by school and compared to the projections completed on behalf of OFCC. The following tables illustrate projected enrollment by grade, by school through the 2033-34 school year.

Cassingham Elementary School
Projected Enrollment

Grade	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
K	74	71	73	65	70	70	70	70	70	70
1	77	80	77	79	71	76	76	76	76	76
2	82	78	82	79	81	72	78	78	78	78
3	92	85	80	84	80	82	73	79	79	79
4	84	93	85	80	84	81	83	75	80	80
5	95	84	93	85	80	84	81	83	74	80
Total	504	491	490	472	466	465	461	461	457	463

Source: FutureThink

Maryland Elementary School
Projected Enrollment

Grade	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
K	49	47	48	43	46	46	46	46	46	46
1	50	52	51	52	47	50	50	50	50	50
2	58	51	53	50	52	47	50	50	50	50
3	56	58	51	52	50	52	47	50	50	50
4	62	58	60	53	54	52	53	48	51	51
5	58	60	57	59	52	53	52	52	47	50
Total	333	326	320	309	301	300	298	296	294	297

Source: FutureThink

Montrose Elementary School
Projected Enrollment

Grade	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34
K	56	54	55	50	53	53	53	53	53	53
1	56	58	54	56	50	54	54	54	54	54
2	48	54	55	53	54	49	52	52	52	52
3	61	51	57	59	57	58	53	56	56	56
4	58	59	50	56	58	55	57	51	55	55
5	60	61	62	52	59	61	57	60	54	58
Total	339	337	333	326	331	330	326	326	324	328

Source: FutureThink

CONCLUSION

As with any projection, the District should pay close attention to live birth counts, enrollment in elementary schools, community school enrollment, open enrollment, and any housing growth. Each of these factors will have an impact on future student enrollment.

FutureThink is pleased to have had the opportunity to provide the District with enrollment projection services. We hope this document will provide the necessary information to make informed decisions about the future of the Bexley City School District.