

THE NEW YORK PUBLIC LIBRARY
MIDTOWN CAMPUS RENOVATION

SASB Stacks Study Final Report

NOVEMBER 7, 2019



mecanoo

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THE NEW YORK PUBLIC LIBRARY
MIDTOWN CAMPUS RENOVATION
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Executive Summary

Executive Summary

The Library has developed a multi-pronged collections plan to satisfy needs for the next 10 years, with guidelines for considering a longer timeframe.

This collections plan of course considers the historic Stacks. Based on current needs and priorities, the Library only tested options for the Stacks that accommodated research collections storage. In their current state, the Stacks can no longer serve as a repository for the Library's collections; their environment is inadequate to that task. An architectural and engineering feasibility study concluded that the approximate cost of retrofitting the space—creating an appropriate environment for general and Special Collections—would be \$200 million. A more modest option, one which would not accommodate Special Collections or offer flexibility for book storage, would, at current construction prices, cost \$80 million dollars.

A study of improvements to the Milstein Research Stacks as well as an expansion of the ReCAP facilities in conjunction with the Library's partners is estimated to cost \$15 million, satisfy needs for collections growth for the next 10 years, and meet preservation environment standards. Attentive to the radical fluidity of publishing and storage technologies, the Library will move forward with the solution that optimizes on-site storage in the Milstein Research Stacks and makes a joint investment in ReCAP, where access to our partners' collections will benefit patrons. In doing so, it ensures a 10-year window of collection growth, optimizes storage environments, and protects the Library's

fiscal well-being. The Stacks will be maintained as-is. Their value is in the future flexibility they embody for needs that cannot now be predicted.

BACKGROUND AND PROCESS

Mecanoo and Beyer Blinder Belle (BBB) were engaged in December 2015 by the New York Public Library (NYPL) for the Midtown Campus Renovation project, the scope of which includes the renovation of the Stavros Niarchos Foundation Library (formerly known as the Mid-Manhattan Library) and selective renovation of the Stephen A. Schwarzman Library (SASB). A master plan was developed for SASB that achieves a range of programmatic and functional objectives, including: improvements to building infrastructure and circulation; enhanced spaces for research, visitor amenities, education and exhibitions; and new and upgraded program and event spaces. While the master plan focused primarily on improvements to public spaces, the Stacks—comprising 160,000 SF of non-public, multi-level book storage—were not considered in order to preserve the potential future use of this space.

At the request of NYPL in late 2017, the project's focus expanded to include the potential re-use of the Stacks, and this analysis converged with the NYPL Research Division's assessment of the current and future states of the General and Special Collections at NYPL's four research libraries.

The process was guided by regular meetings with in-house staff and leadership at NYPL, as well as milestone meetings with a working group of select Trustees to provide updates on progress and refine the direction and focus of the study. The Research Advisory Council, a group representing the academic and research community, also provided input to Research staff, highlighting stewardship of the collections, and access to specialized staff and collaborative spaces in the new scholar center as important ways to preserve and enhance the research mission of the Library.

RESEARCH

The Stacks are constructed from a modular, load-bearing shelving system developed by Snead & Company and installed in 1911 as part of SASB's original construction. At the time, the system was regarded as revolutionary and highly efficient, and installed in many libraries across the United States including the Library of Congress. However, a century later, limitations have become apparent. The system is inflexible in that its construction relies on many inter-connected, small structural members with spans typically no greater than 4'-8", and headroom is less than 7'-6". The single-depth shelving does not accommodate items of varying size, and the environmental and life safety conditions do not meet current codes and standards. In 2012/13 the Library's research collections were removed from the Stacks due to conservation concerns.

Other libraries have faced similar issues. The Stacks at Widener Library at Harvard University were renovated leaving the Snead shelving in place, with upgraded mechanical, fire alarm and fire suppression systems, while the St. Louis Public Library removed the Snead shelving entirely and built new storage, staff and public spaces in its place. We know of no examples of Snead shelving re-configured or re-purposed for uses other than storage on the scale of the SASB Stacks.

VISIONING

The design team initially explored a variety of programmatic and architectural concepts for the Stacks space, in order to test the potential of providing greater connectivity to other spaces and programs at SASB. Programmatic opportunities that both relate to and support the SASB master plan, and others that extend beyond the master plan, were also explored at a concept level. Based on current need and priority, the Library decided to only consider options that would make the space appropriate for research collections storage.

FEASIBILITY OF ADAPTATION

The design team was asked to look at the feasibility of reconfiguring the Stacks in part or in whole to support uses other than storage, if such uses were determined to be a priority by the Library. A range of options were studied, agnostic of program. These included very selective removal and reinforcement of the shelving's structural members to create rooms embedded within the Stacks; partial removal of the Stacks and installation of new structure to create more flexible open plan areas in portions of the volume; and the complete removal of the Snead shelving and re-supporting the Rose Main Reading Room on a super-column structure, as was proposed in the Central Library Plan of 2014.

While these interventions vary in scope and cost, any change in use triggers code-required life safety requirements, including multiple egress stairs, fire protection of the structure, fire separation from adjacent spaces, and increase in headroom. (Without a change in use, these non-compliant issues are "grandfathered" and can remain.) Despite the apparently smaller scope of the limited interventions, their cost was significant, and not demonstrably less than the larger scale scope of structural changes that were part of the Central Library Plan.

SOLVING FOR ACCESS, CONDITIONS, AND COLLECTION GROWTH

NYPL's Research Collections staff and the design team worked closely together to translate future needs for collections growth and care into an architectural solution for the next decade, and consideration for needs beyond that timeframe. The spaces considered for a multi-pronged solution included the SASB Stacks, ReCAP (NYPL's shared, off-site storage facility in Princeton, NJ) and optimization of space within the Milstein Research Stacks under Bryant Park. Accessibility of the collections, environmental conditions, and capacity for growth were identified as the three objectives to be addressed in any proposed solution.

Fifty-six storage spaces across the four Research Libraries house General and Special Collections. Most Special Collections storage rooms are nearing, at, or over capacity, and a large majority are impacted by poor condition issues. The Milstein Research Stacks are projected to reach capacity for General Collections in 2024, and there is limited growth there for Special Collections. At ReCAP, storage space for all Research Library collections are projected to reach capacity by 2024.

In order to address the study's objectives, the following three projects will be prioritized:

- NYPL will invest in retrofits and relocations to improve conditions for at-risk collections at LPA and SASB.
- In the Milstein Research Stacks, shelving will be reconfigured in an existing Special Collections vault to maximize the space in order to address the relocation of some materials that are housed in SASB proper under less than ideal environmental conditions, given the challenge of housing such collections in a historic building.
- At ReCAP, a new module is being planned to serve all four partners (NYPL, Columbia University, Princeton University, Harvard University). This expansion will add storage capacity for both General and Special Collections storage for a minimum of five years' growth and a maximum of ten years' growth, depending on the type of shelving installed. NYPL will have additional information about the new module after the June 2019 ReCAP Board meeting.

The cost of the above three projects is estimated at \$13 to \$15 million dollars and will solve capacity for collections for up to ten years.

As capacity and conditions require, Level One of the Milstein Research Stacks will be renovated in the future to replace motorized compact shelving that was installed almost thirty years ago with higher-density and flexible storage systems, as well as other core and shell improvements to improve waterproofing and pest control. The cost of this project in present value dollars is \$25 million.

LONG-TERM COLLECTION SOLUTIONS

With capacity, access, and improved condition needs addressed for the next decade, the SASB Stacks will be considered a "land bank" for future collections growth and conservation, when the compelling need emerges and at a time where the future can be planned for with more predictability. Two options were proposed for the upgrade of the Stacks for collections needs. The first removes the Stacks in their entirety and installs new structure with a regular grid, potentially accommodating compact shelving systems as a "box within a box" vault to provide greater environmental control and allow for future flexibility that the current Stacks do not provide. This option would hold the equivalent of approximately three million Special Collections items, or more for General Collections, which allow for higher shelving. The project cost is estimated at approximately \$200 million.

The second option is to renovate the Snead Shelving similarly to the renovation at Widener Library at Harvard. A study exploring this approach was completed in 2013; the estimate from this study, escalated to present value and accommodating full project costs is approximately \$80 million. This option offers less flexibility, in that the existing shelving configuration cannot accommodate the specialized storage sizes needed for Special Collections items.

Either long-term option for the SASB Stacks can add enough capacity to house NYPL's collections until 2050 and, through shifting locations of collections between on- and off-site locations, offers the opportunity to house all additional Special Collections materials stored in SASB proper, as well as growth from the other research libraries, until 2050.

The future expansion of ReCAP beyond the module being planned currently will also provide opportunities for increasing capacity as needed. These options will be continually reassessed as these longer-term needs come into focus in the coming decade.



1

Background and Process

Background and Process

Mecanoo and Beyer Blinder Belle (BBB) were engaged in December 2015 by the New York Public Library (NYPL) for the Midtown Campus Renovation project, the scope of which includes the renovation of the Stavros Niarchos Foundation Library (formerly known as the Mid-Manhattan Library) and selective renovation of the Stephen A. Schwarzman Library (SASB). A master plan was developed for SASB that achieves a range of programmatic and functional objectives, including improvements to building infrastructure and circulation; enhanced spaces for research, visitor amenities, education and exhibitions; and new and upgraded program and event spaces. While the master plan focused primarily on improvements to public spaces, the Stacks—comprising 160,000 SF of non-public, multi-level book storage were not considered in order to preserve the potential future use of this space.

OBJECTIVES

At the request of NYPL in late 2017, the project's focus expanded to include the potential re-use of the Stacks. The primary objective of the study was to evaluate the potential to reuse and/or reconfigure this volume of space within the building programmatically, technically and spatially; and to develop concept level construction cost estimates for preferred scenarios to be agreed on by the Project Team during the course of the study.

PROCESS AND INPUTS

The Design Team's study began with two parallel lines of investigation: BBB led the organization and validation of prior studies, and precedent research, while Mecanoo developed initial scenarios showing the potential for large-scale interventions in the Stacks space to support programmatic and functional needs of the SASB building or NYPL system, as well as exploring uses that were mission-aligned but entirely new to the library proper. The research was informed by prior reports and studies into the Stacks volume by Gensler, Foster+Partners, and EYP Architecture & Engineering (EYP) that were developed in the planning and design of the prior Central Library Plan (CLP) project. The Design Team also benefited from the experience of structural engineers Silman as well as Code Consulting International (CCI), who had both been members of the CLP Design Team.

This initial phase of the project included Visioning Sessions with NYPL senior leadership and staff before presenting initial findings to the Midtown Campus Trustee Working Group in December 2017. Feedback from the working group led the Design Team to pivot from a program-driven exploration to a largely program-agnostic investigation of the technical feasibility of modifying or removing the existing Stacks structure for alternative future uses, and to establish rough order of magnitude costs for such interventions to allow the group to better evaluate options in terms of cost and architectural potential.

In March 2018, the Design Team returned to the Trustee Working Group to present “Small, Medium and Large” options for alterations to the Stacks, ranging from the creation of rooms while keeping the Stacks structure largely intact, to the removal of the existing Stacks in their entirety. The Small and Medium options were developed, scoped and estimated at a concept level by the Design Team, while the Large option was represented by studies and cost estimates developed during the CLP.

THE EVOLUTION OF OBJECTIVES AND EXPANSION OF FOCUS

At this point in the process, the analysis converged with the NYPL Research Division's assessment of the current and future states of the General and Special Collections at NYPL's four research libraries. Storage needs for the Special Collections exceeded the space available, and environmental conditions were sub-optimal in most of the 50-plus rooms in which these materials are stored. The Design Team was given a new brief by the Trustee Working Group to investigate the opportunity to solve for issues of access, conditions and growth of the collections within the Stacks space, and across the system as a whole. The Design Team expanded its investigations to include potential renovations on Level 1 of the Milstein Research Stacks; and worked closely with NYPL's Research Division to incorporate NYPL's findings from their on-going

Collections Environment Assessment, proposed projects to mitigate currently at-risk collections in Research Library storage spaces, and planned expansion at ReCAP, the shared storage facility owned by the New York Public Library, Columbia, Princeton, and Harvard University libraries located in Princeton, NJ.

In July 2018, the Design Team presented a series of scenarios to the Trustee Working Group that included a mix of retrofitting the existing SASB Stacks, constructing a new collections storage vault within the Stacks volume, renovating and/or re-organizing storage in the Milstein Research Stacks, and expansion at ReCAP. These studies showed that the Stacks volume could be used as part of a plan to provide adequate storage capacity for Research Collections to 2050, and the Design Team and NYPL Research Division was asked by the Trustee Working Group to investigate a “Four-Chapter Solution” that included: 1) short-term solutions for at-risk collections; 2) upgrading Milstein Level 1 to safeguard collections access and better accommodate Special Collections materials; 3) construction of Mod 10 – a new storage module – at ReCAP; and 4) upgrading the SASB Stacks for future capacity.

Mecanoo and BBB focused on the development of items 2 and 4 above, and

incorporated NYPL’s findings on chapters 1 and 3 in refined collections growth and storage capacity projections that charted results on an annual basis out to 2050. Mecanoo took the lead on developing the conceptual design for a new Special Collections storage vault in the Stacks space, and a prior study and cost estimate prepared by EYP was reviewed and escalated to present value to understand the cost of retrofitting the existing Stacks as SASB Stacks options 1 and 2 respectively. With input from NYPL Facilities staff on waterproofing scope, based on the 2016 renovation and fit-out of Milstein Level 2, NYPL’s Research Division on collections storage needs, and Modern Office on shelving layouts and costs, BBB prepared concept level scoping documents for renovations to Milstein Level 1.

The Design Team and NYPL’s Executives and Research Division presented the findings of this phase of study to the Trustee Working Group in December 2018, at which point it was determined that, while a renovation project in the Stacks would solve storage needs through 2050 and potentially beyond, the focus should be on the next 10 years, in order to address critical collection storage needs as quickly as possible. Given the potential for collections growth patterns to change due to influence of digital technology on the publishing industry, and

the potential impact on acquisition of the collection sharing program that NYPL has engaged in with Princeton, Columbia and Harvard Universities, making a substantial financial commitment now to solve for a condition over 40 years in the future that may not materialize as currently projected was deemed to be imprudent.

Through further meetings with the Trustee Working Group, the Planning and Policy Committee, and the Executive Committee in early 2019, the recommendations were refined and presented to the NYPL Board of Trustees on May 8, 2019.



2

Research

Research

HISTORY

The Stacks are constructed from a modular, self-supporting, load-bearing shelving system developed by Snead & Company and installed in 1911 as part of SASB's original construction. They occupy a large part of the west side of the building, covering a footprint of 24,000 sf, and rising through seven levels from the Basement (aka Ground Floor) up to support the floor of the Rose Main Reading Room above. Level 1 aligns with the Basement, Level 3 with the First Floor, and Level 6 with the Second Floor. They are a strong organizing element in the design of the building, both dimensionally in that their vertical module defines the height of the floors, and metaphorically in that the books and the knowledge they contain support the research above.

The Stacks are supported in turn by a tight grid of cast iron columns in the Cellar that sit on a concrete mat slab foundation. In all they have a floor area of approximately 160,000 sf and accommodate 330,000 linear feet of shelving.

The system consists of densely spaced, cast-iron "columnettes" to which steel angles are attached to support the floors and provide cross-bracing. Cast iron shelf standards are attached to the columnettes to support the bookshelves, but do not contribute to the overall structural system. Typically, the spans between members are no greater than 4'-8".

The floors are constructed of 1-1/2" thick marble slabs that are supported on the steel angles, and floor-to-floor heights are 7'-6". Consequently, headroom is limited and less than the code required 7'-6" required for egress. There are 2" gaps between the edge of the floor slabs and the shelving allowing for the free flow of air between levels for passive ventilation. Vertical ducts are also integrated into the ends of runs of shelving at regular intervals for the distribution of mechanically supplied air.



Diagram A. Photograph of the Stacks volume during construction taken at the cellar floor level, facing north, NYPL Archive

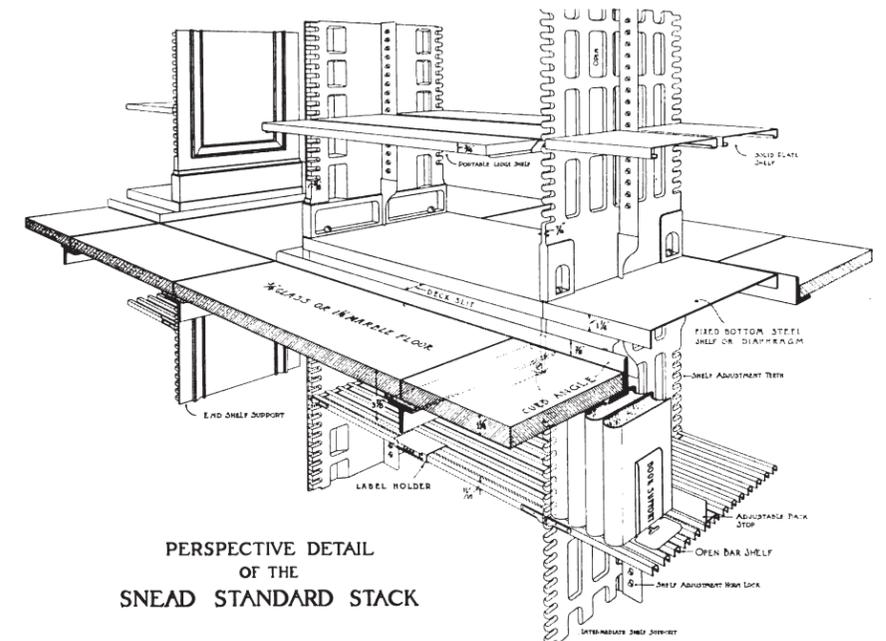


Diagram B. Typical detail of the Snead Standard Stacks system, Snead & Company

The volume itself is surrounded by heavy brick and marble masonry (three to four feet thick), and on the sides facing Bryant Park and the South and North Courts of SASB, full-height, continuous, single-glazed, bronze-framed, original windows. These perimeter walls do not support the Stacks vertically, or the Rose Main Reading Room, but they do provide lateral stability for the Stacks and support the main roof and attics over the Rose Main Reading Room.

At the time, the system was regarded as revolutionary and highly efficient, and installed in many libraries across the United States in the early part of the 20th century, including the Library of Congress and the Widener Library at Harvard University. However, a century later, limitations have become apparent. The system is inflexible in that its construction relies on many inter-connected, small structural members with short spans. Headroom is limited. The single-depth shelving does not accommodate items of varying size, and the environmental and life safety conditions do not meet current codes and standards. In 2012-13, the Library's research collections were removed from the Stacks due to conservation concerns.

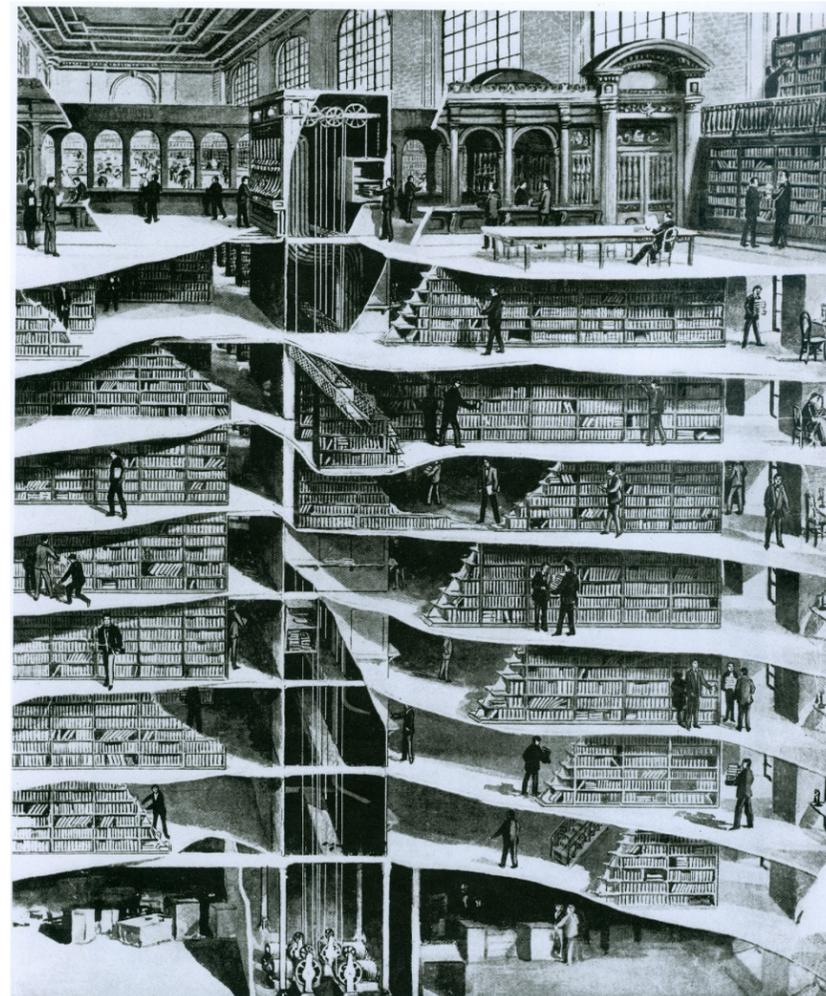


Diagram A. Sectional drawing of the Stacks, NYPL Archive

EXISTING CONDITIONS

The SASB General Collection materials were removed from the Stacks in 2012-13, and relocated to storage rooms in SASB and off site at ReCAP with environmental conditions more appropriate for collection storage. The air handling units serving the space have passed the end of their expected service life. The envelope is not insulated, nor does it contain any vapor barrier. Consequently, there are significant obstacles to maintaining the appropriate temperature and humidity conditions for collections storage.

As the shelving system is designed to allow for the free flow of air between levels, this also means that there is no fire separation between any of the levels. The Stacks, in effect, form a seven-level atrium. Adding fire-resistant materials at each floor to create this separation between the levels would further reduce the already non-code compliant headroom.

While the fire protection and separation issues described above pose challenges, that is not to say that they cannot be addressed in some way. At the Widener Library at Harvard University, the space was compartmentalized, and the fire alarm system further upgraded as part of a larger renovation project.

Currently, the Stacks are used to hold circulating and other less rare collection materials.



Diagram A. The Stacks in their current condition

PRIOR STUDIES

In 2006, Gensler was engaged by NYPL to study the feasibility of creating an "integrated central library" in SASB (then named the Humanities and Social Sciences Library). Their November 2006 feasibility study report described the existing SASB Stacks as "antiquated" and proposed their removal with the resulting space to be occupied by a circulating Central Library, including Stacks, public services, administration and other building services.

Foster + Partners was subsequently engaged by NYPL in 2008 as the Architects of the Central Library Plan (CLP). Two approaches to the Stacks were taken as the design developed. In the first approach, the existing stack structure would be replaced with a new "cradle" framing system that would support the Rose Main Reading Room and rest on two lines of columns running north-south through the Stacks space. The existing Stacks would be completely removed, and new floors with greater floor-to-floor heights would be inserted in the volume supported by the new columns. Other proposed alterations included replacing the existing single-glazed windows with new thermally broken double-glazed windows, creating a new entrance facing Bryant Park for egress purposes, and installing a smoke purge system due to the atrium condition created by the design.

Initial conversations with the NYC Department of Buildings undertaken during this period established a strategy whereby any alterations to the Stacks space would comply with current codes (2008 Code at that time), and that the volume would effectively be treated as a separate building, satisfying its own life-safety needs. Alterations to the rest of the building would comply with 1968 Code. (A similar approach had been taken for the design and construction of the South Court infill project by Davis Brody Bond, completed in 2002, with new dedicated egress routes provided for the new space created in South Court.)

In mid-2013, a second approach was developed by Foster + Partners. Again, a "cradle" would be used to support the Rose Main Reading Room, but with columns along the perimeter, and the cradle spanning the full width of the space. In this option, portions of the existing Stacks were proposed to be retained and altered. In the southern half of the space, double-height volumes would be created in and amongst the Stacks. This would have required significant reinforcement of the remaining Stacks structure. In the northern section, most of the Stacks would have been removed to create a full-height reading room, with two tall, reinforced, free-standing portions of the Stacks remaining.

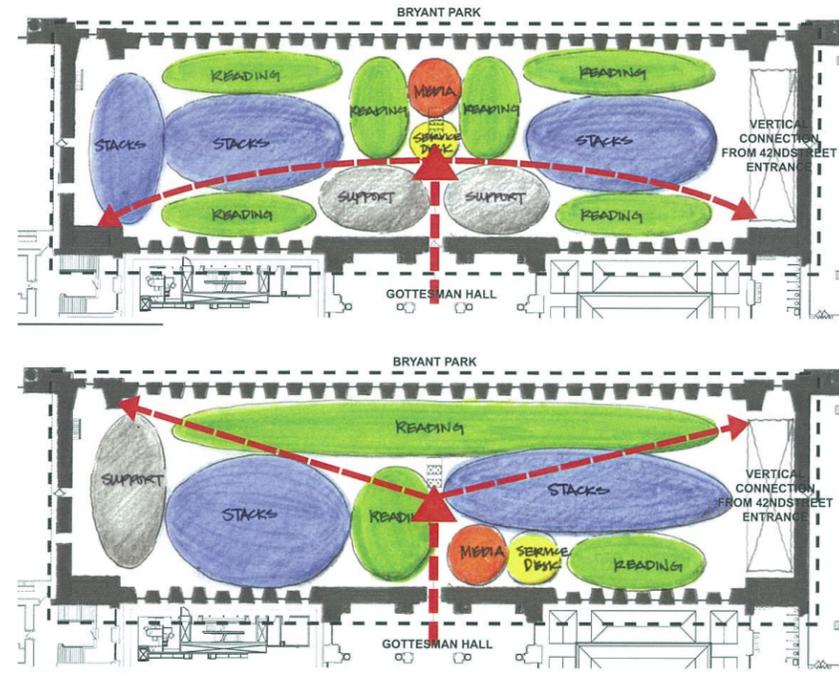


Diagram A. Organizational diagram, Feasibility Study for Central Library, Gensler (2006)

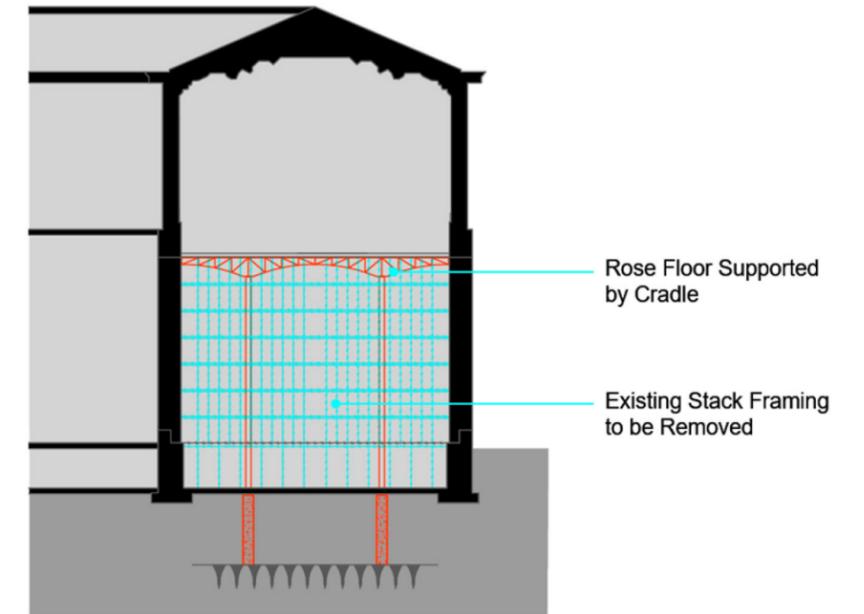


Diagram B. Sectional diagram showing the first approach re-supporting of the Rose Main Reading Room Foster + Partners (ca. 2012)

During the same period that Foster + Partner's second option was being developed, EYP Architecture & Engineering (EYP) was commissioned to study the feasibility of upgrading the existing Stacks to correct the existing shortfalls in providing appropriate conditions for collections storage. EYP had already designed renovations for the Widener Library at Harvard in the late 1990s/early 2000s and a similar approach was proposed for the SASB Stacks, including glass partitions to divide the volume into 14 compartments for smoke control, and an air sampling fire alarm in lieu of rating the structure and providing floor separation; repairs to sprinkler branch piping; new lighting and electrical systems; new HVAC equipment; new double-glazed windows and installation of a vapor barrier at the building envelope; and rehabilitation of the existing elevators and lifts.

PRECEDENTS

Other libraries have faced similar issues as NYPL faces in the SASB Stacks. As noted above, the Stacks at Widener Library at Harvard University were renovated, while the St. Louis Public Library removed the Snead shelving entirely and built new storage, staff and public spaces in its place. We know of no examples of Snead shelving re-configured or re-purposed for uses other than storage on the scale of the SASB Stacks.

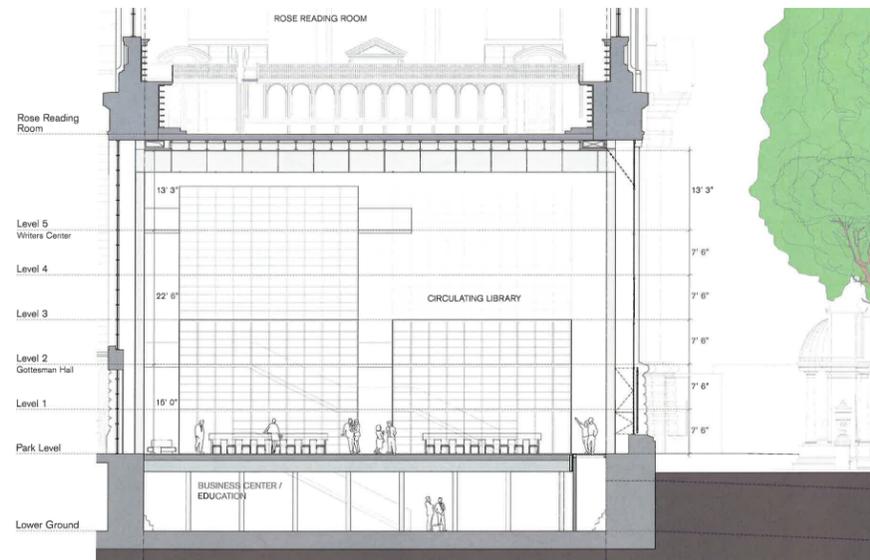


Diagram A. Section drawing showing the second approach to renovating the Stacks, with portions of the shelving retained and modified, Foster + Partners (2013)



Diagram B. Perspective view of the second approach to renovating the Stacks, Foster + Partners (2013)



Visioning

3

Visioning

Positioned at the center of the Midtown neighborhood of Manhattan, at the heart of one of New York City's iconic institutional buildings, overlooking one of New York's most used public green spaces, the Stacks in the Stephen A. Scharzman Building have a lot of potential to become something extraordinary. Without physical limitations, the function of the Stacks could go beyond their current limited use of book storage. Imagine a public space where you can view art, experience performances, hang out, read, work, educate or something far greater than imaginable.

Mecanoo/BBB explored a variety of architectural possibilities at a highly conceptual level for the Stacks space, looking at structural interventions on a range of scales, and the potential to provide greater connection to other spaces and programs in SASB, Bryant Park or the city. The design team facilitated programmatic visioning sessions with NYPL senior leadership and administrative staff members. Suggestions were made for architectural, spatial and programmatic opportunities that both related to and supported the SASB Master Plan, and others that extended beyond the master plan.

Spatial/Architectural Opportunities

By examining the spatial qualities, and without any notion of programmatic needs, one might come up with new uses. Being a space that is not open to the public, and filled with the Snead Stacks system, it is hard to comprehend the proportions and modular quality of the volume of the space. For a better understanding of its dimensions, the design team compared the Stacks volume to existing known spaces.

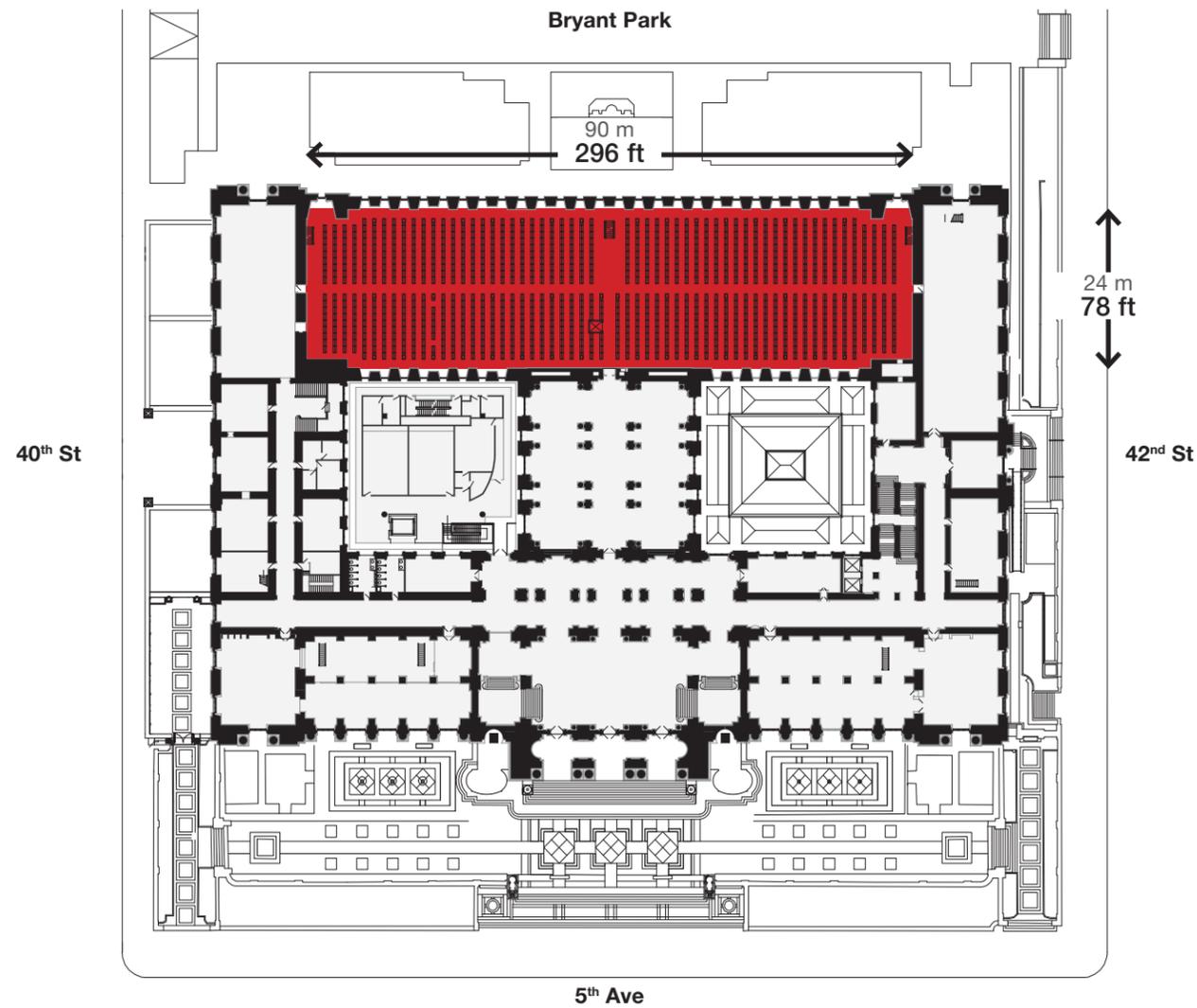


Diagram A. Overall dimensions 1st floor / Belle Etage Level

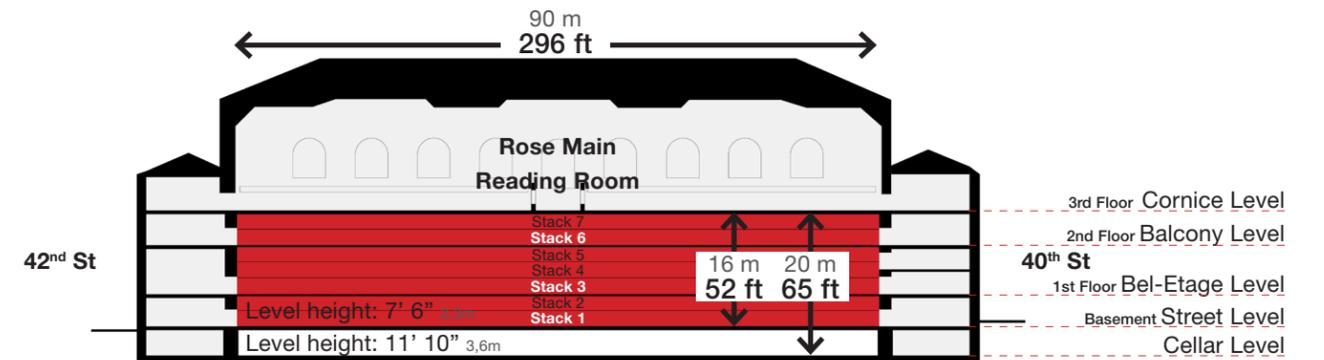


Diagram B. Overall dimensions, Longitudinal Section

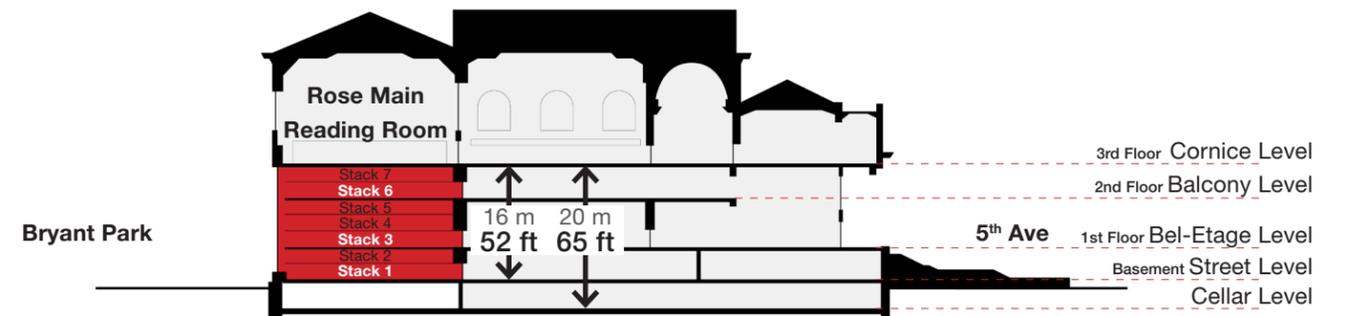


Diagram C. Overall dimensions, Cross Section

SCALE COMPARISONS

NYPL - ROSE MAIN READING ROOM



SASB Rose Main Reading Room

Length:	296'	90m
Width:	78'	24m
Height:	50'	15m

SASB Stacks

Length:	296'	90m
Width:	78'	24m
Height:	52'	16m

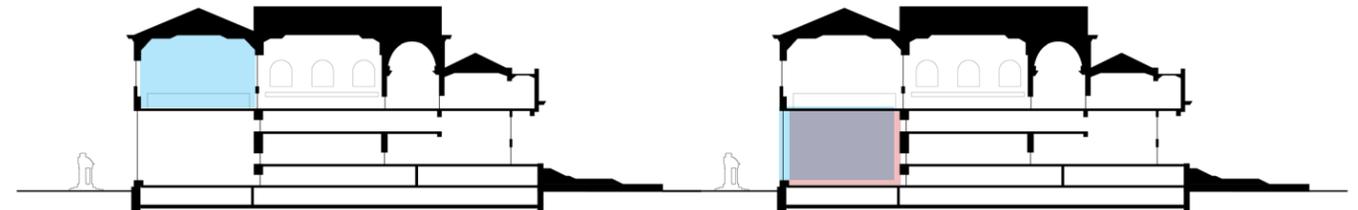
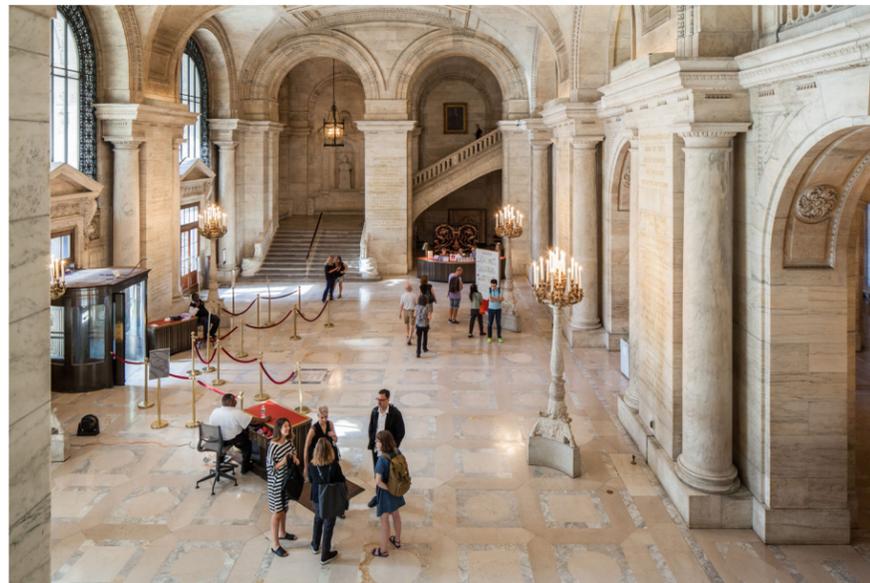


Diagram A. Rose Main Reading Room.

NYPL - ASTOR HALL



SASB Astor Hall

Length:	77'	24m
Width:	46'	14m
Height:	38'	12m

SASB Stacks

Length:	296'	90m
Width:	78'	24m
Height:	52'	16m

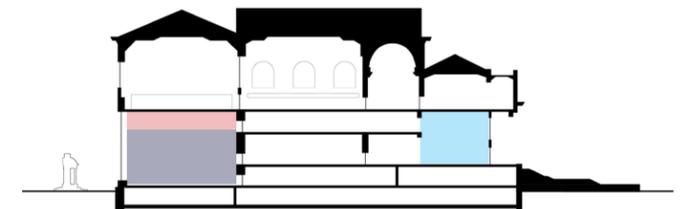
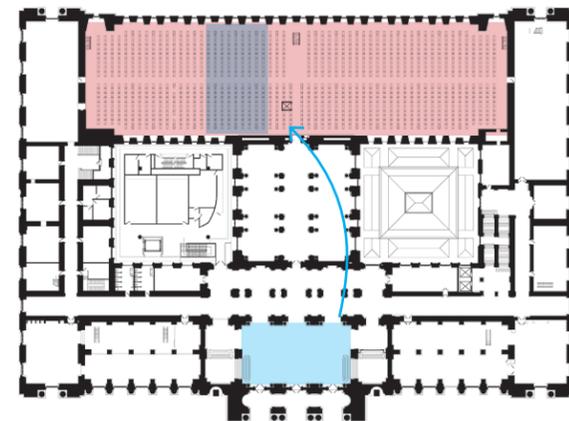


Diagram B. Astor Hall

SCALE COMPARISONS

MoMA, NYC



	MoMA Main Hall		
	Length:	49'	15m
	Width:	49'	15m
	Height:	61'	19m

	SASB Stacks		
	Length:	296'	90m
	Width:	78'	24m
	Height:	52'	16m

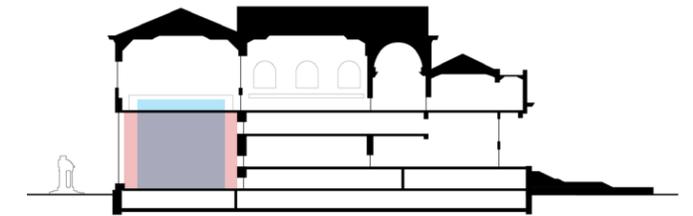
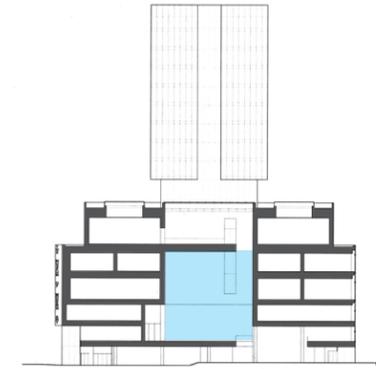
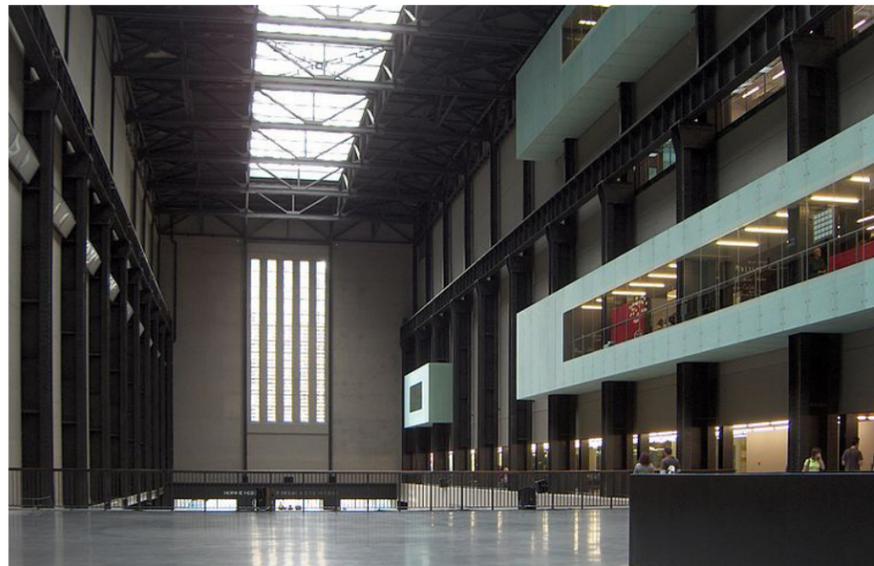


Diagram A. MoMA, NYC

TATE MODERN, LONDON



	TATE Moden Turbine Hall		
	Length:	500'	152m
	Width:	75'	23m
	Height:	85'	26m

	SASB Stacks		
	Length:	296'	90m
	Width:	78'	24m
	Height:	52'	16m

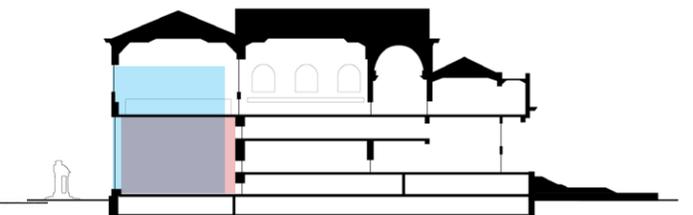
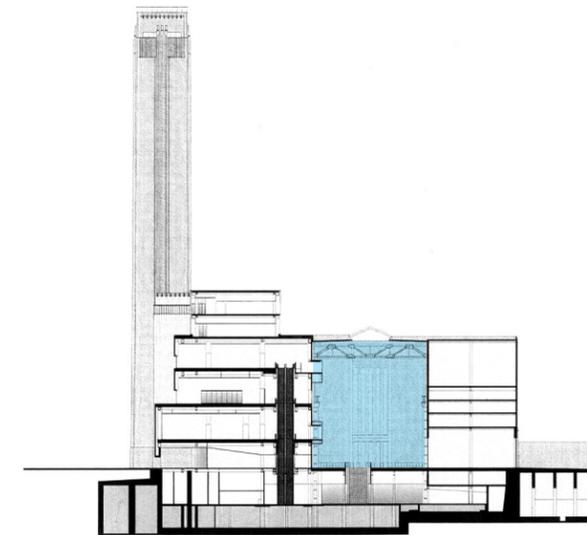
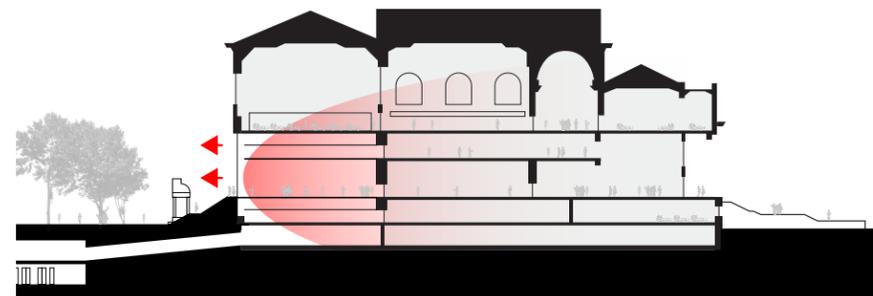


Diagram B. Tate Modern, London

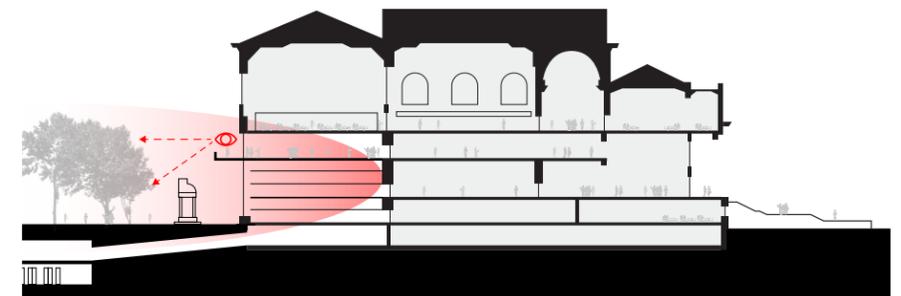
CONCEPT: CONNECTION TO BRYANT PARK



A Diagram A.
Opportunity for daylight ingress from Bryant Park (and South Court)



B Diagram B.
Opportunity to connect to Bryant park with an entrance



C Diagram C.
Opportunity to connect to Bryant park with a balcony



The position of the Stacks under the Rose Main Reading Room, connected to the rest of the building on three of its four, sides was not an accident. The low stacked floors allowed for dense and efficient storage. Many rooms had direct connections to the different Stacks levels, which allowed for quick access from all sides. The central location has a lot of spatial potential for connecting new functions in the Stacks with the rest of the building.

A Tall windows allow light to fill the space giving the Stacks a nice connection to the green outdoor space in Bryant Park. This allows light to come in. The connection to Bryant Park also allows for an opportunity to create a separate entrance **B** or a new outdoor balcony space, **C** subject to the approval of the Landmarks Preservation Commission.

CONCEPT: CONNECTION TO BRYANT PARK



Diagram A. Conceptual new Entrance **A** or Balcony **B**, promoting connection to Bryant Park as described on previous page.

CONCEPT: LEVELS OF INTERVENTION

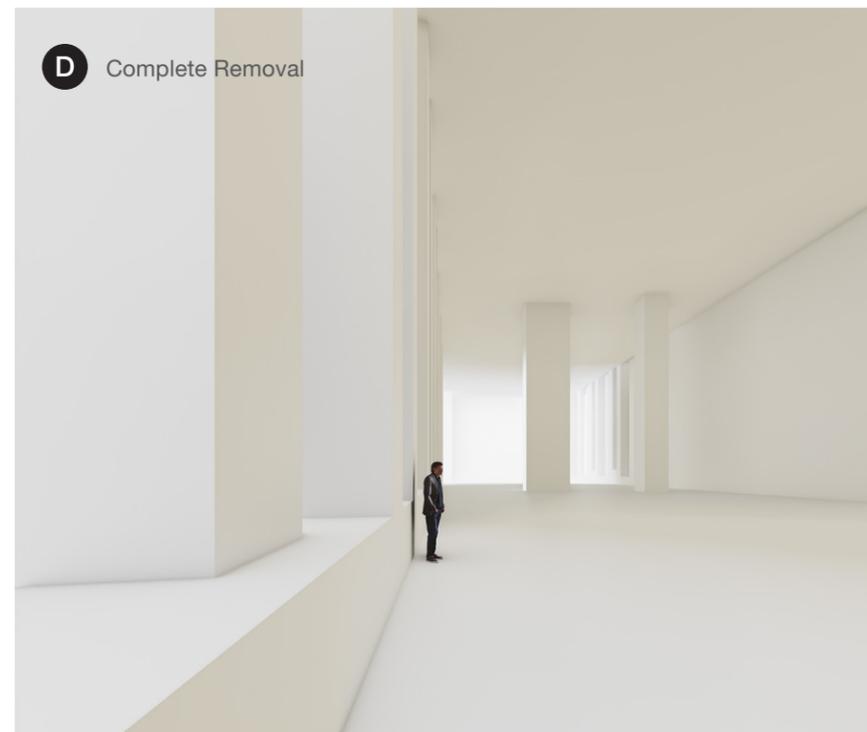
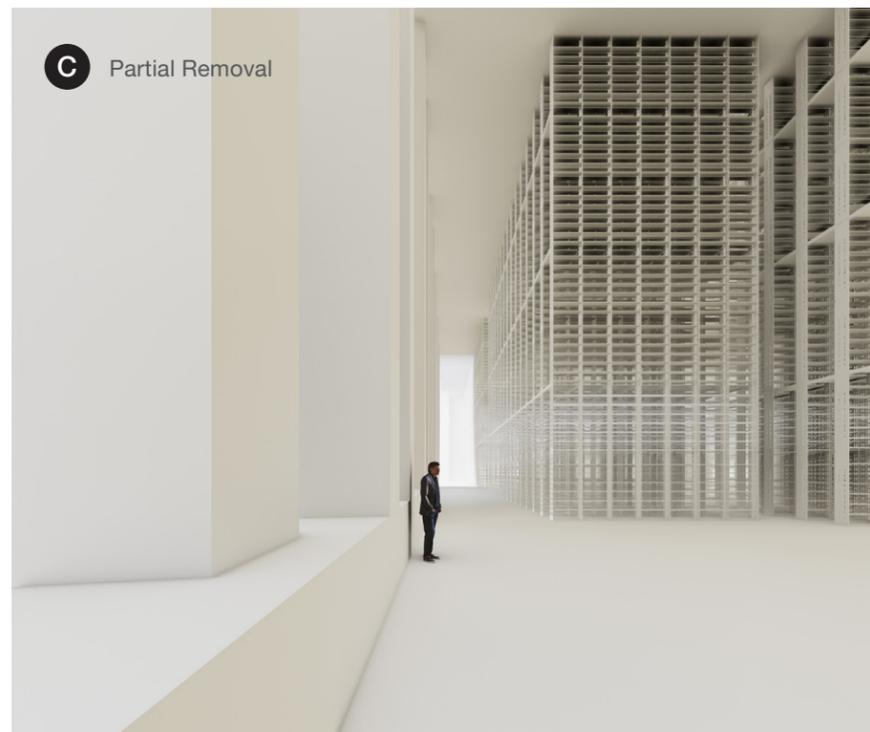
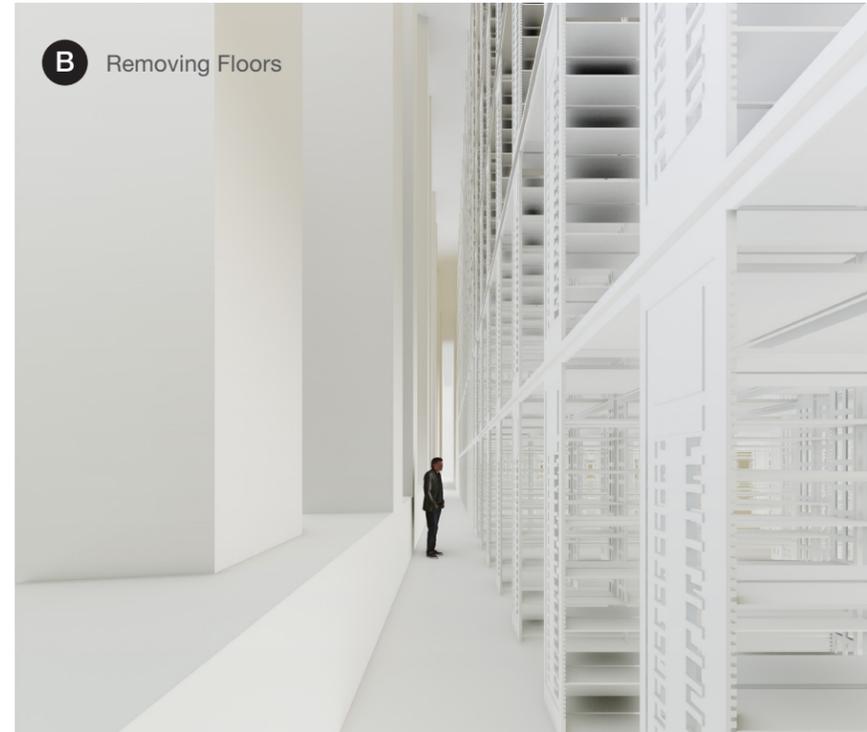
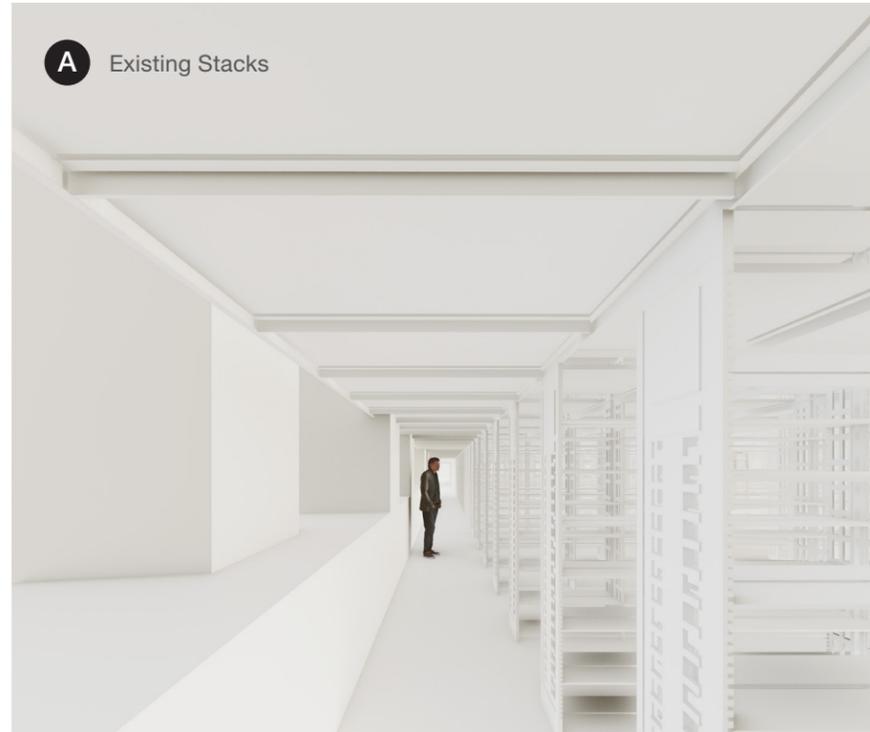
Diagram A, B, C, D. Stacks Level 01 (Street Level) - Center aisle facing North



On this and the next page two distinct views are rendered with conceptual modifications to the stacks. While the repetitive nature and sheer size of the Stacks lend them an esthetic quality of their own, it is hard to grasp and understand how they fill the space when you are among them. In a series of studies, the Design Team has explored the partial removal of the Stacks and what spatial quality this would bring. Removing part or all of the Stacks emphasizes the sheer quantity and dimensions of the original Stacks system and could potentially free up space for other uses.

CONCEPT: LEVELS OF INTERVENTION

Diagram A, B, C, D. Stacks Level 01 (Street Level) - Western aisle facing North

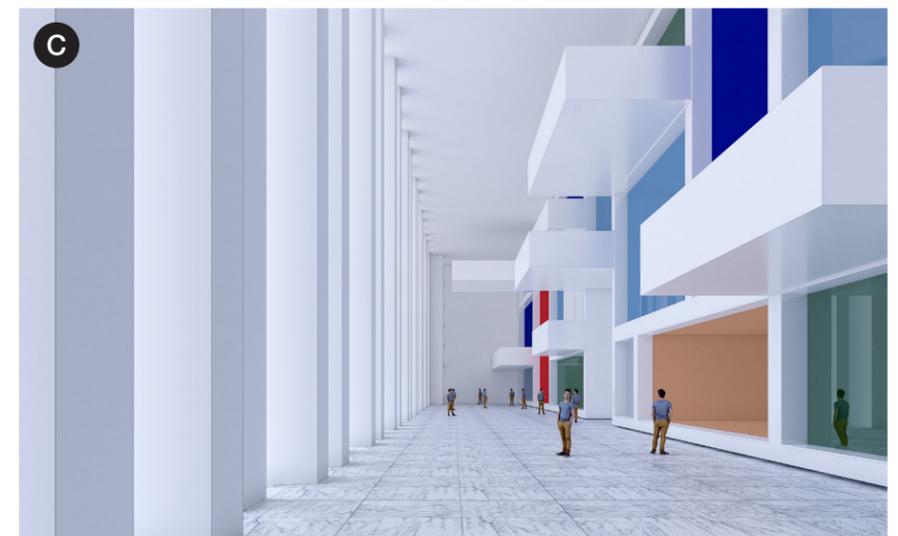


With the hypothetical tabular rasa of removing the Snead Stacks in their entirety, and the absence of a specific programmatic use, the Design Team explored some options for re-inserting new spaces into the volume. These were tests to understand scale and potential spatial qualities, testing architectural interventions without the parameters of function.

THE DOLL HOUSE

Diagram A, B, C. Explorations of the "Doll House" concept, looking north, with windows facing Bryant Park on the left hand of the images.

Boxes reflect the modularity of the original Stacks. The large interior windows allow the public to see what is happening from the lower floor. Research areas, meetings spaces, small exhibitions, or book vaults are potential uses associated with SASB. The existing windows facing Bryant Park allow light to enter.



THE LAYER CAKE

Diagram A, B, C. Explorations of the "Layer Cake" concept, looking north, with windows facing Bryant Park on the left hand side of the images.

The emptied volume allows new floors at levels independent from SASB to be inserted. The new floors, pulled back from the Bryant Park facade, allow light and views into the space. The free floor areas allow potential uses — for example, exhibitions or reading rooms.



OLD VS NEW

The opportunity to create an entirely new type and scale of space in the Stacks allows for a conceptual re-thinking of the architecture that is profoundly different from the historic spaces in the rest of the building. While these historic spaces are static, formal, and somewhat inflexible, the new intervention could be dynamic, informal, and flexible. This approach could allow for unconventional and unexpected uses of the space.

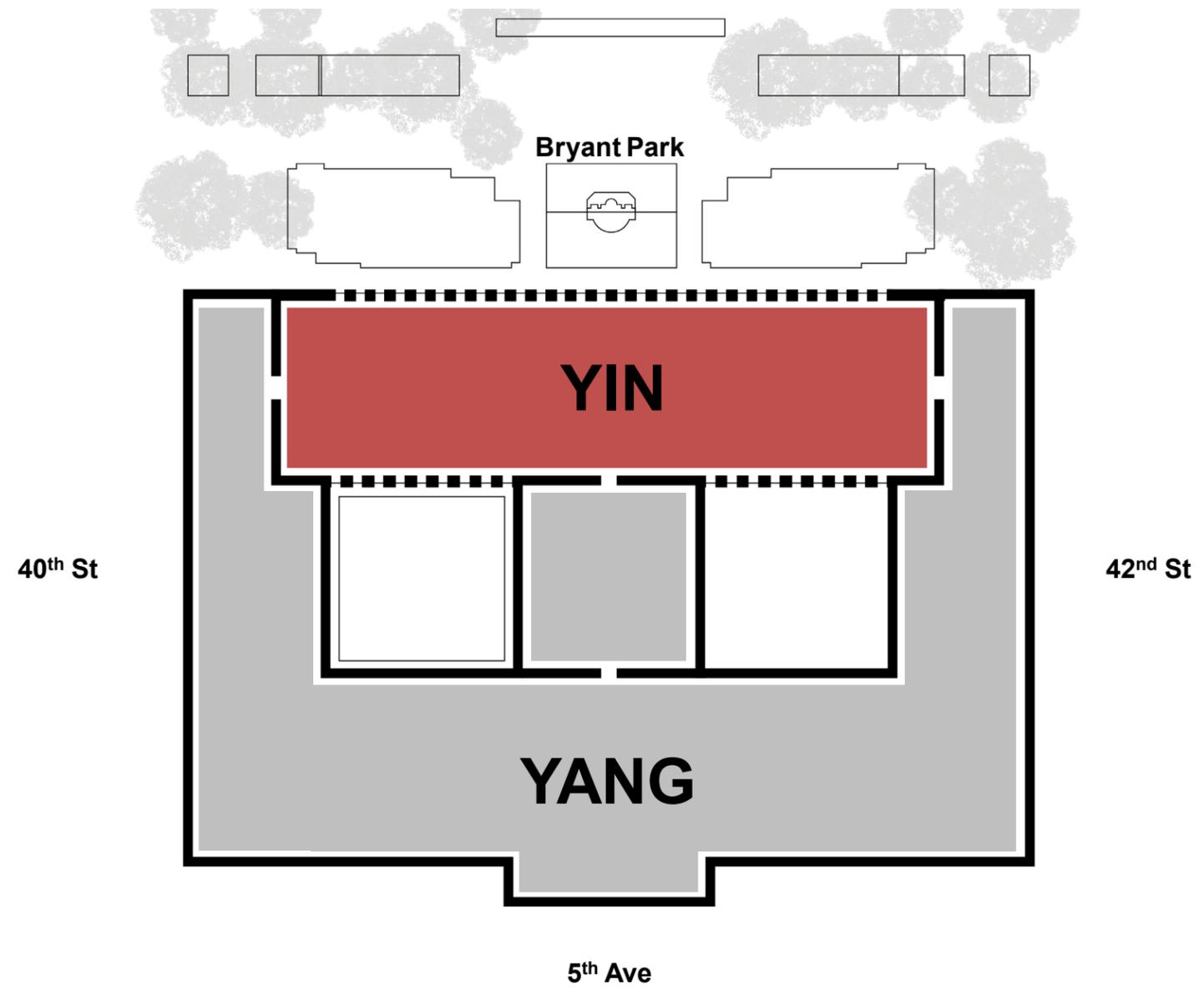


Diagram A.

Programmatic Opportunities

The Design Team explored different opportunities for the Stacks space to contribute to the functionality of the Library both as a building and an institution. The Design Team explored how the Stacks space can be linked to existing SASB spaces to transform uses. The SASB Master Plan and conversations with Collections staff brought to light some functions that are lacking in the current building, or that could be transformative additions to the existing program, such as book vaults, exhibition spaces, all with access to state-of-the-art service and support.

In order to be able to facilitate the Library's needs, the re-use of the Stacks should follow the guiding principles of the SASB Master Plan:

- Create a master plan that implements program and infrastructure goals in phases
- Restore elements of original Beaux Arts design
- Make infrastructure improvements to facilitate movement and circulation of people and collections
- Use vertical arrangement of programmatic elements to improve user experience

The plans on the next pages were developed to provide inspiration and a starting point for early conversations with NYPL staff; they are not intended to reflect any specific priorities in functional or programmatic need.

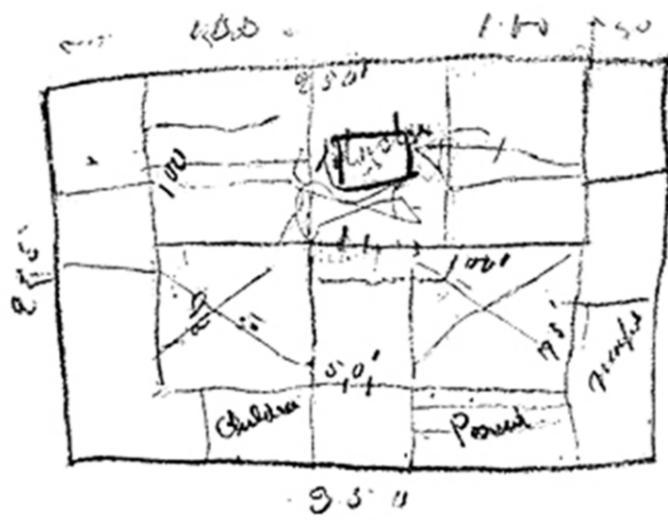


Diagram A. Original sketch of central library parti by JS Billings, first Director of NYPL

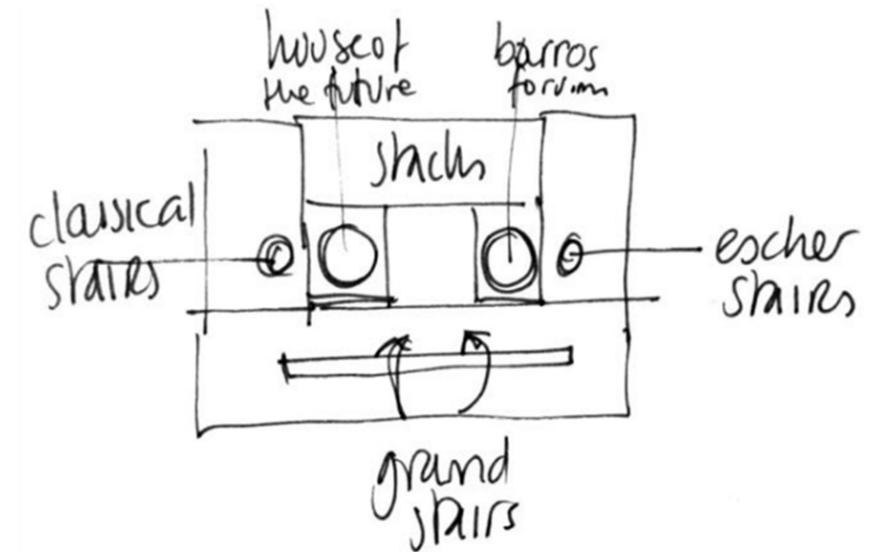
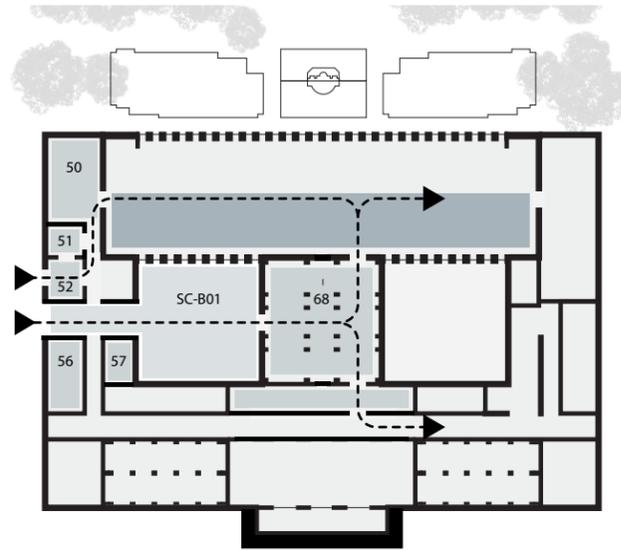


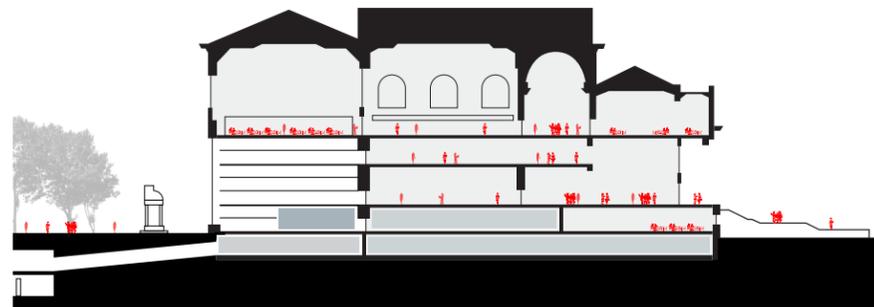
Diagram B. Parti sketch of SASB's current organization by Mecanoo

PROGRAMMATIC OPPORTUNITIES RELATED TO THE SASB MASTER PLAN

01. BUILDING SUPPORT

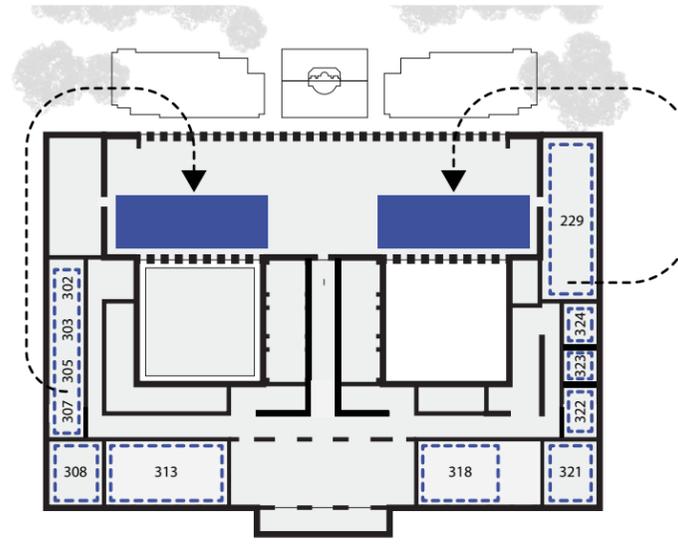


ground floor/street level

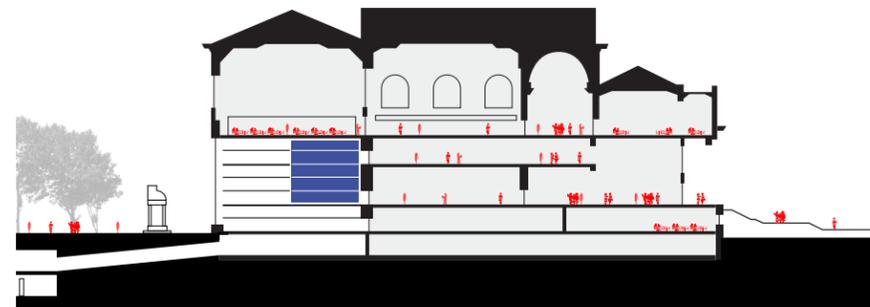


- Create Building Support back bone on Street Level for new circulation routes separate from public areas for safe book transport.
- Support spaces for projects involving large numbers of items from the collections, well connected to loading dock and central stack elevator.

02. VAULTS

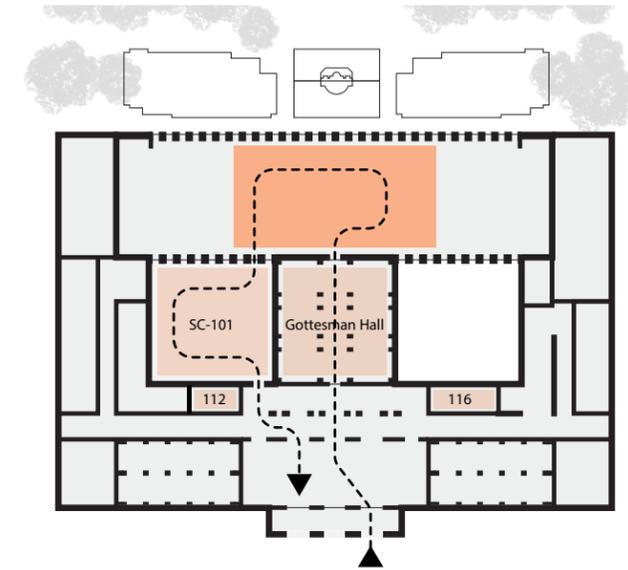


3rd floor

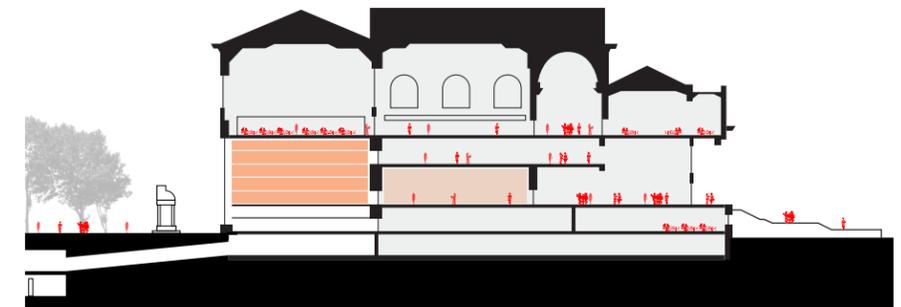


- Create Special Collections storage rooms for optimal storage conditions.
- Existing vaults become (restored) public reading rooms for more public access and optimal environmental reading conditions.
- New Special Collection storage rooms in the Stacks serve the reading rooms on all levels which would allow shorter transport lines and quicker access.

03. EXHIBITION

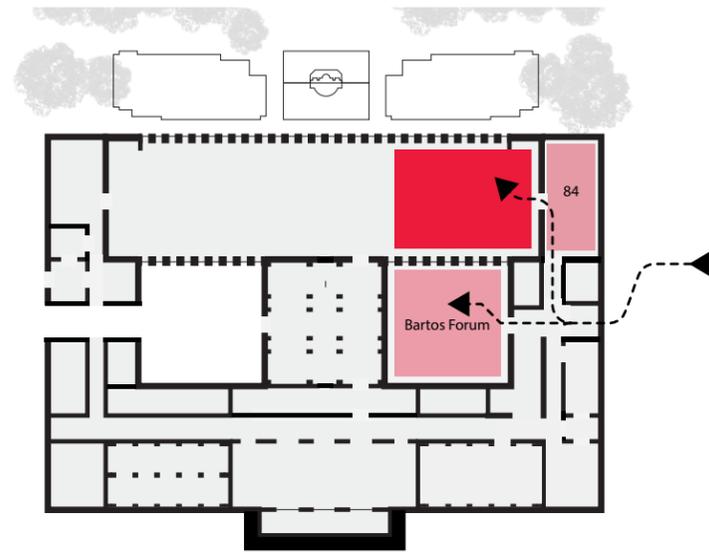


1st floor/belle etage

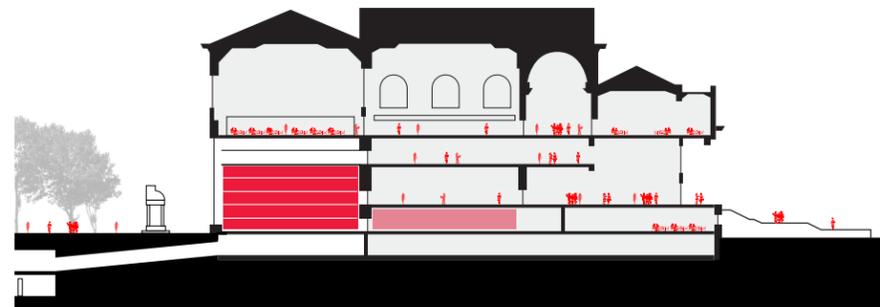


- Create Exhibitions Loop with Gottesman Hall and proposed Library Shop to allow for more exhibition space.
- Allows a clear route through the exhibition spaces.
- Create a connection with daylight to Bryant Park.

04. PERFORMANCE SPACE

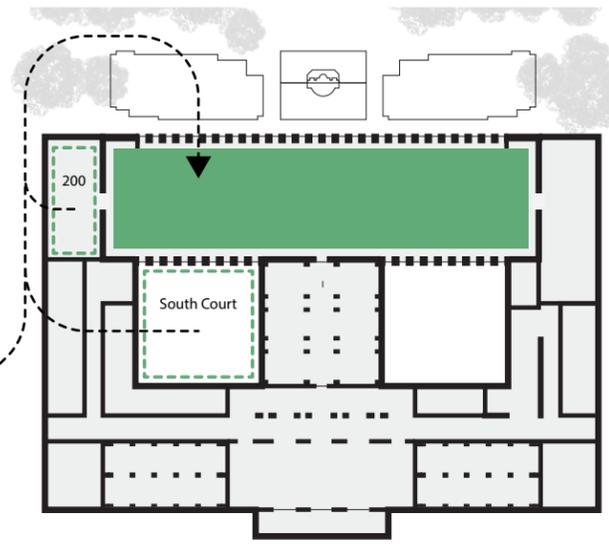


ground floor/street level

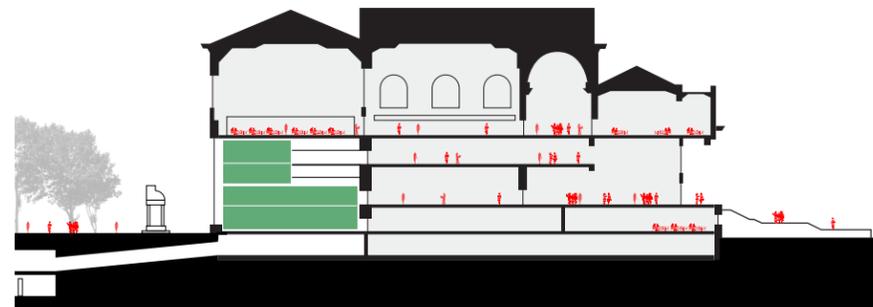


- Entrance on 42nd Street allows for a separate entrance to a new larger venue space in the stacks.
- Room 84 as potential break-out space for the performance space.

05. STAFF WORKSPACE

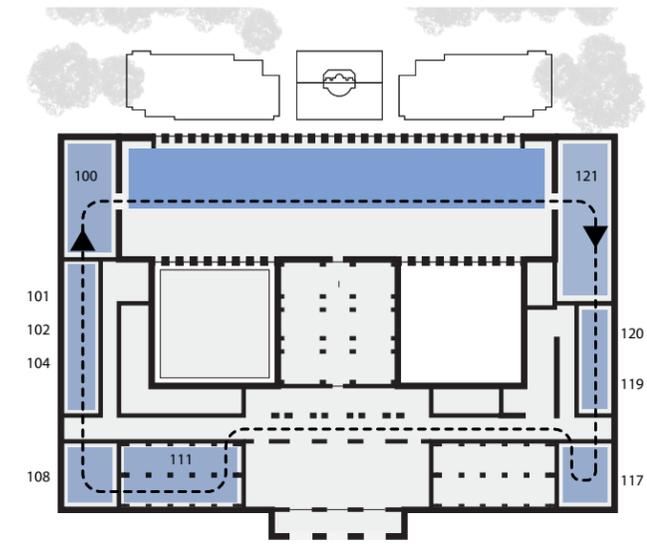


South Court (all floors)

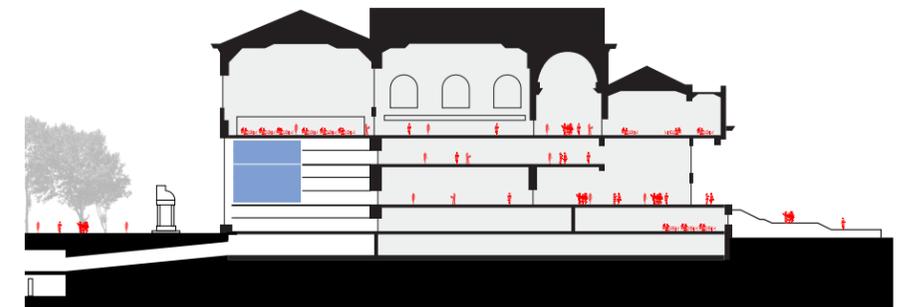


- Create Staff Workspaces with daylight with a view, facing Bryant Park
- Open South Court for public use.

06. READING ROOM



3rd floor



- Creates additional public rooms for seminars or reading.
- A view on Bryant Park with daylight.

PROGRAMMATIC OPPORTUNITIES BEYOND THE SASB MASTER PLAN

Throughout the world spaces have been successfully transformed from their original use and given a second life. Looking beyond the current use of the Library as a place for research and education, the Design Team can also envision that the Stacks space allows broader opportunities for:

- Mission alignment partnerships, collaboration and education spaces could be shared with universities and other cultural institutions with similar research goals. For instance, what if the Stacks became an exhibition space for MoMa literature and library exhibitions?
- Addressing other needs of Midtown Manhattan and/or New York City yet to be identified, be they social, civic, entrepreneurial or otherwise.
- Encouraging Public (indoor) Space. We strongly believe that libraries are the last truly public buildings where people can just be. What if the Stacks are transformed into a free (indoor) social meeting place where people can meet and interact in small or large groups?

By facilitating broader functions, NYPL can strengthen its visibility and brand awareness to a broader public.

PROGRAMMATIC OPPORTUNITIES BEYOND THE SASB MASTER PLAN

Diagram A. Atocha Station Hall, Madrid



ORANGERIE / ARBORETUM

A New type of collection synergies with Bryant Park

Diagram B. Slaughter House converted to Film House, Madrid



PUBLIC CINEMA

Synergies with Lincoln Center and other film institutes

Diagram C. Military Hospital converted to restaurant, Belgium



MAJOR RESTAURANT

Revenue generation
Serving the campus including Bryant Park

Diagram D. Railway Station converted to Museum, Paris



MUSEUM SPACE

Synergies with other cultural institutions

Diagram E. Turbine Hall TATE Modern, London



ART INSTALLATION





4

Feasibility of Adaptation

Feasibility of Adaptation

The Design Team was asked to look at the feasibility of reconfiguring the Stacks in part or in whole to support uses other than storage, if such uses were determined to be a priority by the Library. A range of reconfiguration options were studied. These options included:

- Very selective removal and reinforcement of the existing shelving's structural members to create small rooms embedded within the Stacks
- Partial removal of the Stacks and installation of new structure to create more flexible open plan areas in portions of the volume
- The complete removal of the Snead shelving and re-supporting the Rose Main Reading Room on a super-column structure, as was proposed in the Central Library Plan of 2013.

These interventions were categorized as “Small”, “Medium” and “Large”, respectively.

The feasibility study was program-agnostic, but the assumption was that the use of the adapted space would change from the current storage use, and the three approaches were evaluated in terms of what kind of use they could support.

Technical Considerations

The current occupancy of the Stacks volume is S1 Storage, as defined by the NYC Building Code. While no program was defined for this portion of the study, potential future occupancies might include:

- S1 Storage – Special or General Collections, in fixed and/or compact shelving
- A1, A2 Assembly – Large conference rooms, event spaces, etc.
- B Business – Offices, workspaces, meeting rooms
- E Educational – Reading or study rooms

As noted previously in this report, several non-code compliant conditions exist in the SASB Stacks (lack of fire protection of the structure and fire separation between floors, insufficient head room), but these are considered to be legally non-compliant or “grandfathered” since the space is used as originally intended when the building was built. Should the legal occupancy of the Stacks change, it is likely that non-compliant conditions would have to be corrected or improved. There are also practical considerations in changing the function of this space, with examples as follows.

Structure

- The existing structural grid is too dense for any use other than static storage.
- The floors only have capacity to support modest live loads such as office or circulation space, not assembly space.

Life Safety

- The 2014 NYC Building Code for life safety would likely apply to any alterations in the Stacks space.
- Structure supporting the Rose Main Reading Room would need to fireproofed.
- A smoke control system would be needed for the atrium condition (i.e. more than two interconnected floors), or fire separation would be required between the floors of the Stacks.
- The headroom is too low for anything but the existing use.
- A minimum of two independent protected means of egress from the space would be required.

MEP

- Infrastructure loads may increase to serve the demands of the new uses (particularly electrical).
- Mechanical ventilation via ducts would be needed for any enclosed spaces within the Stacks space.

Previous Approaches

As noted in the Research section of this report, two prior studies looked at alterations to the Stacks space. The Central Library Plan created a new, fire-proofed structure to support the Rose Main Reading Room above, any remaining Stacks were structurally reinforced, smoke control for the atrium was proposed to vent out of the tops of the windows, and pre-determinations were anticipated for low head-room areas and the lack of fire protection on historic structural shelving.

The 2013 EYP Stacks renovation study upgraded the fire alarm, HVAC, and sprinklers among other systems; however, since the occupancy did not change, existing non-compliant fire-proofing and fire-separation conditions were not required to be brought up to current code.

Proposed Code Strategy

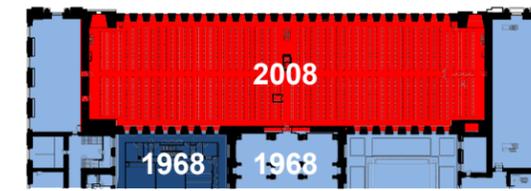
SASB was built in 1911, before the first NYC Building Code was established in 1938. It does not have a current Certificate of Occupancy. Typically, the Certificate of Occupancy would form the baseline against which any alterations to use or occupancy would be judged by the DOB when considering an application for a permit. As part of the Midtown Campus Renovation project, NYPL and the Design Team filed a pre-determination to establish the existing use, occupancy, and egress capacity of the entire building as the baseline despite the fact that by modern codes, the egress capacity is less than the building's occupancy. This pre-determination was approved by the DOB. Any future increase in the building's occupancy will have to be accompanied by an equal or greater increase in the egress capacity.

In order not to over-burden the rest of the building's egress capacity, this study recommends that any alteration to the Stacks includes the construction of a minimum of two new egress routes serving the reconfigured Stacks space. These egress routes will need to discharge directly to ground level outside of the building. The Central Library Plan included a similar provision, using an existing doorway facing Bryant Park at the southwest corner of the building in Room 50, and converting a window at the northwest corner in Room 84 to a doorway in a symmetrical fashion. The alterations proposed in this study use the same egress points from the building, and include two new, fully enclosed egress stairs at either end of the Stacks space. Consequently, if the Stacks are only altered in part, the division between the altered and un-altered portions should be along a line the length of the space, rather than the width to ensure connection to both egress routes. Any egress route requires a minimum headroom of 7'-6".

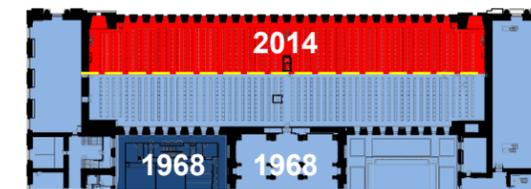
Furthermore, the study recommends creating a 3-hour fire separation between the altered Stacks space and any portion of the building that remains as existing, so that the altered portion of the Stacks can operate independently from a fire separation and egress point of view. Finally, the alterations should be designed to comply with the current (2014) NYC Building Code, similar to the approach taken for the Central Library Plan, pre-determinations notwithstanding.

Existing Circulation

Currently books and other materials are moved between the Milstein Research Stacks, the Rose Main Reading Room and other research spaces in the building via an elevator and a book conveyor within the Stacks space. These circulation routes will need to be maintained in all options.



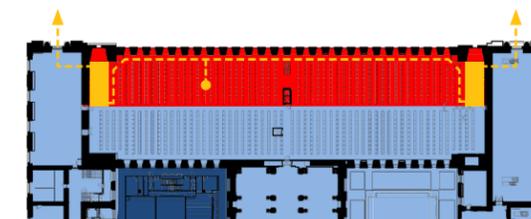
CLP Approach



Current study assumption

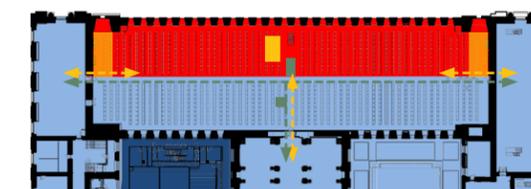
- Original Building (built 1911)
- South Court (built 2002)
- Altered stack space (proposed)

Diagram A. Code strategy - prior proposals and current assumptions



- Proposed egress stair locations
- Egress route

Diagram B. Showing proposed egress strategy for re-purposed Stacks space



- Existing elevator and book conveyor
- Existing book handling circulation routes
- New elevators (locations TBD)
- New circulation to/from/within Stacks

Diagram C. Existing and proposed circulations for re-purposed Stacks space

Small, Medium, and Large Structural Interventions

For the Small Intervention it is envisioned that as much of the original stacks structure as possible will be preserved, with the possibility to create limited spaces for well-conditioned storage spaces or small study, reading and meeting rooms. This allows the identity of the Stacks to remain, while strategically reinforced beams and floors allow for limited load transfers to create small double high rooms within and continue to provide support for the Rose Main Reading Room.

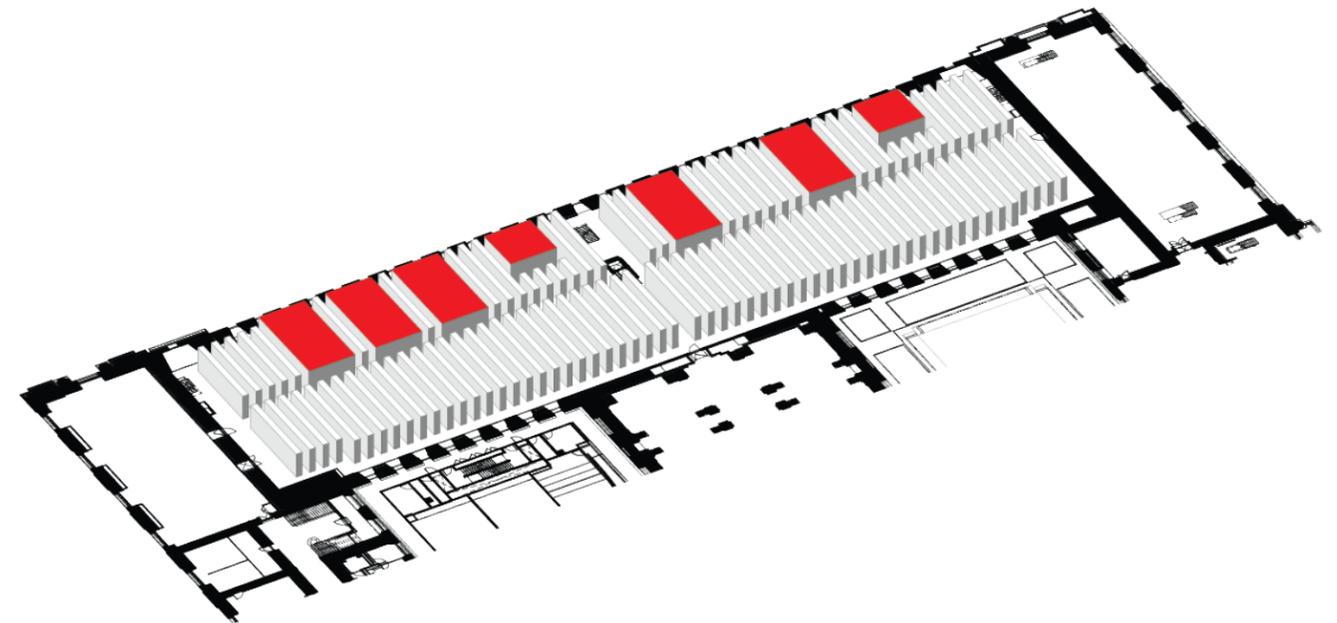
The Medium Intervention entails the removal of parts of the Stacks by replacing its structural elements by new beams and floor. This possibility creates larger rooms suitable for open floor office areas, larger meeting and reading rooms or potential exhibition spaces. This intervention creates a sequence of new and old. The new structural floors create new open areas for multifunctional use, outside of these areas the existing structure will remain and together will support the floor of Rose Main Reading Room.

The Large Intervention is a scenario where the whole Stacks will be removed and replaced by a superstructure that will hold up Rose Main Reading Room. This creates a tabula rasa; the space can be used for multiple new programmatic uses divided into smaller spaces, but also as a large venue space.

Scoping documents for these options were developed, and “core and shell” cost estimates were prepared by the Design Team.

SMALL INTERVENTION

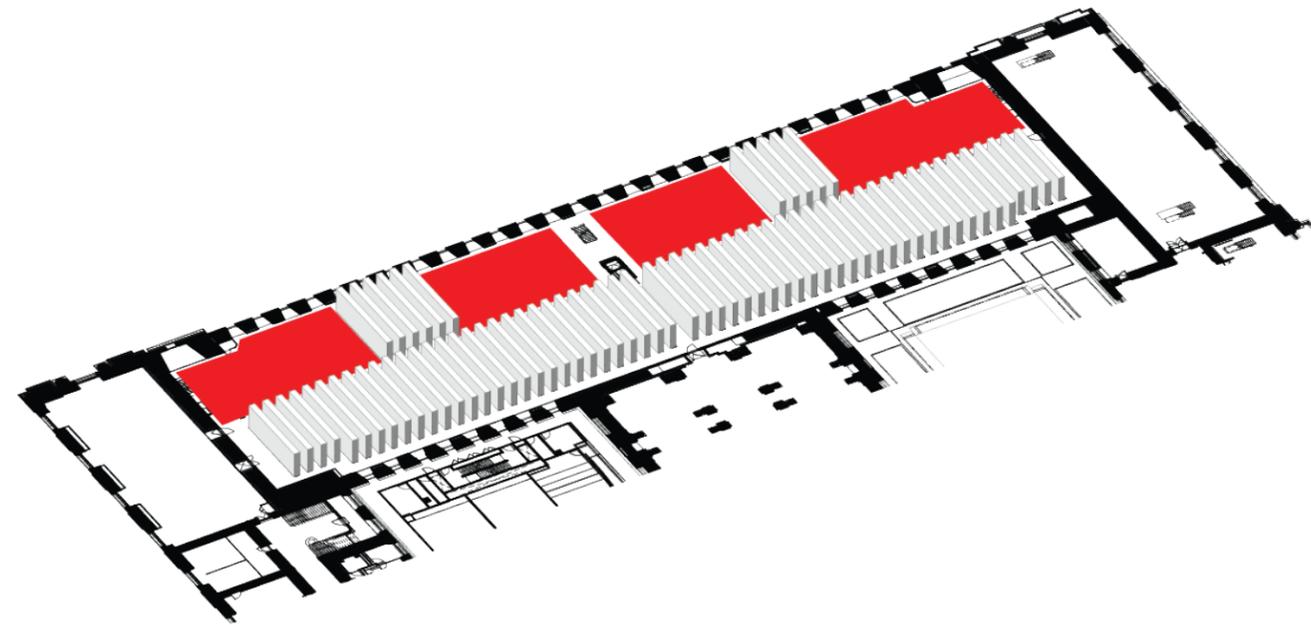
- Reuse as much as possible of the existing Stacks.
- Modify Stacks structure to create new rooms and support Rose Main Reading Room.



- Offices, meetings rooms (18'x 30'), rooms, workspace and study rooms.

MEDIUM INTERVENTION

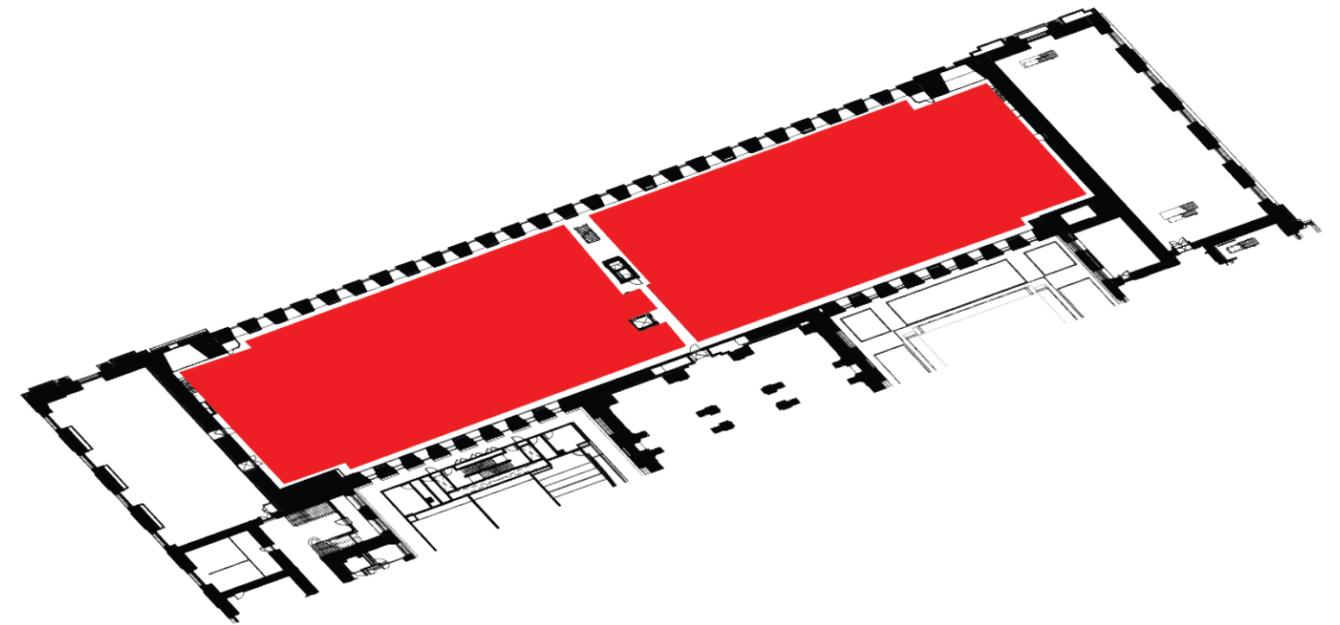
- Partially remove areas of the Stacks and insert new structure.
- New structure and remaining Stacks supports Rose Main Reading Room.



- Open plan office/workspace, meeting rooms (24'x 28'), reading rooms, exhibition space.

LARGE INTERVENTION

- Remove existing Stacks in their entirety.
- New super structure supports Rose Main Reading Room.



- Any program (max 70'x 296')

Structural Strategies

Each level of the Stacks is supported by the level below and on top it holds the floor of the Rose Main Reading Room. The Stacks consist of small beams and columns. Each shelf post contains a small column. The columns are on a typical grid of 3'-2" x 4'-8". Between these columns are small beams that support a structural 1 1/2" marble slab.

The lightweight structural system of the Stacks is an efficient use of material, but it also limits the ability to alter the design and create larger spaces. Different approaches have been considered to create spaces in and around the Stacks. Modifications to the structure are possible but were considered very costly and time consuming. The following modifications to the Stacks were considered:

- Removal of a (row of) columns: to remove an in-between column, the beam on the floor above has to be reinforced to support the load above.
- Remove multiple (rows of) columns: when larger rows of columns are removed, structural beams have to be inserted; the load on the remaining columns will increase and requires reinforcing the vertical columns. Reinforced beams will limit the clear height, thus requiring the removal of a floorslab to create usable spaces. The columns are reinforced to prevent buckling or movement in the joints.

STACKS SYSTEM

Diagram A.

LIBRARY PLANNING, BOOKSTACKS AND SHELVING

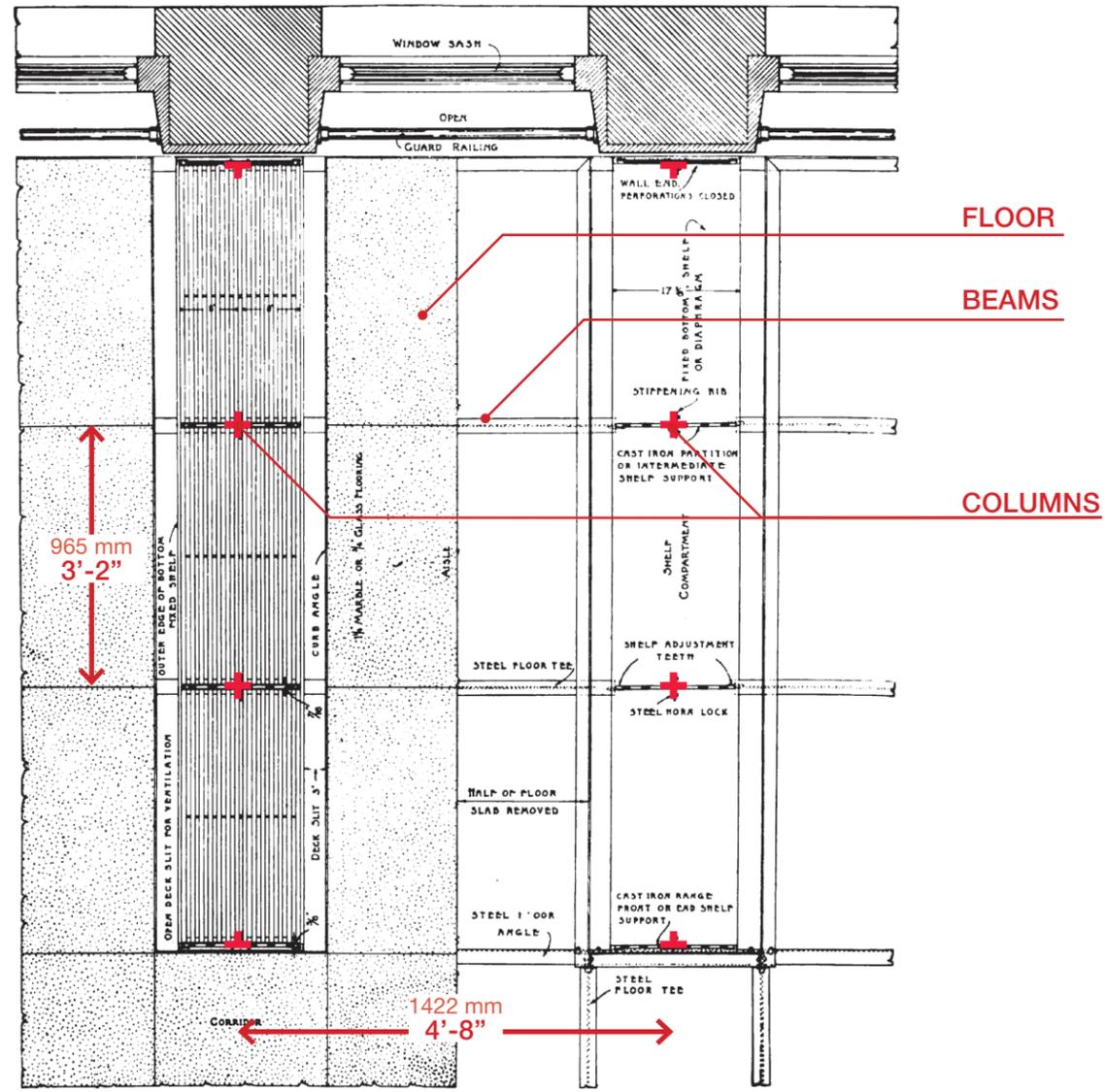


Fig. 13. SECTION THROUGH SNEAD STANDARD STACK SHOWING DECK FLOOR AND PLAN OF TYPICAL 16' RANGES

Diagram B.

THE SNEAD AND COMPANY IRON WORKS, INC.

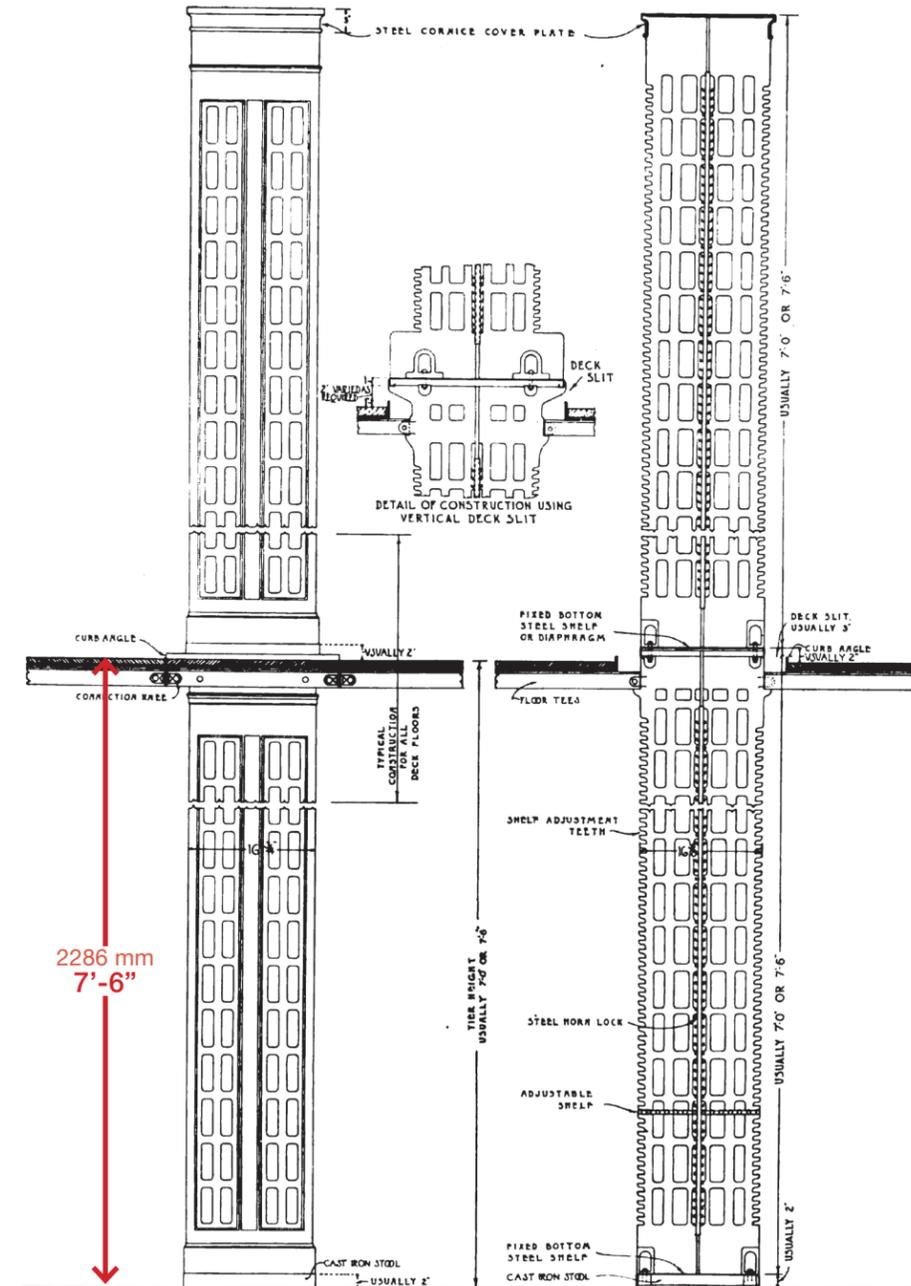


Fig. 14. SECTION THROUGH DECK FLOOR AND TYPICAL 16' RANGES OF SNEAD STANDARD STACK

SMALL STRUCTURAL INTERVENTION

- Selectively remove columns and floor structure
- Insert new beams, or reinforce existing
- Reinforce surrounding columns
- Provide new fire rated floor
- Could be implemented on a floor-by-floor basis

Diagram A. Partial section

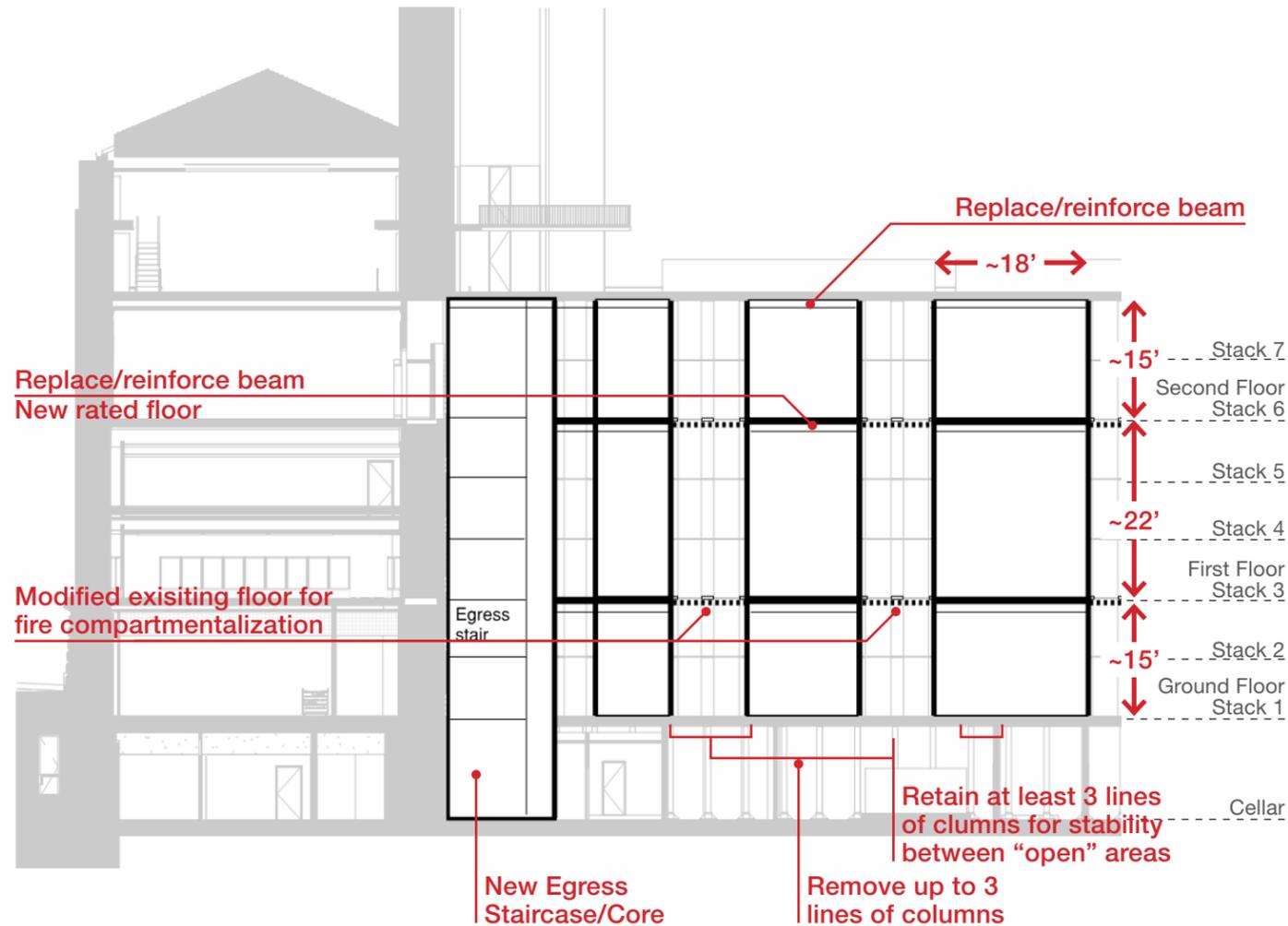


Diagram B. Demolition partial plan

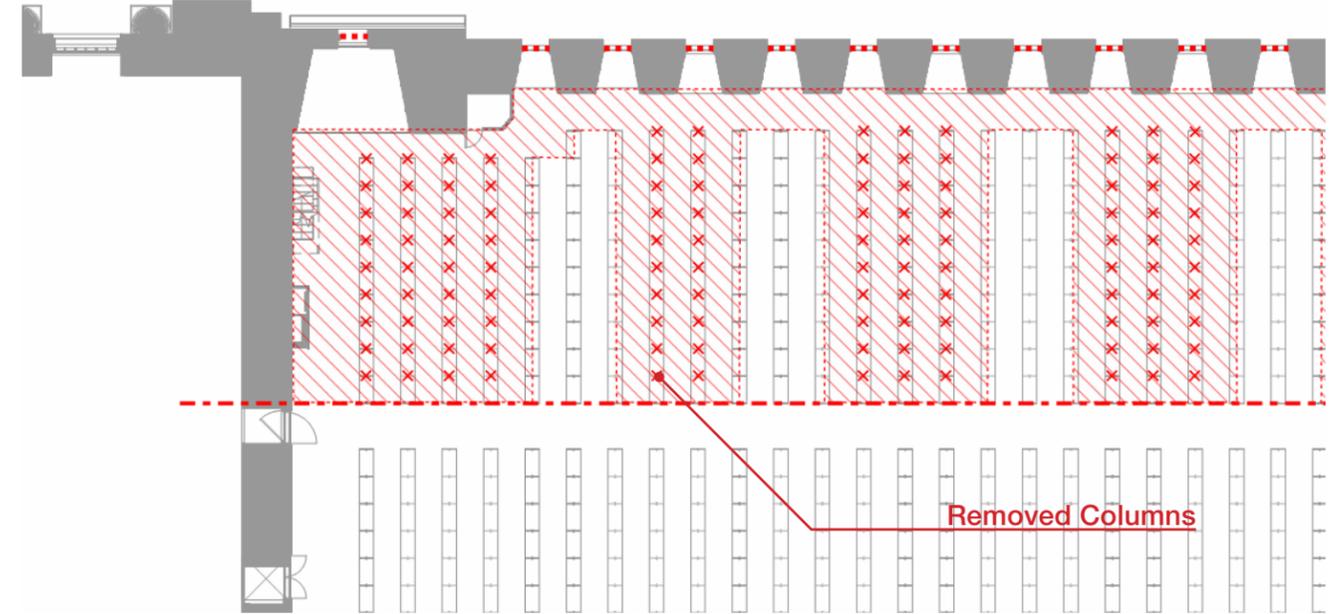
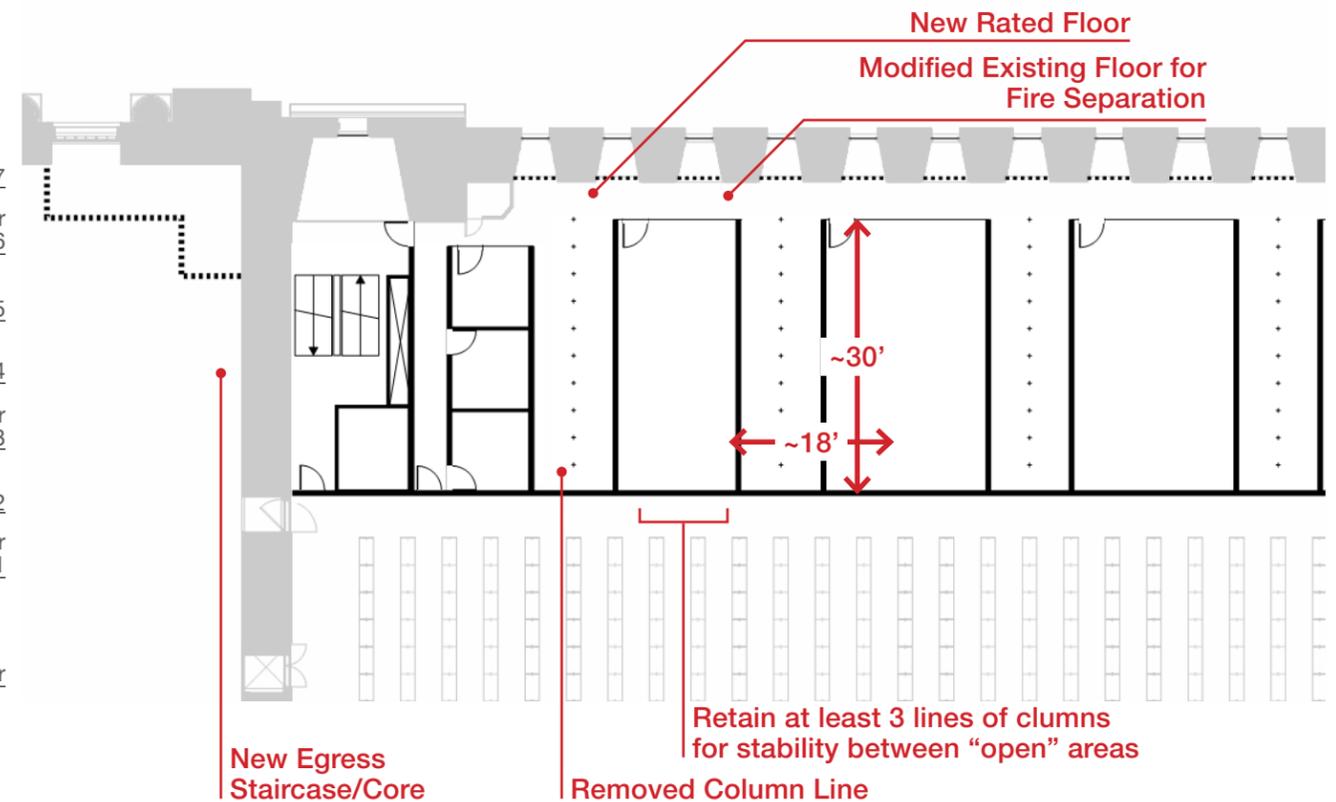


Diagram C. Floor partial plan



MEDIUM STRUCTURAL INTERVENTION

- Remove portions of Stacks structure for full height of volume
- Insert new structure to re-support Rose Main Reading Room, and create new, open floor areas within the Stacks

Diagram A. Partial section

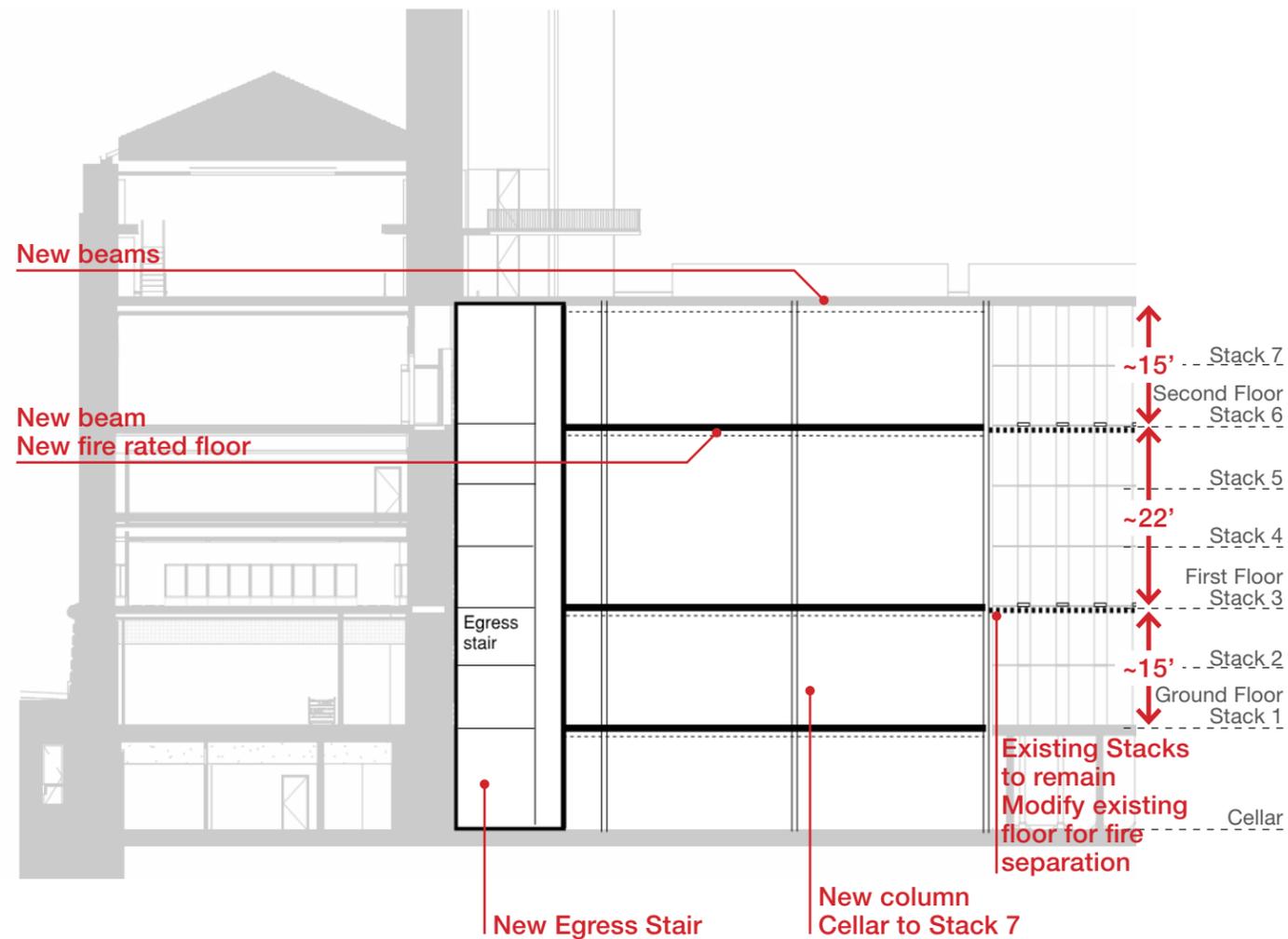


Diagram B. Demolition partial plan

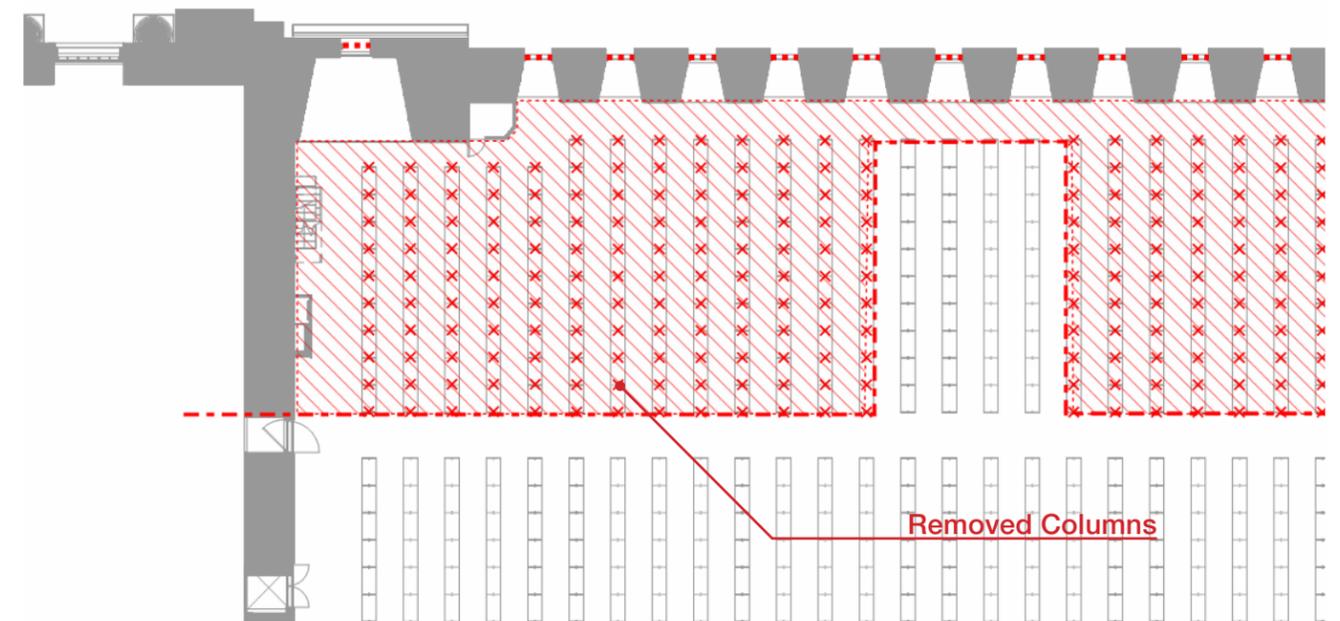
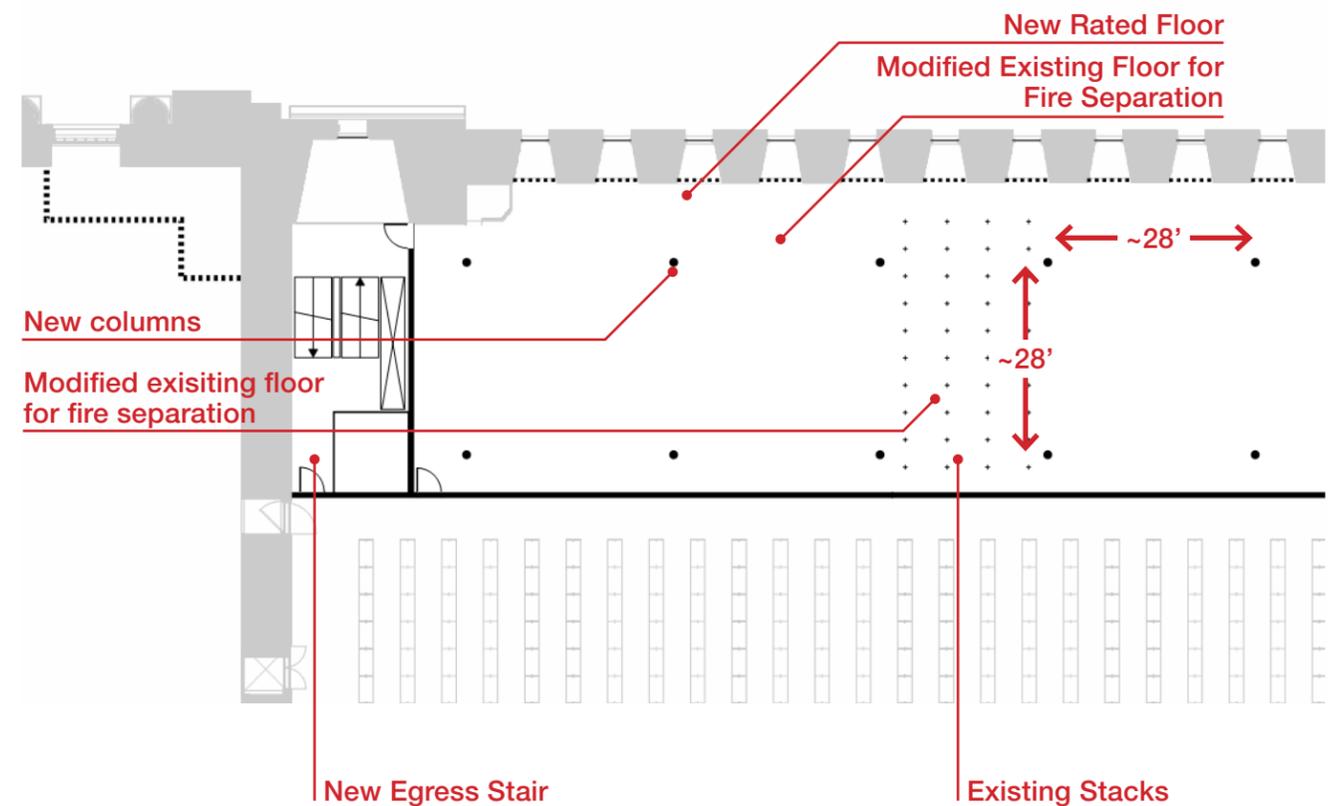


Diagram C. Floor partial plan

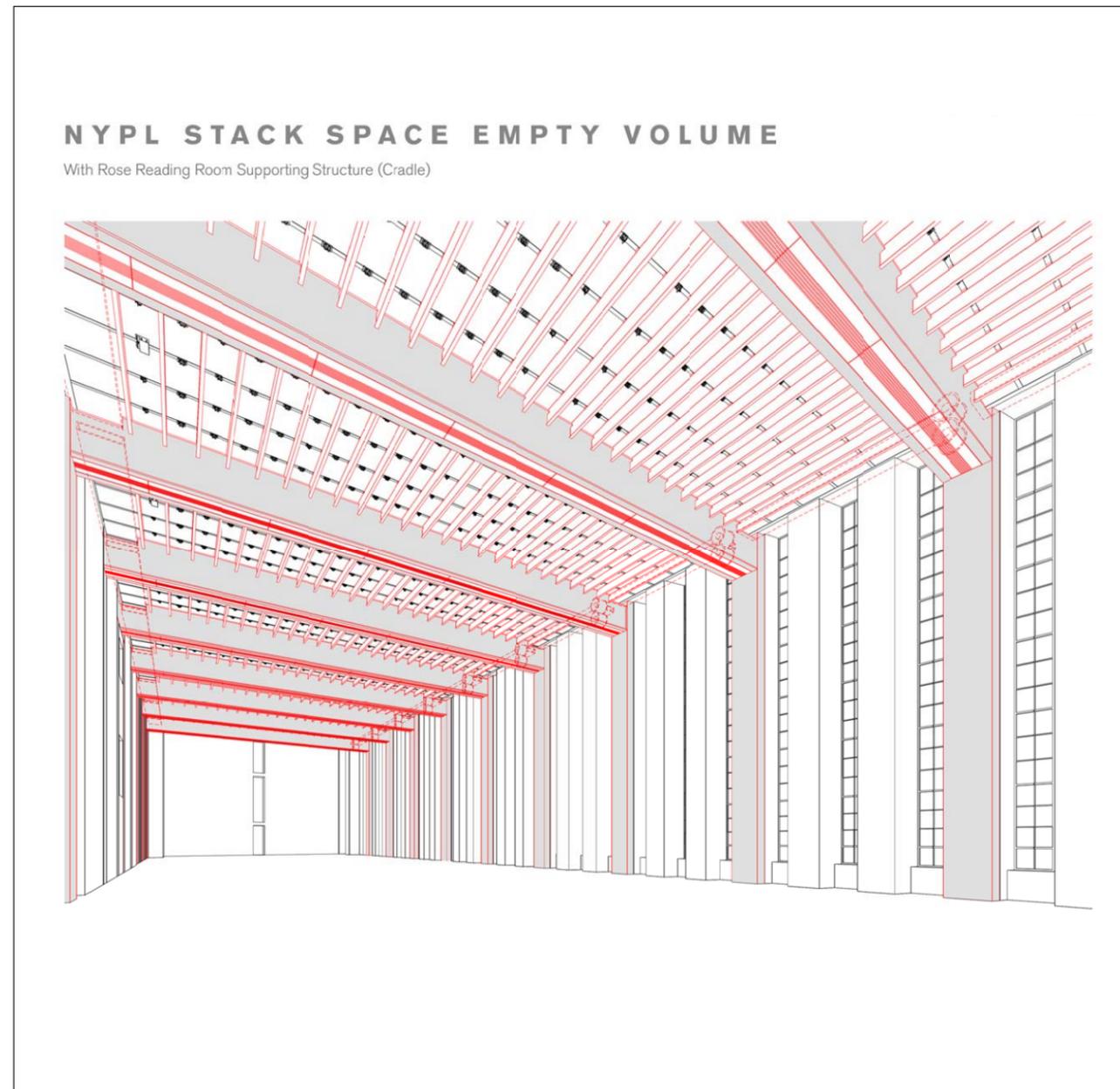


LARGE STRUCTURAL INTERVENTION

Complete Removal of the Stacks

The Central Library Plan proposed the complete removal of the existing Stacks to create a column-free volume spanning the entire length, width and height of the existing Stacks space. This large intervention is a scenario where the whole Stacks will be removed and replaced by a superstructure that will hold up Rose Main Reading Room. This provides the greatest level of flexibility in how the space might be re-used.

The Design Team relied upon studies conducted during the Central Library Plan to evaluate the relative cost of this option.



Slide from Foster + Partners presentation "NYPL Cost Summary - Draft," 26 March 2014, illustrating the Stacks volume with the Stacks removed and the Rose Main Reading Room supported by a structural "cradle".

Summary of Findings

When the three options are compared, it is clear that the SMALL option is very inefficient in spatial terms. There is a large proportion of leftover space between the rooms created within the Stacks, and there is little flexibility in the plan that results from this approach. The MEDIUM option showed significant improvements over the SMALL in terms of flexibility, efficiency and cost of the structural changes. The LARGE option provides the greatest level of flexibility. However, the scope of the LARGE option as presented in this study only includes the removal of the existing Stacks, and not the construction of new floors within the Stacks space.

In terms of cost, to get the most “apples for apples” comparison between the options, only the cost of demolition, structure and fire-proofing were compared since they were available for all options. While these interventions vary in scope and cost, any change in use triggers code-required life safety requirements, including multiple egress stairs, fire protection of the structure, fire separation from adjacent spaces, and increase in headroom. (Without a change in use, these non-compliant issues are “grandfathered” and can remain.) Despite the apparently smaller scope of the limited interventions, their cost was significant, and not demonstrably less than the larger scale scope of structural changes that were part of the Central Library Plan.

	AREA	WIDTH	LENGTH	PROGRAM	STRUCTURE	COSTS*
SMALL Removal of 1-3 column lines on a floor by floor basis	32,000 GSF 14,900 NSF	~18' (free span)	~30'	Offices, meetings rooms (18'x 30'), workspace and study rooms.	<ul style="list-style-type: none"> • New fire rated floors • Structural beams/ reinforcements • Columns reinforcements • 2 Stacks bays remain on either side of an “open” area 	Structural and fire-proofing \$\$\$\$
MEDIUM Partial removal of the Stacks for all floors	32,000 GSF 23,300 NSF	~24' (free span)	~28' (free span)	Open plan office/ workspace, meeting rooms (24'x 28'), reading rooms, exhibition space.	<ul style="list-style-type: none"> • New fire rated floors • New inserted structural beams and columns 	Structural and fire-proofing \$\$
LARGE Complete removal of Stacks	22,800 GSF 22,600 NSF	~296'	~70'	Any program (70'x296')	<ul style="list-style-type: none"> • New “super” columns and beams to support Rose Main Reading Room 	Structural and fire-proofing \$\$\$

Diagram A. * Relative cost of structure and fire-proofing per NSF



5

Solving for Access, Conditions, and Collection Growth

Solving for Access, Conditions and, Collection Growth

The presentation of the SMALL, MEDIUM and LARGE alterations study described in the previous section coincided with the culmination of the NYPL Research Division's assessment of the conditions and capacity of their collections storage spaces. These revealed that the 56 Special Collection storage spaces at the four Research Library locations – SASB, the Schomburg Center for Research in Black Culture, the Library for the Performing Arts (LPA), and the Science Industry and Business Library (SIBL) – were struggling to maintain the appropriate environmental conditions for the proper preservation of collections, and that they were either at or over capacity. Furthermore, the existing General Collection storage spaces in the Milstein Research Stacks and at ReCAP will reach capacity in 2024.

General Collection

- Newest and most used titles
- Primarily book-like materials with standard shelving configuration requirements
- Most-requested titles remain on-site for quick recall
- Older and lesser-used items stored at ReCAP

Special Collection

- Unique and high-value materials, e.g. manuscripts, rare books, photographs
- Require a variety of shelving configurations and stronger security controls
- Some material formats ill-suited for high density storage spaces
- Some materials ideally stored on-site due to their value and fragility

Consequently, this was identified as the key programmatic use for any of the interventions examined. The Design Team and NYPL's Research Collections staff were instructed to closely translate future needs for collections growth and care into an architectural solution for the next decade, and include consideration for needs beyond that timeframe. The spaces considered for a multi-pronged solution included the SASB Stacks, ReCAP and optimization of space within the Milstein Research Stacks under Bryant Park.

Guiding Principles

Three objectives were identified to be addressed in any proposed solution:

- Address existing issues and solve for future needs related to **capacity**
- Improve collections storage **conditions** to preserve collections for future generations
- Ensure **access** to materials for the many patrons who rely on NYPL's research collections

Capacity

NYPL provided the Design Team with data on the overall size, growth and capacity of existing storage spaces for the General Collections expressed in terms of the number of items to be stored, noting that the SIBL programs, services and circulation and reference collection will be relocated to the new Stavros Niarchos Foundation Library, while its research materials would be housed in SASB and at ReCAP.

For Special Collections materials, the Design Team was provided with a detailed inventory of current storage needs expressed in terms of linear feet of storage space required for each type and size of storage solution (shelf, archive box, flat file, etc.). The Design Team consolidated storage types from the 95 types provided into 20 categories, and converted the linear footage measurements to net assignable square footage (NASF) required for storage furniture (i.e., not including circulation space around the furniture) using assumptions vetted by NYPL on the height of storage units (i.e., no unit should be taller than 8 feet). NYPL had already accounted for the extra space required to “un-pack” the materials from their current, over-crowded conditions, and factors for safe handling space and growth were agreed on and applied. Assuming compact shelving is used, a factor of 1.5 to 1.75 was applied to the NASF to give a Net Usable Square Footage for the storage room required. In both cases, the growth of the collection was initially projected out to 2050 to represent a thirty-year collections growth plan.

Conditions

A large majority of the Special Collections storage rooms are impacted by poor environmental conditions. Contributing factors are aging HVAC equipment; risk

of water infiltration; and poor performance of the building envelope in mitigating fluctuations in temperature and humidity, particularly in older buildings. In addition, many collections are stored in spaces shared with staff or researchers. Human comfort requires temperatures less suited to collections storage, and the co-location of people with collection materials increases the risk of accidental damage to the collections, or theft.

Several collections are deemed to be particularly at risk:

- Collections at the Library for the Performing Arts Rose Building (a satellite storage space across the street from LPA) are scheduled to be moved out and the space will no longer be used for collections storage.
- Archival boxes at the LPA do not have appropriate storage space.
- Fine Art materials at the LPA and SASB do not have appropriate storage space.
- Valuable and fragile Special Collections materials on the First, Second and Third Floors at SASB are over-crowded and improperly stored.

The Milstein Research Stacks provide a considerably more stable environment for collections storage, and ReCAP provides the best performing environment of all the storage spaces used by NYPL.

Access

NYPL is committed to accommodating the majority of requests for collection materials same day, and all others within 18 hours depending on the day of request. As such, it holds sufficient collection materials on site to fulfill these requests. At present, for General Collections in SASB, this means holding 3.9 million items in the Milstein Research Stacks, and 200,000 items throughout the building to ensure that the most frequently requested items are kept close at hand.

For the Special Collections, fragile and/or valuable items are at the greatest risk of damage or loss when in transit. Preservation, security and access needs must be carefully balanced.

Storage Systems

The Design Team assessed a range of storage systems for their suitability to be used in the renovated Stacks. While fully automated systems offer slightly higher storage capacity, it was determined that a manual, compact shelving solution would give the best balance of efficiency, reliability and future flexibility.

				
	STANDARD SHELVING Fixed (mounted) shelves. Items stored directly on the shelves or in storage boxes. Storage heights are usually not higher than one floor	COMPACT SHELVING Movable shelving with better use of circulation space. Items are stored directly on the shelves or in storage boxes. Storage heights are usually not higher than one floor	ReCAP MODEL Fixed Mounted High shelves. Items are stored in boxes. Items need to be manually picked with a person in a movable lift.	AUTOMATED STORAGE AND RETRIEVAL SYSTEM (ASRS) Fixed Mounted High shelves. Items are stored in boxes (potentially in multiple rows). Items are picked by an automated machine.
Collection type supported	General Collections (not large books)	General Collections & Special Collections	General Collections & Special Collections (archival)	General Collections
Future flexibility	Low	High	Low	Low
Cost/maintenance	\$	\$\$	\$\$\$	\$\$\$\$
Proven performance	High	High	High	Low

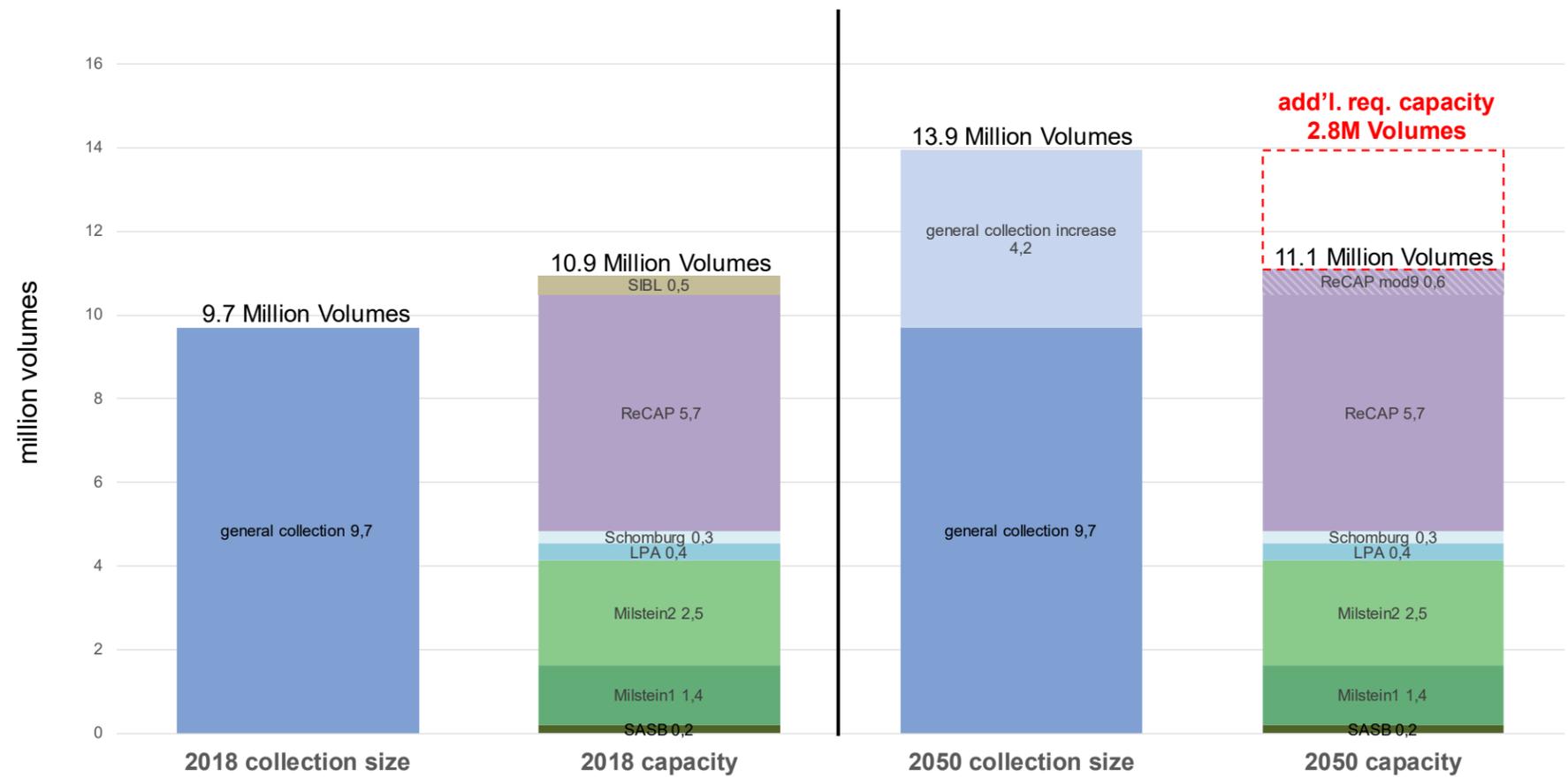
Diagram A. Assessment of potential storage types for use in the renovated SASB Stacks

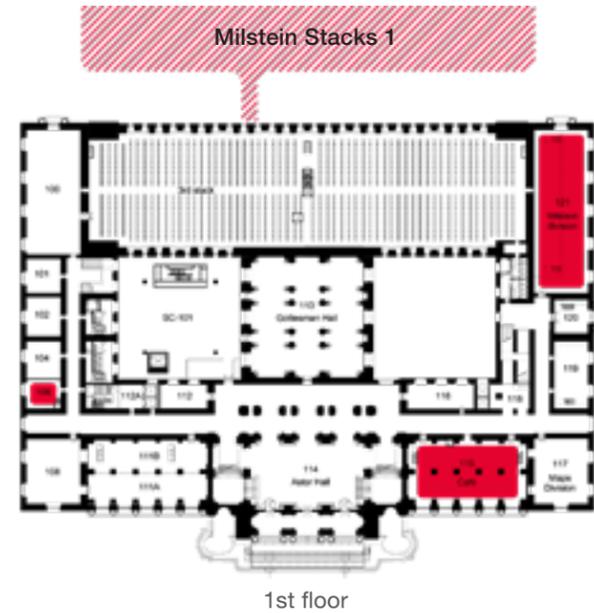
General and Special Collections Capacity and Space Needs Analysis

NYPL's research collection materials consists of General and Special Collections. In order to understand what the potential capacity challenges are in the future, the Design Team and the Collections staff conducted an analysis of collections capacity and space needs across the four research libraries. Below is an overview of the differences between the two collections, the current available capacity, and current and future needs.

GENERAL COLLECTIONS ANALYSIS

- Primarily published book-like materials including serials
- Require stable environmental conditions based on library standards
- Most-requested titles remain on-site for quick recall
- Older and lesser-used items stored at ReCAP and shared with partners
- Growth in print collections is anticipated to slow over the next 10-25 years
- General Collection annual growth is predicted to be steady (150k-160k items per year) until 2024, and then gradually decrease by approximately 4.22% annually until growth is halved by 2050





SPECIAL COLLECTIONS ANALYSIS

- Unique and high-value materials, e.g. manuscripts, rare books, prints, and photographs
- Require stable environmental conditions based on library standards
- Require more stringent security controls
- Many formats should remain on-site due to value, fragility, and inefficiencies transporting back and forth to ReCAP
- Growth of these collections fluctuates from year to year
- Special Collection annual growth is predicted to be approximately 3% through 2050
- Special Collections in SASB are in under-performing environmental conditions (temperature and humidity). LPA, LPA Rose, and Schomburg have similar issues

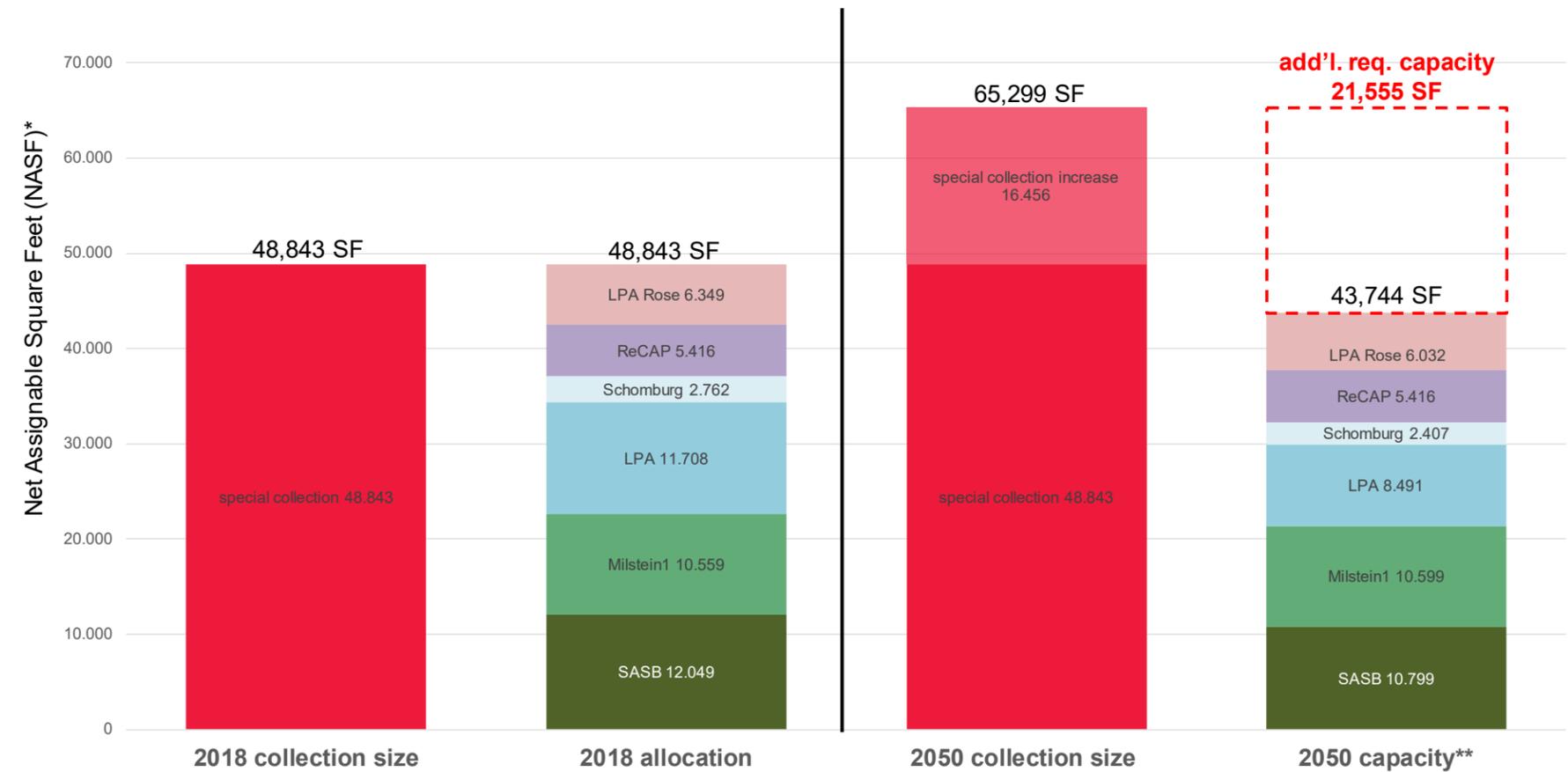


Diagram A.

* does not include circulation space

** 2050 capacity adjusted to relieve overcrowding of storage space

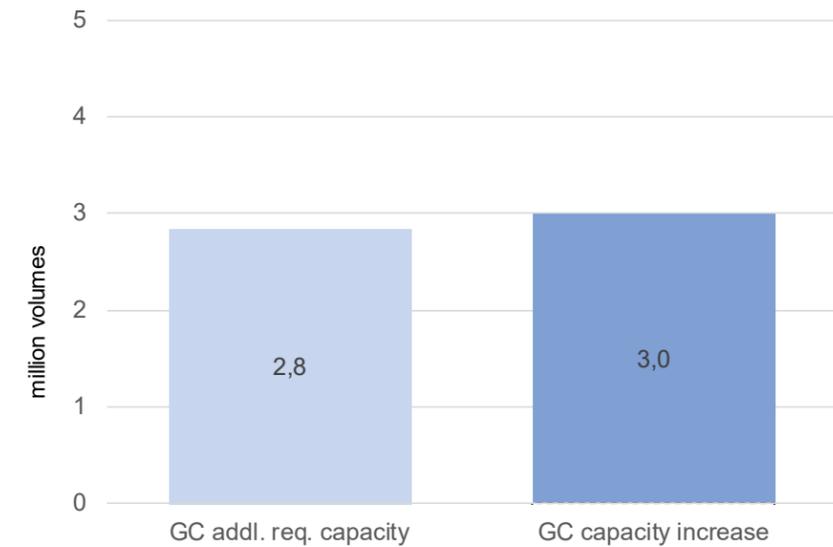
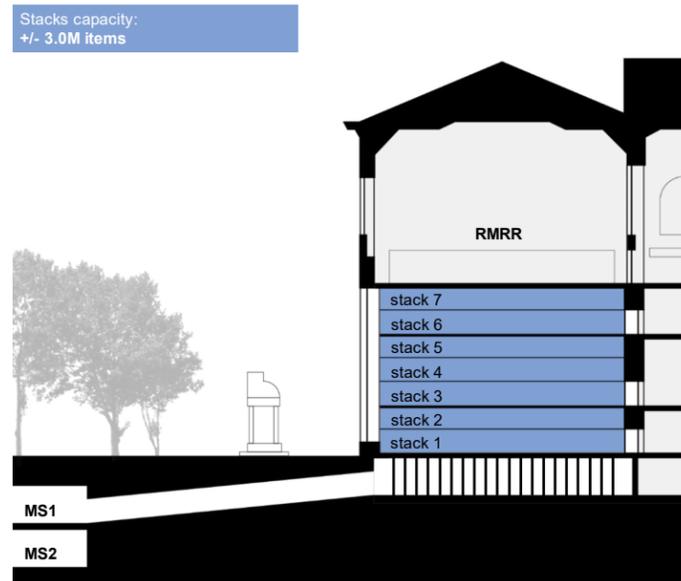
Potential Solutions

The Design Team explored several scenarios at a high level, involving re-using the SASB Stacks space, re-assigning portions of the Milstein Research Stacks, and/or building a new storage module (Mod 10) at ReCAP. Scenarios have first been laid out just for General Collections, then Special Collections and 2 scenarios for a combined solution. Solutions studied for the Stacks included either renovation of the current structure, introduction of a fully automated storage system, or new floors with compact storage, as appropriate for the materials to be stored there.

GENERAL COLLECTION SCENARIO 1: UPGRADE SNEAD STACKS (2013 STUDY)

Considerations:

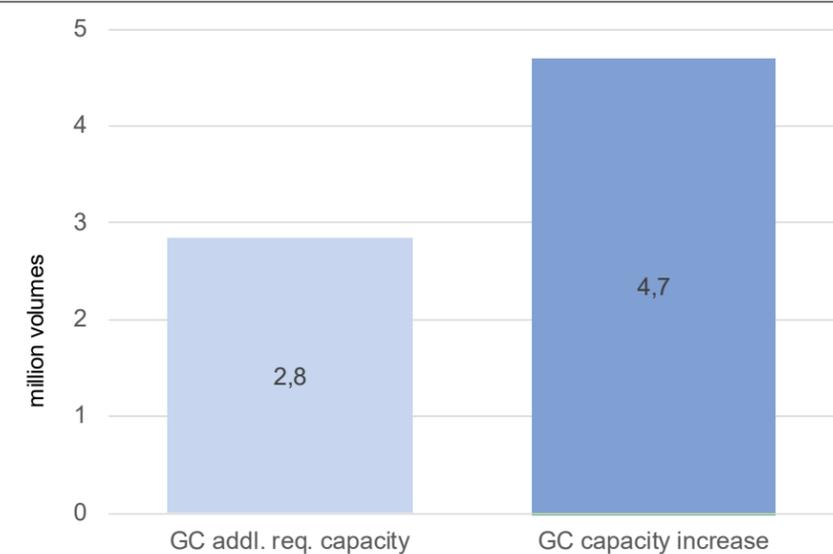
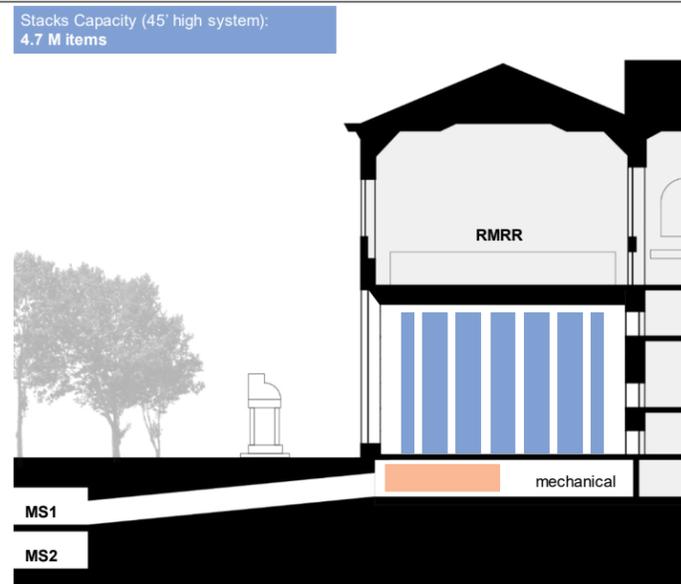
- Improves on-site storage capacity
- Retains historic use
- Stacks do not provide storage for oversize books
- No flexibility for future or alternative uses
- Cost \$\$



GENERAL COLLECTION SCENARIO 2: HIGH DENSITY STORAGE (2013 STUDY)

Considerations:

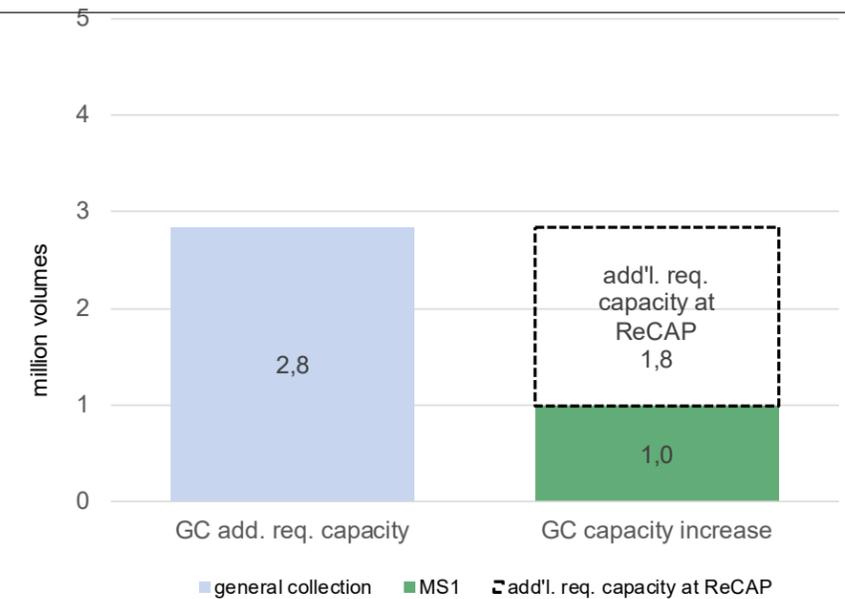
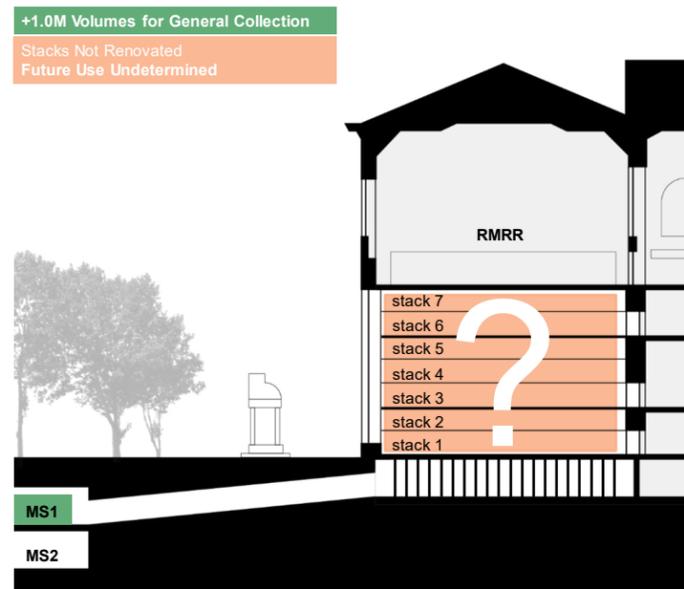
- Improves on-site storage capacity
- Provides large volume of space, but requires “Large” structural modification
- Maintenance costs associated with automated systems
- use is limited to storage; structural concept allows for flexible use in the future
- Cost \$\$\$ (excluding storage system)



GENERAL COLLECTION SCENARIO 3: UPGRADE MILSTEIN 1, THEN BUILD RECAP MOD 10

Considerations:

- Provides General Collection storage up to +/- 2034
- Allows time to continue conversation with ReCAP partners on Mod 10
- Milstein 1 General Collection could become part of ReCAP exchange program
- Requires moving Special Collections from Milstein 1
- Cost \$ + \$ (M1 + ReCAP)



RECAP MOD 10

Pros

- Could solve the projected 2.8 million volume gap in General Collections storage
- Cost-effective storage and delivery solution for less frequently requested material
- Provides strongest preservation environment
- Supports long-term storage and access for less frequently used archival collections (a large portion of the Special Collections storage needs and projected growth)
- General Collection materials can be shared directly with partners
- Digital scanning from the collections further expedites access
- Construction could occur more quickly than the renovation of Stacks
- Could provide storage for a large portion of the LPA Rose Building collection

Cons

- Does not address storage needs for high-value, or fragile Special Collections, e.g., manuscripts, prints, photographs
- Does not address the need to move Special Collections from suboptimal and out-of-date storage rooms in SASB or LPA
- Does not solve the projected growth of all Special Collections
- Potentially longer wait time for delivery of materials

Issues

- Uncertainties about partner needs and timeline for Mod 10
- Potential land issues (more info forthcoming)

Strategy for upgrading the SASB Stacks

- Replace existing Stacks with new structure to create **50,974 NUSF**, similar to "Large intervention" but with intermediate columns supporting new floors and Rose Main Reading Room above.
- Accommodate all SASB Special Collections with growth to 2050, overflow from at- and over-capacity Special Collections storage rooms at LPA & Schomburg with **49,124 NUSF**
- Opportunity to program **1,850 NUSF** remaining



Diagram A. Special Collections: future size and storage capacity

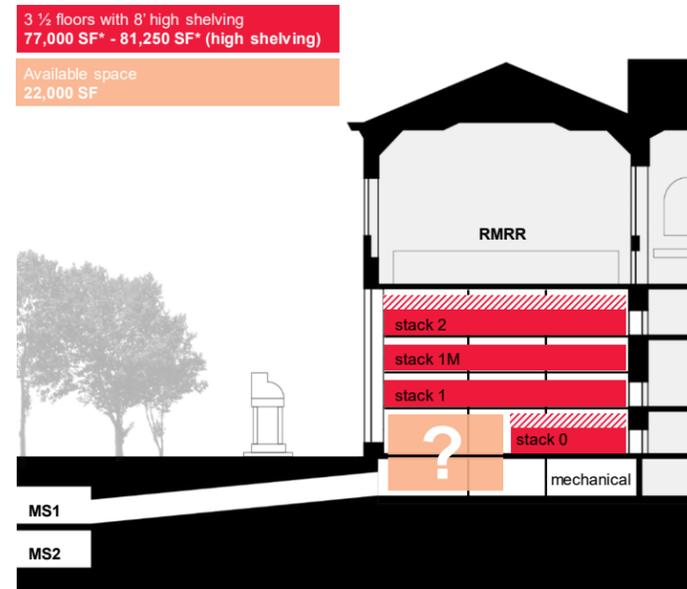
* Includes circulation and non-assignable square feet (NASF to NUSF ratio = 1.65) Total net height of 96" is assumed for compact shelving. Additional bottom and top base of 6" each is assumed.

** unstuffing LPA & Schomburg Special Collections is not included

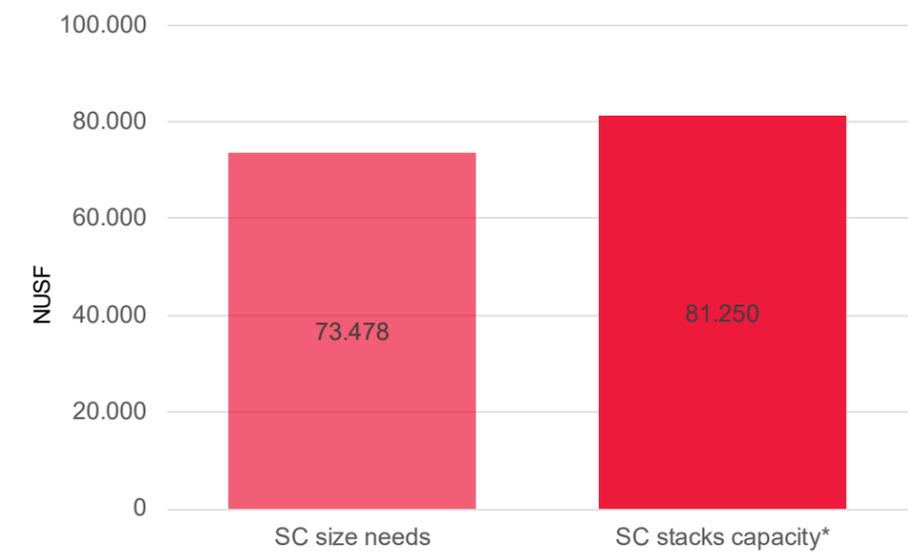
SPECIAL COLLECTIONS: SCENARIO 1

Considerations:

- Solves all Special Collections growth in new SASB Stacks
- Alleviates over-filled Special Collections shelving in the research libraries; moves collections in LPA Rose to new SASB Stacks
- Moves all SASB Special Collections (including Milstein 1) to new SASB Stacks
- Flexibility and space available for other uses
- Cost \$\$\$\$



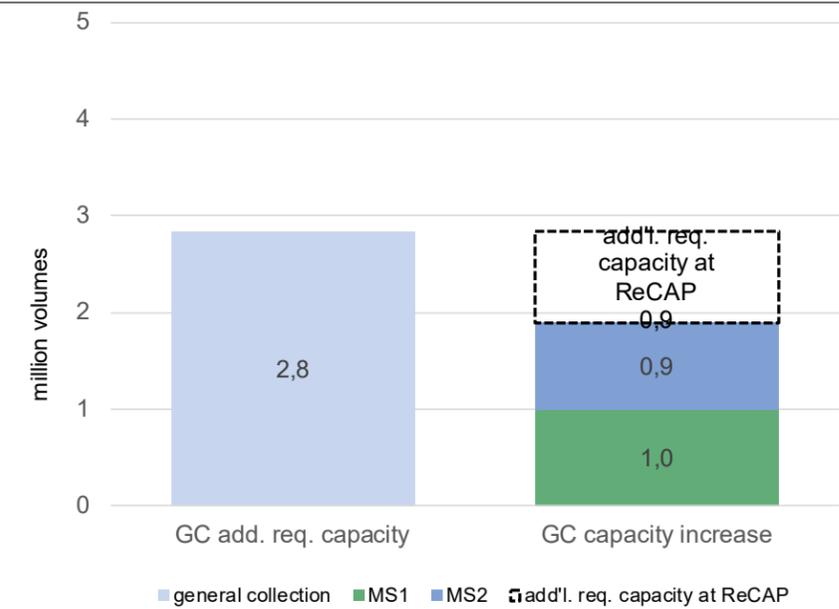
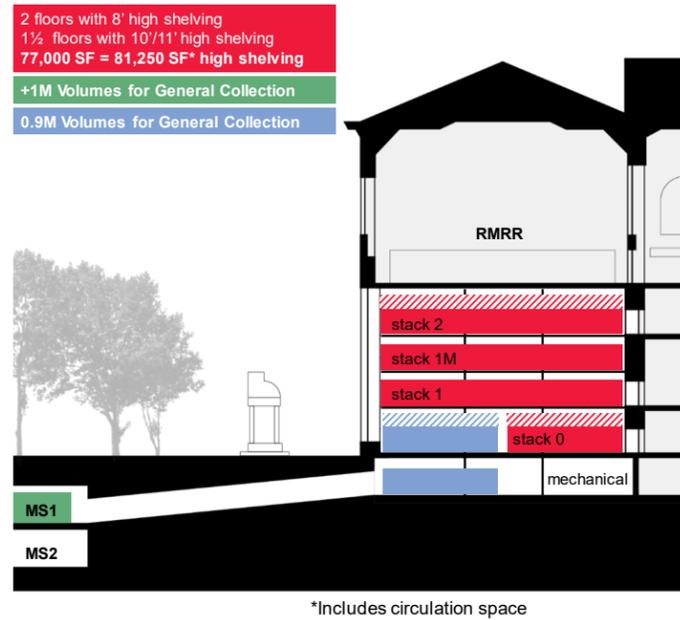
*Includes circulation space



COMBINED COLLECTIONS: SCENARIO 1

Considerations:

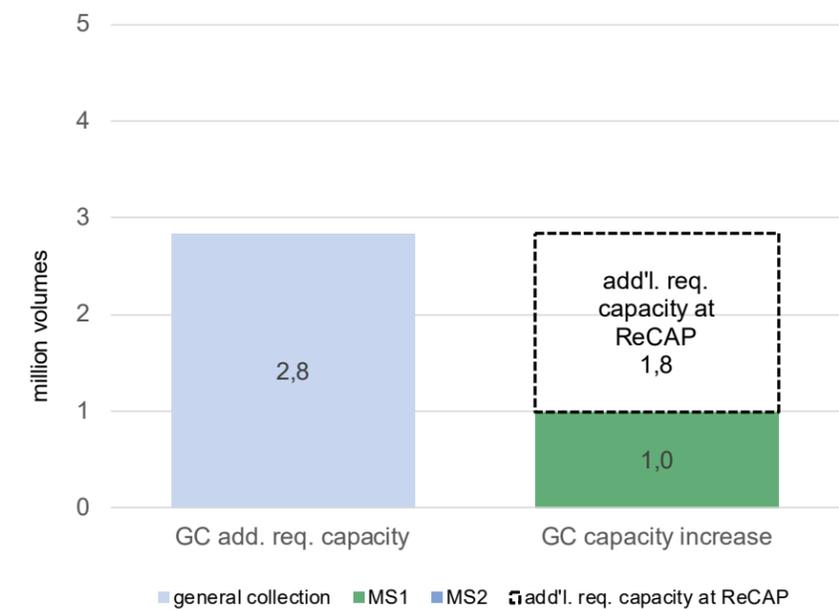
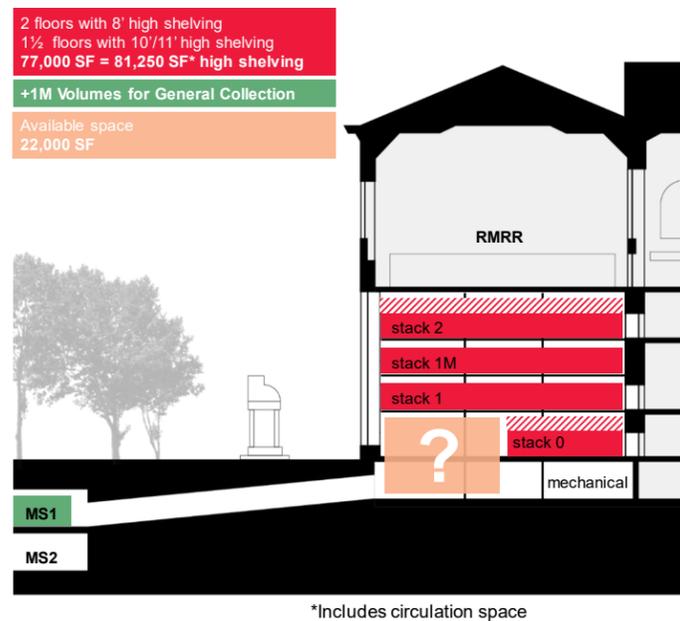
- Special collections Scenario 1, and use remaining space in the SASB Stacks for General Collections
- Upgrade Milstein 1
- Provides Special Collections storage up to 2050
- Provides General Collections storage up to +/- 2042
- ReCAP MOD10
- Cost \$\$\$\$\$+\$ (Stacks + M1 + ReCAP)



COMBINED COLLECTIONS: SCENARIO 2

Considerations:

- Special collections Scenario 1, and use remaining space in the SASB Stacks for General Collections
- Upgrade Milstein 1
- Provides Special Collections storage up to 2050
- Provides General Collections storage up to +/- 2034
- ReCAP MOD10
- 22,000 SF space available for other uses
- Cost \$\$\$\$\$+\$ (Stacks + M1 + ReCAP)



Feedback and Next Steps

Initial Findings

Review of the scenarios revealed that a combined approach to solving both General and Special Collections needs across multiple sites offered the greatest potential to solve for collections access, conditions and growth. The Design Team was advised by the Trustee Working Group to explore a sequential solution that

1. Protected collections that are immediately at risk
2. Upgraded Milstein Level 1
3. Expanded ReCAP with Mod10 build out
4. Upgraded the SASB Stacks

Cost estimates were to be developed for each of these solutions.

OVERVIEW OF SOLUTIONS	
Short-Term Solutions	Secure collections with most immediate risks through limited upgrade of LPA Stacks and relocation of LPA Rose collections to LPA Stacks, ReCAP, and using offsite storage as necessary.
Milstein 1 Upgrade	Improve preservation environment for at-risk Special Collections at SASB and preserve access to General Collections through a phased renovation of Milstein 1
ReCAP Mod 10	Increase storage for General Collections & Special Collections by 6-9 years through build out of Mod 10, and explore opportunities for future growth at ReCAP.
SASB Stacks Replacement	Accommodate all SASB Special Collections including growth to 2050, unstuff at- or over-capacity Special Collection storage rooms at LPA & Schomburg by creating new structure in Stacks.
SASB Stacks Upgrade	Renovation of the existing Stacks. Move General Collections into the renovated Stacks and move Special Collections into retrofitted Milstein 1.



6

Near, Medium, and Long Term Collection Solutions

Near, Medium, and Long Term Collection Solutions

Following the Trustee Working Group's guidance, the Design Team advanced the stacks study by scoping and estimating upgrades to Milstein Level 1, and by developing a design concept and cost estimate for a Special Collections Vault in the SASB Stacks space. The previous study by EYP Architecture & Engineering (EYP) to retrofit the existing Snead Stacks, suitable for housing General Collections, was reviewed for comparison.

Meanwhile, the NYPL Research Division scoped and estimated a series of projects to address at-risk collections in the immediate term, and continued to liaise with their partners at ReCAP to refine their understanding of the feasibility of expansion there.

During this time, the Design Team also charted out the potential impact of these projects on storage capacity compared to collection size and growth on an annual basis through 2050.

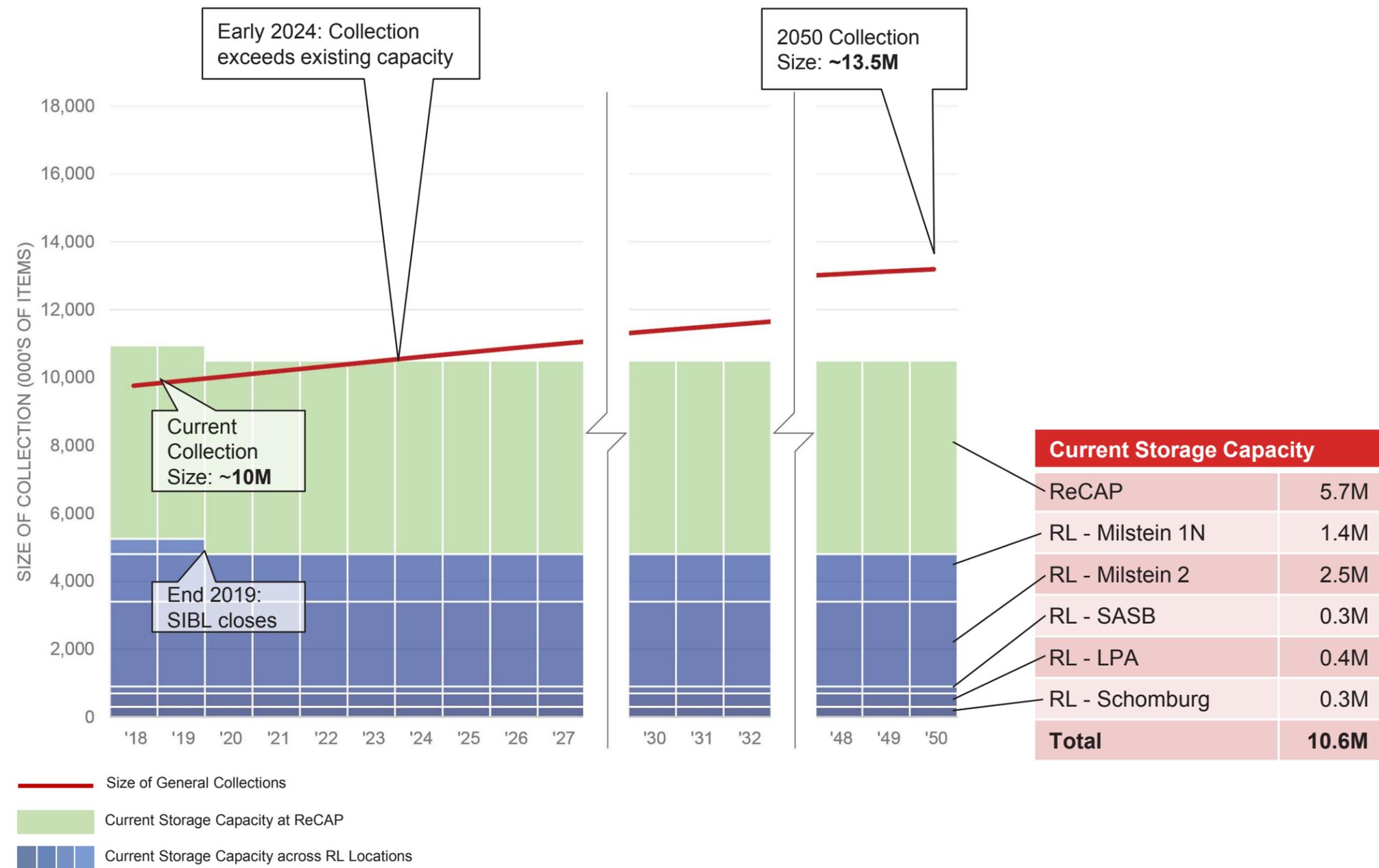


Diagram A. Current storage capacity and projected growth for General Collections
RL = Research Library

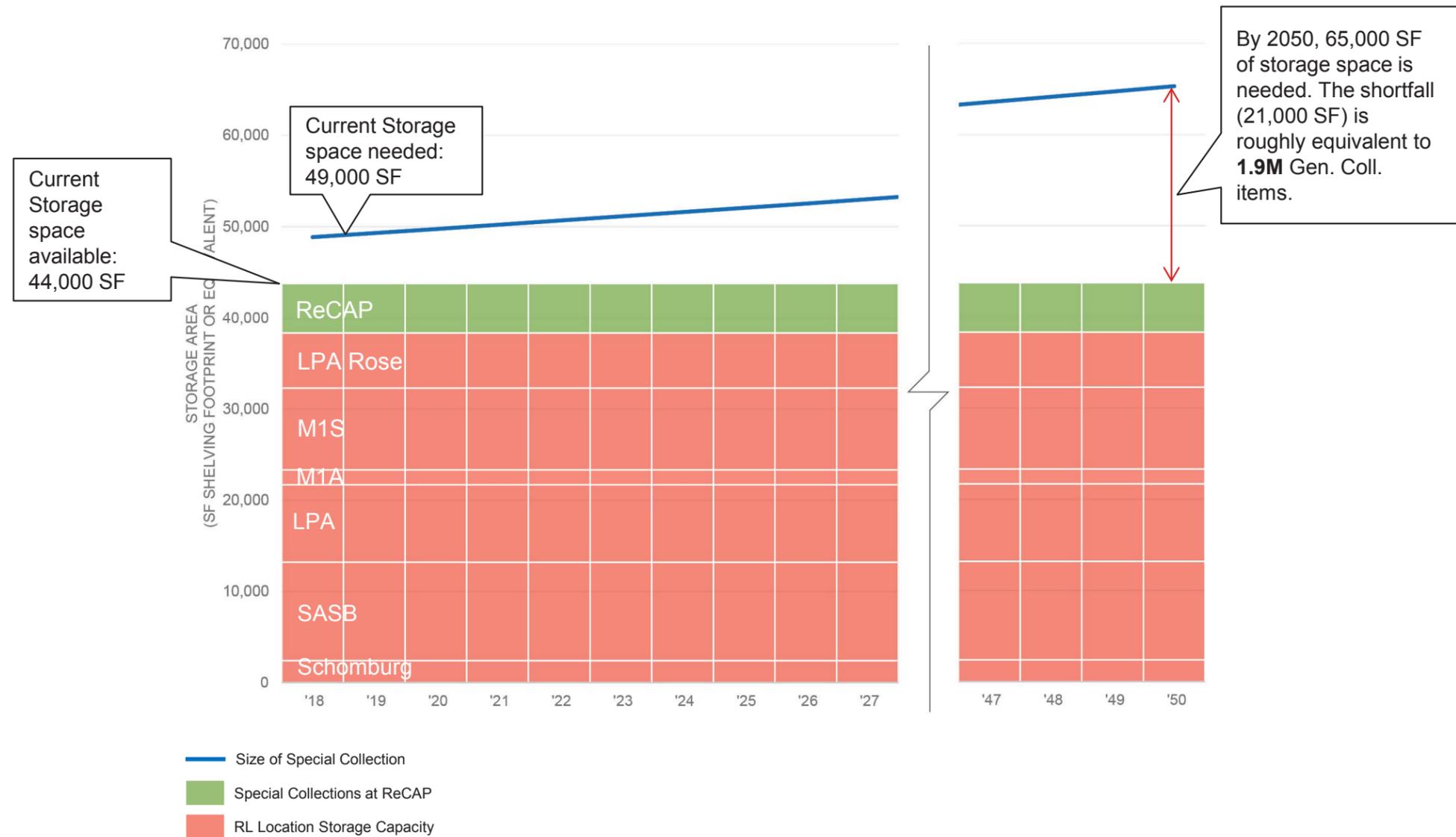


Diagram A. Current storage capacity and projected growth for Special Collections.
 RL = Research Library

Near Term Solutions for “At Risk” Collections

Affecting primarily Special Collections, four projects were identified to serve the needs of “at risk” collections. NYPL will:

- Complete a limited retrofit of the LPA Stacks to accommodate the most at-risk Special Collections materials at that location this year.
- Relocate collections currently stored at the LPA Rose Building to ReCAP and the LPA Stacks, using temporary off-site storage if necessary, over the next three years.
- Relocate fine art materials at LPA and SASB to specialized off-site storage facility for stabilization and improved inventory control over the next two years.
- Upgrade Room M1A in the Milstein Research Stacks, including installation of compact shelving, and relocate some of the most at-risk materials currently stored in SASB, which is described in more detail below.

The measures described above will mostly address the shortfall in storage capacity for Special Collections up to 2022, but not entirely. Beyond 2022, the collection will continue to grow and will place a burden on other storage spaces. In this study, it is assumed that ReCAP will absorb the overflow.

Milstein Level 1 Upgrades

The Milstein Research Stacks were constructed and opened in 1991. At that time, only the upper level (Level 1) was occupied, and it was equipped with motorized compact shelving. It houses both General Collections (in M1N, and Special Collections (in M1S), both in the compact shelving; and a mix of General and Special Collections materials of various sizes and formats in fixed storage furniture.

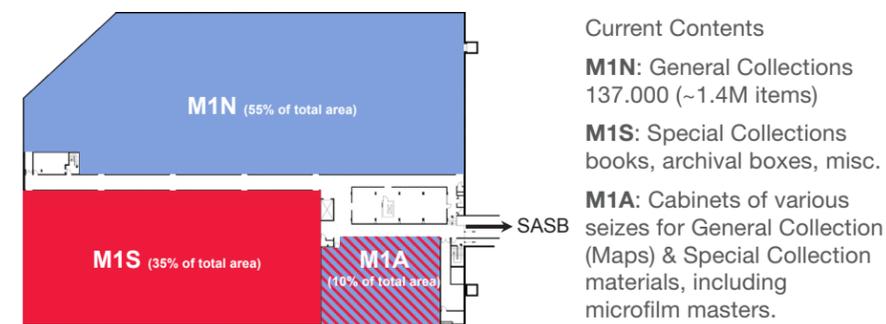


Diagram A. Plan of Milstein Research Stacks Level 1

In 2013, the electronics controlling the motors in the compact shelving were replaced. At this time, NYPL entered into a maintenance agreement with Modern Office Systems (a shelving system vendor) to service the system for 22 years.

In 2016, Level 2 was fit out and the HVAC system for Level 1 was upgraded at this time. On Level 2, to minimize future maintenance burdens, manually

operated compact shelving was installed. This shelving also differs from that on Level 1 in that it is deeper and holds trays of books, similar to the high-density system used at ReCAP. Work on Level 2 also included waterproof grout injection at the perimeter of the structure to solve infiltration issues at that level.

The Design Team worked with Modern Office Systems to scope out the replacement of all shelving on Milstein Level 1 with a similar system to that used on Level 2, which would also allow for more efficient retrieval and replacement of items on the shelves, since only one system would be used across the system. Based on information on the collections supplied by NYPL, Modern Office developed shelving layouts to test capacity and estimate the cost of replacement shelving.

The Design Team also developed scoping documents to estimate the removal of existing VCT flooring on a plywood sub-floor for replacement with a sealed concrete floor to mitigate the collection of dust and creation of a habitat for pests; replacement of fluorescent lighting with more efficient LED lighting; and waterproof grout injection at the perimeter similar to what was done on Level 2.

While the new shelving system provides modest gains in capacity in M1N & M1S, it provides a significant increase in capacity in M1A. Renovating M1A will enable NYPL to consolidate at-risk collections currently stored across multiple rooms in SASB in an environment with significantly better conditions for preservation.

At this time, upgrading the shelving in M1S and M1N is not critical, but should be planned for as the maintenance agreement approaches its expiration date.

Mid-Term Solutions — Safeguarding the Collections to 2030

Currently, the General Collection includes 10 million items. At the end of 2019, there will be storage capacity across the system for 10.6 million items. The collection will continue to grow, and capacity is expected to be reached in 2024, which can be seen on the graph above.

When the needs of the Special Collections are added to those of the General Collections, capacity will be reached sooner.

NYPL, along with its partners, will continue to pursue an expansion of the ReCAP facility through the buildout of Mod 10. Currently, there are two options being considered: Option 1 proposes to build Mod 10 using the same storage system as employed in the existing modules. This will yield storage space for approximately 1.35 million items for NYPL (assuming NYPL purchases a 25% share of the capacity of the module, as one of four institutional partners in ReCAP). Option 2 uses an Automated Shelving Retrieval System (ASRS), which yields storage space for approximately 2.5 million items for NYPL; however, this option would require a zoning variance since the ASRS requires more height. The operation and maintenance burden for Option 2 is expected to be higher than Option 1.

Both options are expected to be completed by 2024. Option 1 would provide adequate capacity to 2026, with the ability to borrow aisles from partners thereafter. Option 2 would provide adequate capacity to 2033. In both cases, aisles can be borrowed from partners to cover shortfalls before construction is complete.

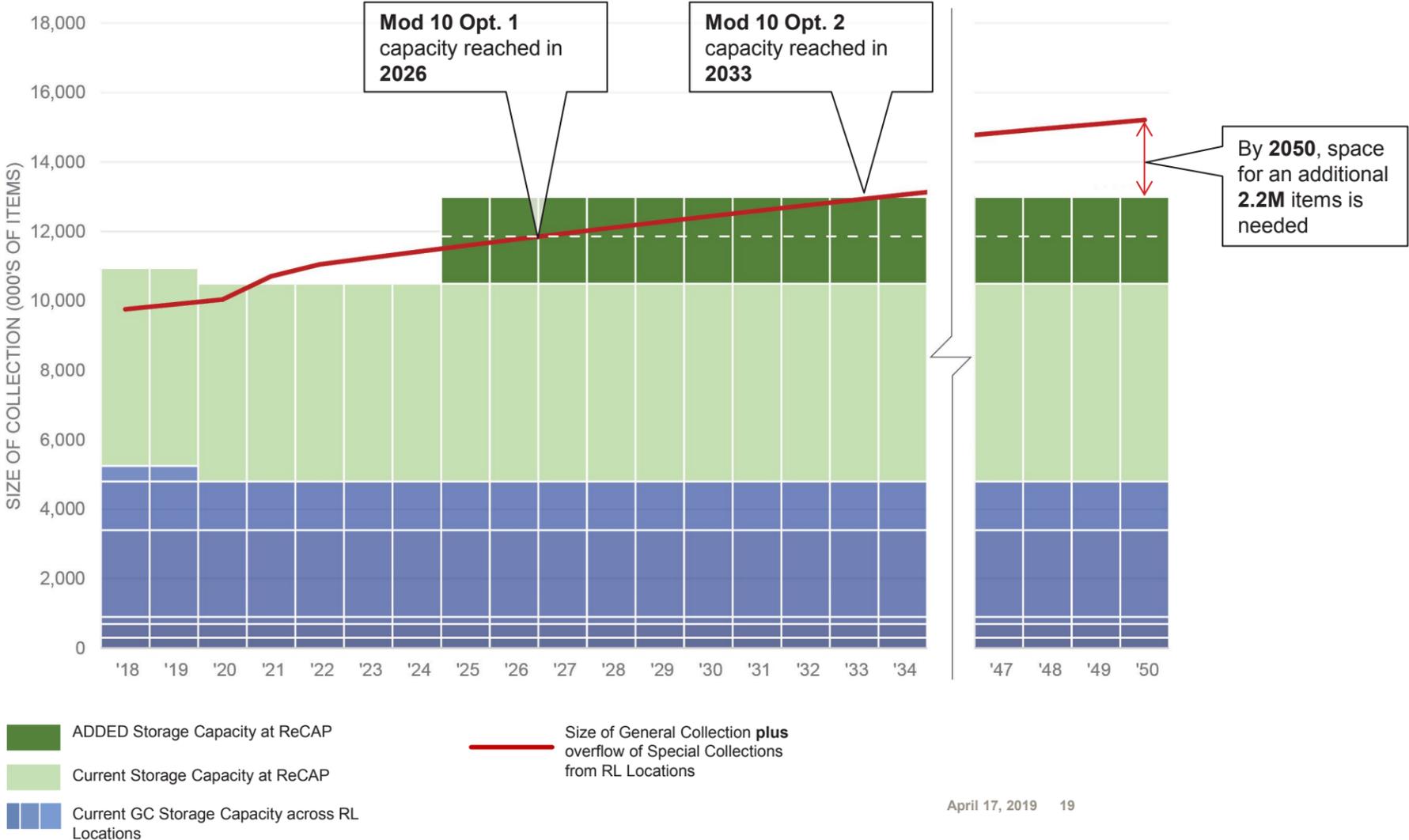


Diagram A. Impact of Special Collections overflow needs and Construction of ReCAP Mod 10 on General Collections storage capacity
RL = Research Library

Long Term Solutions - Beyond 2030

Ongoing assessment of NYPL's collection storage needs, growth projections, and usage patterns should inform plans for collections storage in the long term; however, at this point in time, committing resources to projects that are not needed within the next decade cannot be recommended with confidence. There are several solutions investigated in the course of this study that can be employed at the appropriate time:

- Continued expansion at ReCAP: As items stored in SASB or the Milstein Research Stacks are requested less frequently, they can be moved to ReCAP to free up space for newer, more often requested items, both in the General and Special Collections.
- Upgrading Milstein 1N and Milstein 1S: The existing motorized system will reach the end of its service life in the 2030s. Replacement of the system should be planned to ensure un-interrupted access to materials (motor failure will result in an inability to access items as shelves cannot be manually moved to allow for their retrieval). This also provides an opportunity to convert the storage system in Milstein 1N to the trayed system used in Milstein 2 and ReCAP, and to optimize the shelving types in Milstein 1S to best suit the needs of Special Collections materials, allowing more materials to migrate from rooms in SASB to the better conditions in the Milstein Research Stacks.
- Upgrading the SASB Stacks: With capacity, access, and improved condition needs addressed for the next decade, the SASB Stacks will be considered a "land bank" for future collections growth and conservation, when the compelling need emerges and at a time where the future can be planned for with more predictability. Two options were proposed for the upgrade of the Stacks for collections needs, and are described in more detail below.

Stacks Option A - Special Collections Vault

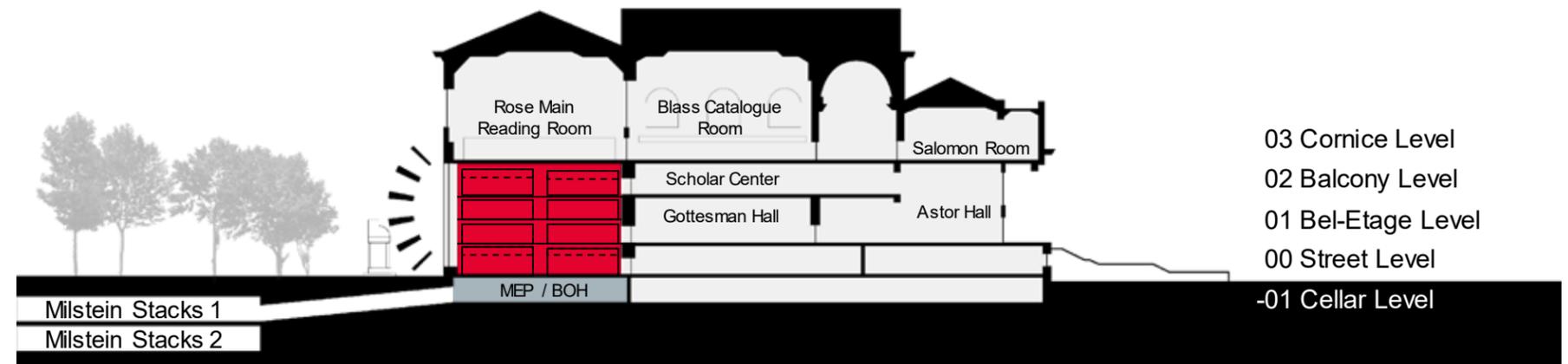


Diagram A. Storage space with optimum environmental conditions to store Special Collections

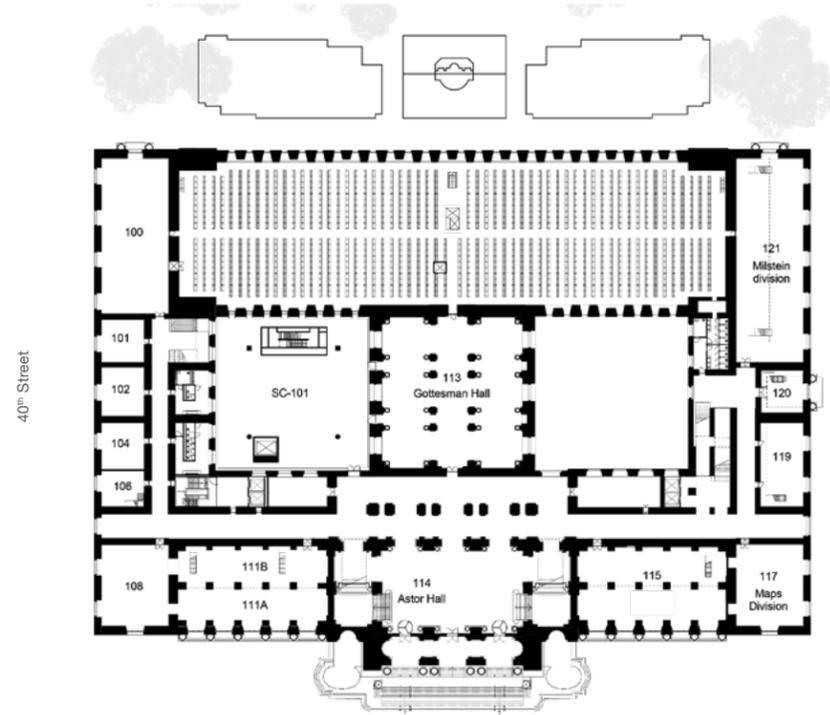


Diagram A. Existing

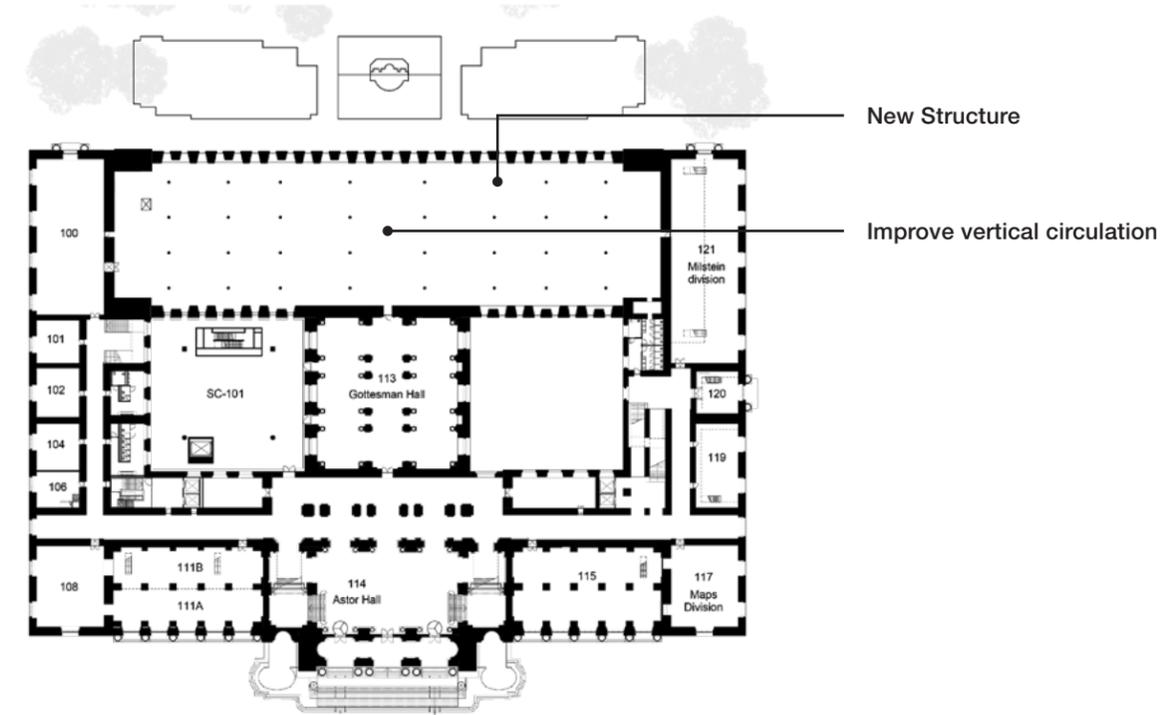


Diagram B. Step 1 - New Stacks Space

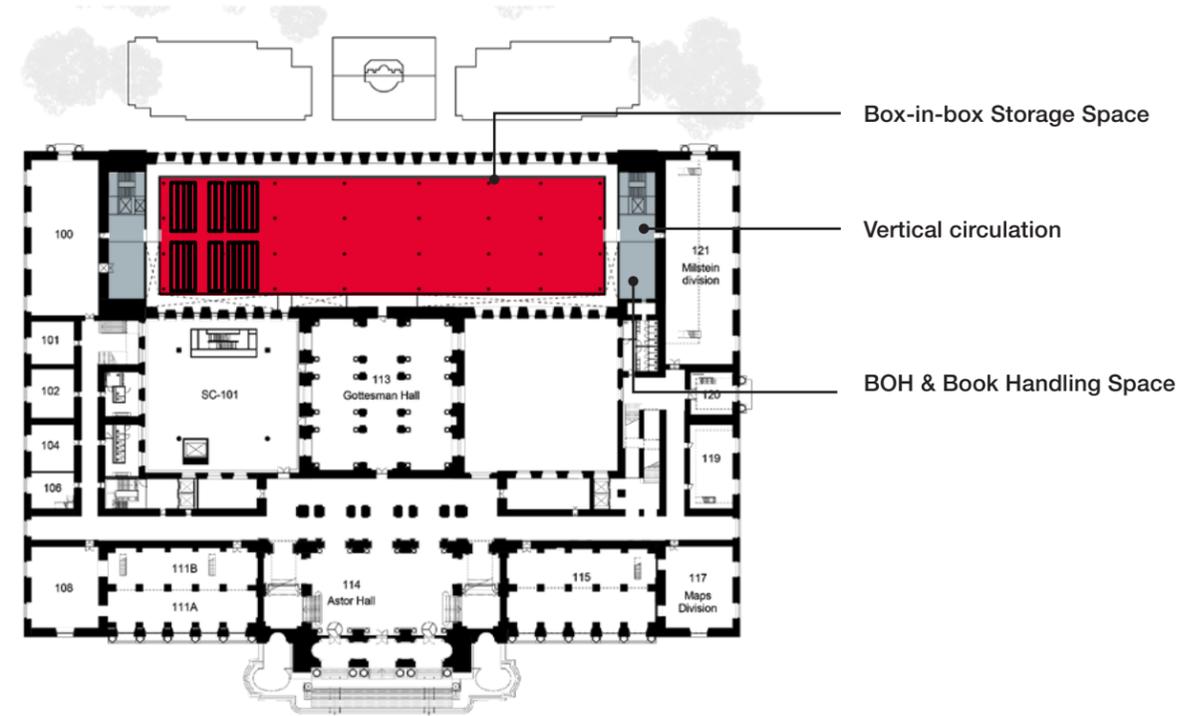
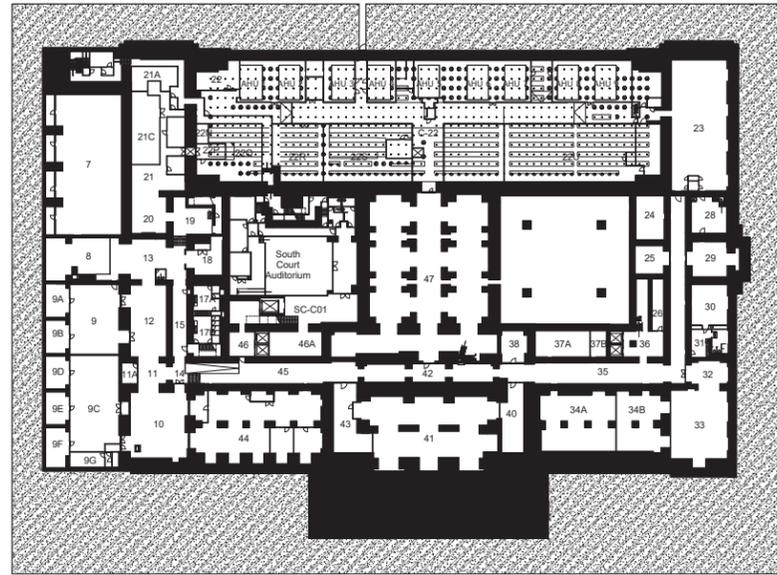
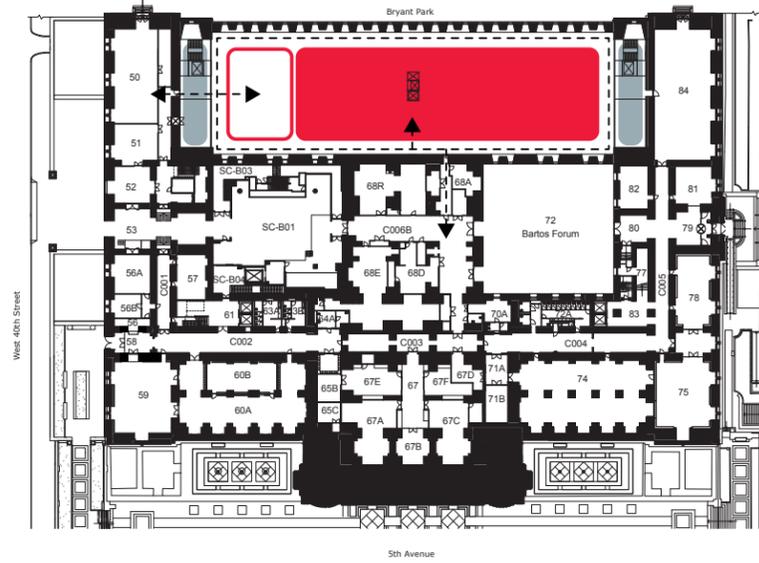


Diagram C. Step 2 - Storage space with optimum environmental conditions to store Special Collection

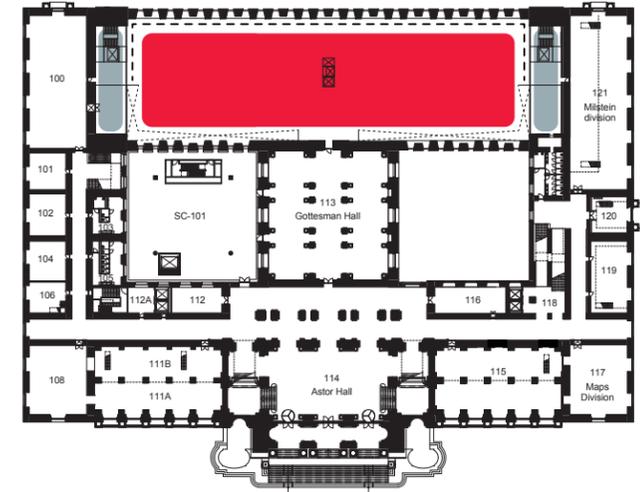
STACKS FLOOR PLANS



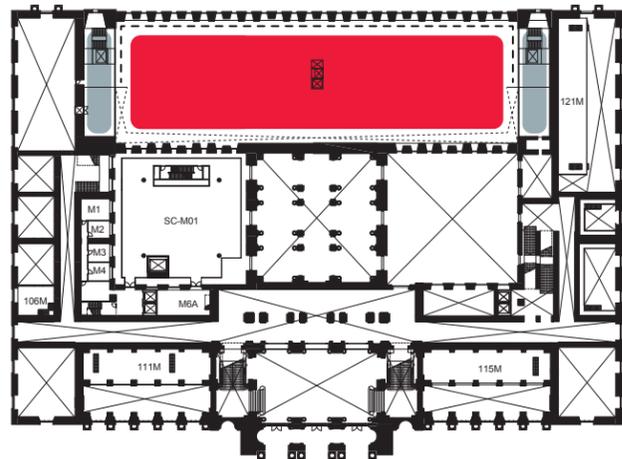
C01 Cellar Level



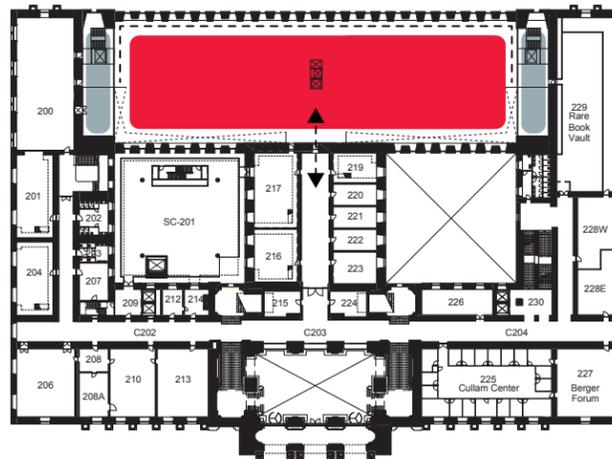
00 Street Level



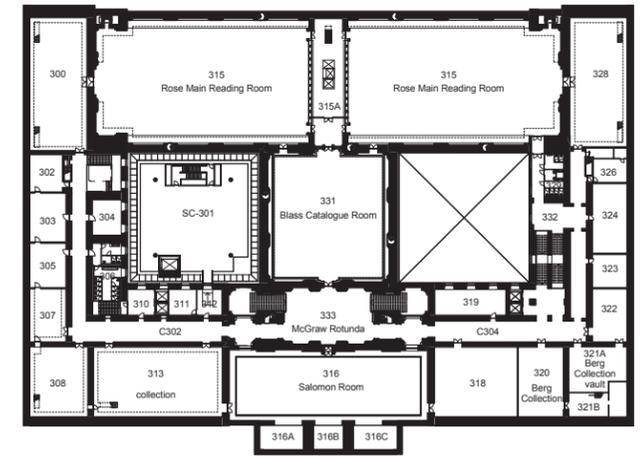
01 Bel-Etage Level



01M Mezzanine Level



02 Balcony Level



03 Cornice Level

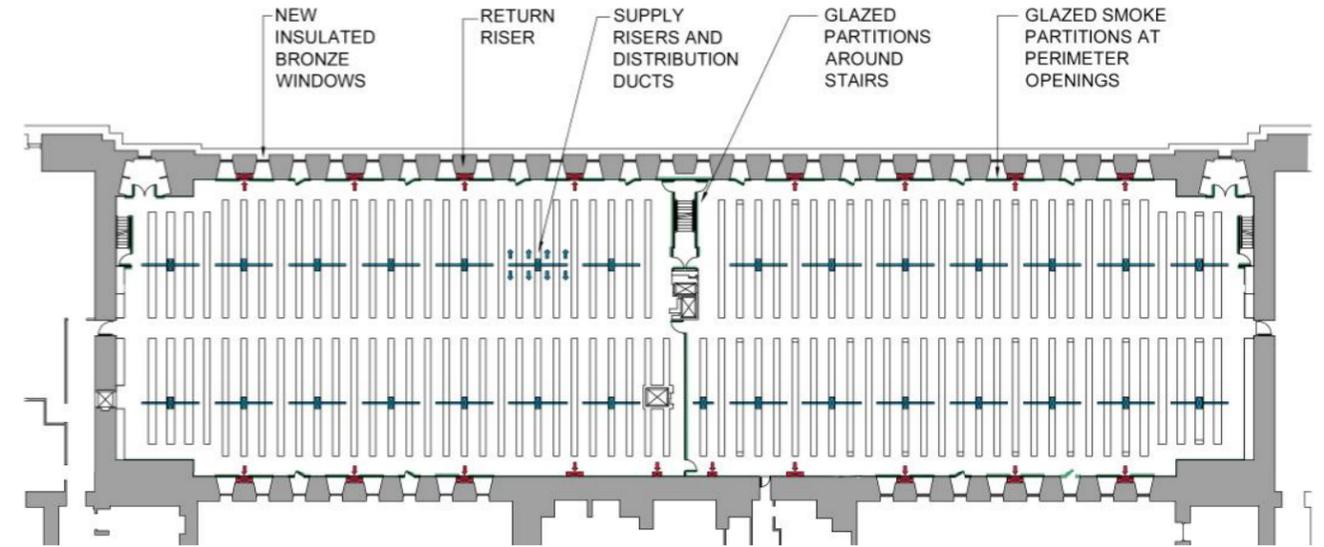
Diagram A.

■ proposed Special Collection space

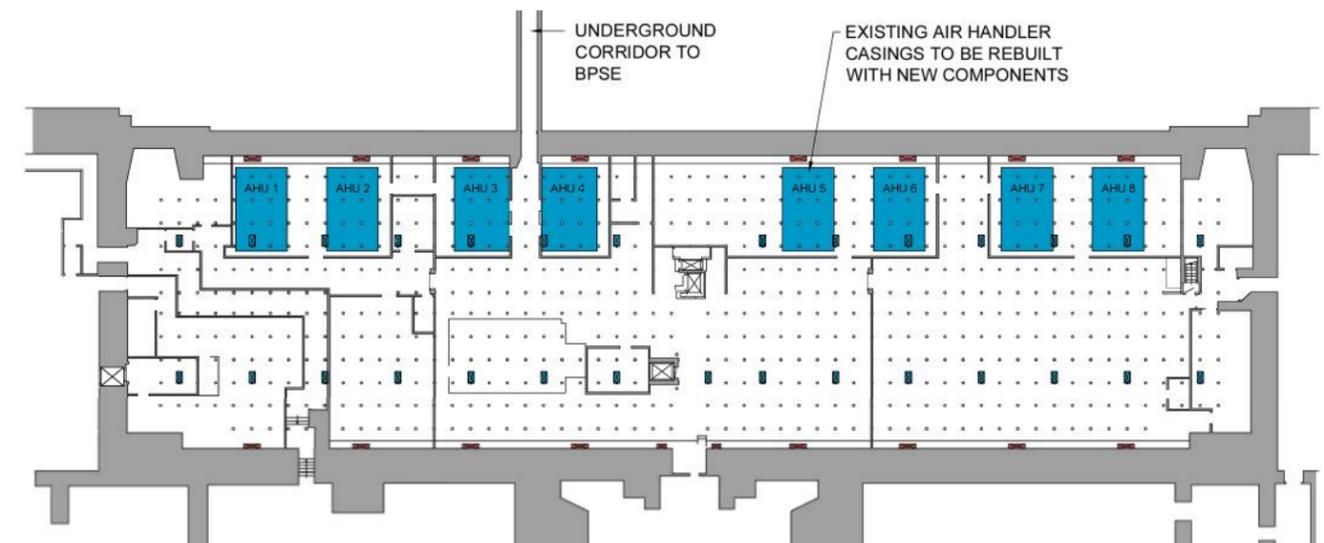
Stacks Option B - Retro-fit Snead Stacks

Following the recommendations of the EYP study, the renovation of the existing Snead Stacks could accommodate approximately 2.5 million General Collections items (based on the number of items removed when the Stacks were emptied in 2012-13).

This space would not be suitable for the storage of Special Collections due to the inflexibility of the structural shelving; if adequate space to house Special Collections on site to meet 2050 projections is desired, the Milstein Research Stacks would have to be re-organized to accommodate solely Special Collections, and the General Collections would be moved to the retrofitted SASB Stacks.



Proposed Typical Floor Plan



Proposed Cellar Floor Plan

Diagram A. Proposed renovations to the Snead Stacks, EYP Architecture & Engineering, P.C. (2013)

Comparison of Stacks Options

RELATIVE PRO'S (+) AND CON'S (-) OF THE STACKS OPTIONS

Option A – Special Collections Vault

Pros

- + Allows more spatial flexibility for current collection needs, and potentially future changing collections needs
- + Allows more spatial flexibility for a future where space might be needed/ desired for other uses in the future.
- + Allows for more environmental control
- + Full code compliance could be achieved without variances for fire protection
- + Can potentially accommodate space for public uses
- + Designing the space anew allows for a more planned relationship between the collections spaces and the rest of SASB
- + Potentially puts the Special Collections above grade, a more resilient solution
- + Designing anew allows for a purpose-designed collection access strategy (i.e., controlling height of shelving, depth of aisles, etc.)

Cons

- First cost much higher than a Snead Stacks retrofit
- Longer design and construction schedule

Option B – Snead Stacks Retrofit

Pros

- + Less expensive first cost than Special Collections vault
- + Retains the original fabric and parti of the Snead Stacks holding up the Rose Main Reading Room

Cons

- Will require a “jerry-rigged” solution to house any collections that require non-standard shelving depth
- Not an optimal vuse of space versus storage capacity
- Less control of environment
- Requires variances from Department of Buildings (existing structure would still not be fireproofed)
- Less current and future flexibility for needs, both collections and other uses

Conclusion

Either long-term option for the SASB Stacks can add enough capacity to house NYPL's collections until 2050 and, through shifting locations of collections between on- and off-site locations, offers the opportunity to house all additional Special Collections materials stored in SASB proper, as well as growth from the other research libraries, until 2050.

The future expansion of ReCAP beyond the module being planned currently will also provide opportunities for increasing capacity as needed. These options will be continually reassessed as these longer-term needs come into focus in the coming decade.