

FEASIBILITY STUDY for
ADAPTIVE REUSE

for
THE MURPHY HOUSE
Wilmington, Delaware

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JOHN MILNER
ARCHITECTS, INC.

Chadds Ford, PA



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INTRODUCTION & METHODOLOGY

This study has been produced to determine the feasibility of restoring and renovating the c. 1840 Murphy House, on the Nemours Hospital Campus, and converting it from its historical use as a residence to a commercial use as an office or business space.

The Murphy House is located at the intersection of Rockland Road and Children's Way in Wilmington, New Castle County, Delaware. The site was visited on two occasions during January, 2010, by architectural staff to review the conditions of the existing building components and to measure the floor plans and building elevations. These layouts are presented as a basis for preliminary design and for calculating square footage of areas.

Due to the historic nature of the building, all proposed modifications should comply with the Secretary of the Interior's Guidelines for Historic Rehabilitation; therefore the Nemours Foundation has retained John Milner Architects, Inc. to prepare this Feasibility Study, which will serve as the basis for estimating the cost of required design and architectural construction work.

EXECUTIVE SUMMARY

The George (aka William) Murphy House, situated at 1601 Rockland Road, has been sitting vacant for many years. Previously used as a single family residence since its original construction in the 1840's, the house is now in need of repair at every level and no longer retains its "context". Historically, this farm workers residence was contiguous with its surrounding agricultural setting and would have been part of a rather vernacular landscape. Because of the encroachment of new roadways and modern construction surrounding it, the building has lost its relationship altogether from its historical place in time.

The first step in evaluating the nature and extent of the work was to visit the building and complete a room-by-room survey to document the issues. Given the location of the site, which is contiguous to heavily traveled roads, and in a noisy, open intersection with no potential for privacy, e.g., it seemed that the most viable reuse might be commercial office space. This, however, also has its challenges given the limited size of the building and the configuration of its floor layouts. This program, therefore, has been used as a baseline in order to develop a list of necessary improvements to be made and to attach an Order-of-Magnitude Cost Estimate to that list of recommendations.

Recommendations are also being made with The Secretary of The Interior's Guidelines for Historic Rehabilitation as the reference point for design decisions. Upon measuring and drawing the entire building, the available gross square footage is calculated as follows:

| | |
|---------------|----------------|
| Basement: | 975 GSF |
| First Floor: | 1,063 GSF |
| Second Floor: | 947 GSF |
| Attic: | <u>809</u> GSF |
| Total: | 3,794 GSF |

Since the Basement and Attic would not be habitable for a number of reasons, the remaining "occupiable" area is 2,010 GSF. This is challenging, however, to justify an occupancy classification other than single-family residential, which it is no longer suited for.

The Order-of-Magnitude Cost Estimate came out to \$885,500.00. This estimate, however, does not take into account any major structural work or hazardous material remediation, (since these components were not included in this assessment). If, for discussion purposes, we were to allocate another ten percent (10%) to cover these cost unknowns, the estimate would be closer to \$974,000.00, or \$257.00 per gross square foot for the entire building, or, \$485.00 per GSF for the two "occupiable" floors only. This estimate, however, is about three times what it would cost to construct a new facility.

FORMAT OF THE STUDY

The Feasibility Study includes the following components.

- I. Architectural Conditions Assessment and Recommendations: to identify the conditions of architectural components and recommend sensitive repairs, additions and modifications necessary to architectural fabric for adaptive re-use as a commercial building.
- II. Structural Conditions Observations: to identify structural components and their issues relative to conversion from a residential to a commercial structure.
- III. Mechanical, Plumbing & Electrical Systems Conditions Assessment and Recommendations: to specify the replacement of out-dated heating and plumbing equipment, fixtures and systems, replace all electrical systems, and add air conditioning.
- IV. Order of Magnitude Construction Cost Estimate: to assign construction cost values to specific categories of work.
- V. Schematic Drawings of Architectural Modifications and Mechanical, Plumbing and Electrical Systems: indicating the conceptual design of proposed repairs, restorations and renovations to commercial use.
 - A1 Proposed Commercial Basement and First Floor Plans
 - A2 Proposed Commercial Second and Attic Floor Plans
 - A3 Proposed Commercial Elevations

SECTION I
ARCHITECTURAL CONDITIONS
ASSESSMENT AND RECOMMENDATIONS

SECTION I ARCHITECTURAL CONDITIONS ASSESSMENT & RECOMMENDATIONS

The Murphy House consists of a rectangular, three-bay, two-story, stone structure of gabled form with roof ridge running roughly east west, with a later-constructed, frame-built, two-story kitchen and bedroom wing extending to the north, resulting in an el form plan. At the north and east elevations of the kitchen el there is a one-story porch wrapping those facades. At the south (front) elevation of the main block, a hip-roofed porch covers the centered front door. Both porches are open, although the south (front) porch is screened with modern lattice materials at its sides.

At the northern side of the wrapping porch, the porch floor is a concrete slab on grade; however, at the eastern side, the floor is a plywood surface covering wood framing, which spans over a basement beneath that section of the porch. The floor of the front porch is wood framed over a continuous masonry foundation with painted board flooring, and a single stone step down from the porch to grade.

A chimney is located at each gable end of the main block and of the kitchen el, with the easternmost extending up from first and second floor fireplaces of the stone building and the other two extending up from utility locations in the basement. The roofing is currently asphalt shingle on all roofs and the chimneys are all exposed brick above the roofs. There is a gabled dormer with a single window on each of the east and west-facing roof slopes of the kitchen el. The sashes and leafs of all windows and doors have been removed (and stored inside the house) during an earlier mothballing project and in-filled with plywood, some of it containing pre-fabricated louvers for ventilation. Three windows into the basements are relatively unprotected, containing remnants of sash and louver parts that appear to have been broken by vandalism.

The main block and the kitchen el are both stuccoed and painted. The stucco is applied over Delaware "blue rock" granite walls at the main block and over German-cut wood clapboard siding at the kitchen el. There is minimal exterior window and door trimwork within the stuccoed openings and the only additional woodwork is a small, denticulated frieze board below the horizontal eaves of the stone portion of the house. There is a basement areaway entrance with modern sloped, paired metal doors, nearly centered on the west façade of the stone portion of the house.

Due to previous widening of the streets at the front (Rockland Road) and west (Children's Way) side of the house, the curb-lines are very close to the house, and a concrete sidewalk, with curb ramps, exists on the west side. An asphalt pathway exists at the rear, connecting together various buildings of the Nemours Hospital complex. Due to the small size of the Murphy House, and its historic status, commercial development of it could be exempted from handicapped accessibility requirements. However, because the rear porch is very close to grade, it would be relatively expedient to provide barrier-free accessibility to the first-floor spaces. If the project is to proceed, accessibility should be taken into further consideration.

General Items:

Cleaning and Demolition:

Conditions: The interior of the building has accumulated a great amount of debris from the years of mothballing and neglect, including unused, out-of-date cabinets, sinks etc. in the former kitchen, fallen plaster in several locations, and animal debris, etc. in a few locations inside.

Recommendation #1: Remove debris, former equipment, and extraneous materials to provide a safer, healthier environment for the commencement of the project.

Interior Plaster:

Conditions: Considering the amount of rain that has occurred in this region in the past year, the interior of the house is acceptably dry and there was no standing water evident in most locations observed, other than the basement area under the open porch. (This may be largely due to this survey being done in winter months, as opposed to the more humid summer time period). The interior plaster is in various levels of deterioration and decay from outright total loss of plaster and lath due to roof leaks, to significant deterioration around fireplaces and other stress points, to simpler routine damage and mildew from the dampness, which must be present during the more humid summer months.

Recommendation #2: Due to the extent of plaster deterioration, and in order to more adequately upgrade the building's structure, facilitate installation of new mechanical, electrical, and plumbing systems, and to install insulation, it is recommended that all interior plaster be removed to the bare studs and exterior walls where practicable. At the time period of this house's construction, the woodwork was installed in most areas prior to the plaster installation; therefore, most of the wood window and door surrounds, and baseboard moldings, can remain in place, or be removed, then reinstalled later in the same locations after new wall finish installation.

Vertical Circulation:

Conditions: The only means of vertical circulation from the basement to the first floor, and the first floor to the second and attic is by means of an original box winder stair located in the northeast corner of the main block of the house. The stair construction is in good condition except for some failed treads and support structure at the lower part of the flight nearest the floor of the basement, presumably from earlier deterioration or insect damage. Regardless of condition, these stairs do not meet current building code and could not be used for a commercial re-use.

Recommendation #3: Construct a new code compliant stair in an enclosure at the northeast corner of the open wrapping porch, over the area where the porch has a basement beneath its floor. This will solve the vertical circulation problem of the non-compliant stair and also help to protect the area of the basement from leakage through the open porch floor. An area to the north of the new stair enclosure would still consist of an exterior floor over a basement, and would need a waterproof floor covering. To place an architecturally compatible roof over this enclosure, a code compliant stair would not be able to be installed to the third floor. Since the

third floor would be only used for mechanical equipment purposes, the existing winder stair would have to suffice for periodic maintenance, cleaning, filter changes, etc at the air-handling unit proposed to be located in the attic.

Insulation:

Conditions: There was no thermal insulation observed in the house.

Recommendation #4: Insulation sufficient to meet applicable Building and Energy Codes should be installed at exterior walls, and attic floor or roof to maintain the heating and conditioning, which will be provided by new HVAC equipment installed during the renovation.

Exterior Stucco:

Conditions: The exterior stucco is largely intact; however several areas of water damage, peeling, spalling and occasional stucco loss are present at each elevation. Paint on the stucco is peeling in approximately half of its area.

Recommendation #5: Pressure wash stucco to remove loose paint and stucco; selectively replace, repair and stabilize deteriorated stucco that remains; afterward, prime and re-paint the entire exterior.

Basement:

Main Block:

Basement Conditions: The main block contains a basement with 5-feet-11-inches of headroom from a modern concrete slab to the underside of 3 x 9 sawn floor joists spaced 22-inches on centers, spanning from front to back (south-north), nominally 15 feet. The basement space is 23-foot wide east west and is surrounded by 18-inch thick rubble-laid stone foundation walls of Delaware Blue-Rock granite, which are roughly parged and were whitewashed some time ago.

Recommendation #6: Treat all interior surfaces of the basement exterior stone walls with waterproof finish to reduce moisture infiltration from surrounding grades.

Kitchen El:

Conditions: The Kitchen el, to the north of the main block, contains a basement with 5-feet-8-inches of headroom from the concrete slab to the underside of 3 x 5 dimensional lumber joists and 6-inch diameter log floor joists. The space is nominally 14-feet wide (east-west) and 18-1/2-foot long (north-south) surrounded by 18-inch thick, rubble-laid granite foundation walls similar to the main basement, but of a later period of construction. For an unknown reason, the south portion of this room is framed with the log joists, although the entire wing appears to be of younger vintage than the south half of the house. The log joists are exhibiting severe deflection and lack-of-load-carrying capacity apparently from a combination of cracking, deterioration and insect damage and/or deterioration and disengagement at the bearing walls. Two (2) windows occur on the west wall of this basement, are larger than the aforementioned stair window. There is a chimney foundation on the north wall. All walls are stuccoed / whitewashed.

To the east of this space there is a narrow basement area, which oddly is located under the wood-framed east portion of the open wrap-around porch above, the porch floor thereby forming its ceiling / roof. This space is nearly 7-feet wide, 18-½-feet long with a masonry opening approximately centered in the western stone wall dividing it from the kitchen el basement. This opening has finished stone jambs indicating it was constructed concurrent to these basements, whereas the openings from both of these to the main block basement (to the south) appear to be former basement windows, which were deepened to become door openings, between the adjoining construction campaigns. Framing of the floor under the porch spans north-south with two (2) carrying beams east-west (one is collapsed). The porch floor finish is currently weathered and deflected plywood.

Recommendation #7: Install two (2) new steel-framed windows in the openings on the west basement wall.

Recommendation #8: Re-frame former kitchen floor above, at least at the southern half of the space and perhaps the entire room.

Recommendation #9: Re-frame the east floor of the wrap-around porch (north of where the new stair and enclosure will be located), and install a waterproof floor material above.

Box Winder Stair:

Condition: In the northeast corner of the oldest basement space, there is a wooden winder stair that comes down from the parlor above, and a small broken-out window approximately two (2) feet square in the east stone foundation wall provides the only source of natural illumination into this portion of the basement.

Recommendation #10: Re-build lower third of the basement winder stair, replace window with a steel casement window.

Basement Areaway:

Condition: In the main block basement, to the south of the winder stair and comprising approximately the middle one-third of the east basement wall, is the stone-arched foundation of the house's vertically aligned fireplace, one of each which is in the parlor above and the bedroom on the second floor. A cleverly-placed passage under this foundation arch leads to a set of six (6) stone step treads, leading up through a stone-enclosed areaway to a cellar door at grade (apparently an original feature except for the "Bilco"-type paired metal doors at the exterior).

Recommendation #11: Replace metal "Bilco"-type paired metal doors at the exterior, re-point stone steps, waterproof areaway walls.

Front Porch:

Condition: The front (south) porch appears to have a continuous stone foundation, which does not allow ventilation of the floor structure. The floor surface consists of weathered floor boards; there is non-original lattice screening at both sides of this open porch, and a hipped roof above.

Recommendation #12: Stabilize the front porch foundation; rebuild the porch floor framing, install new floorboards and paint.

First Floor Items:

Former Kitchen:

Condition: The original, rear door to this space is missing; there is beaded wood wainscot throughout the room and a beaded wood built-in full height corner cabinet in the northwest corner. Window sashes, apparently for the majority of the windows of the house, are stored in this room. There are two (2) window openings on the west wall and a window, door and enameled porcelain sink on the east wall. There are minimal other built-in shelves and cabinets. The floor is soft and in very poor condition in the south half of the room and the two (2) radiators appear to be collapsing through the floor on the west side. The plaster ceiling is intact.

Recommendation #13: Remove existing flooring and subflooring (entire room); re-frame floor structure of entire room, install new plywood subfloor and wood finish floor. Frame new interior partition walls for Half Bath, Print Room and Pantry, and install new wall, floor and ceiling finishes.

Open Porch:

Condition: Off of the kitchen to the north is an open porch with a concrete floor.

Recommendation #14: To increase usable floor area with minimum impact on the exterior architectural footprint of the building, this porch space could be enclosed as a conference room with new framed, insulated walls, windows, and new interior and exterior finishes such as carpet and painted wood siding.

Living Room:

Condition: The original Living Room is located in the southeast corner of the oldest portion of the house, with a large, brick fireplace on the east wall. The firebox is plastered over and the mantle is missing. To the right of the fireplace is a cupboard, which is missing its doors; to the left is the box winder stair, also with no doors. In front of the stair the ceiling plaster is collapsed, exposing the structure above that consists of 4" x 7-1/2" floor joists spanning north-south at 24 centers. There is one south facing window, window and door trim are intact. The front (exterior) door is missing; Greek Revival paneled door jambs and head are intact. 5-inch to 6-inch wide floorboards are intact. An intact stud and plaster wall partition separate this room from the Parlor to the west.

Recommendation #15: Restore existing windows; install a new or period exterior door, and new replica period interior doors. Replace the missing mantle and restore/refinish existing woodwork and built-ins including new cabinet doors.

Parlor:

Condition: The Parlor is to the west of the Living Room through a single interior door, the leaf of which is missing. There is a former "exterior" window facing the kitchen el, which has been in-filled with plaster. There is one window each on the south and west walls in which the sashes are removed, but their casings, sills and jamb woodwork are intact. There is moisture damage at the plaster walls and ceiling, and the oak floorboards are intact. There is miscellaneous debris, exposed electrical wiring and peeling wallpaper and paint throughout the room.

Recommendation #16: Remove all plaster to install insulation, utilities and to verify the condition of the structure. Install new plaster, re-finish woodwork and restore and re-install window sashes and a replica period wood door to the Living Room.

Second Floor Conditions:

Southeast Bedroom:

Condition: Two windows on the south wall are missing their sashes; however, the Greek-Revival window casing, sill, apron and two-step baseboard moldings in the room are mostly intact. There is a brick fireplace (firebox is in-filled) on the west wall, which is missing its mantel. To the right of the fireplace, a built-in cabinet is missing casing and doors. Wall and ceiling plaster are moisture damaged. Oak floorboards, ranging from 3 inches to 7 inches wide are in good condition. Some floorboards have been removed near a radiator possibly to disconnect it, as it is tilting over.

Stair Hall:

Condition: Woodwork except for window sashes is mostly intact. The box stair to the third floor is in good condition with grain-painted treads; however, both doors to the stair are missing. The floorboards are in good condition. There is severely collapsed plaster at the ceiling and plaster delamination from the stone north wall, due to moisture damage from a former roof leak.

West Room:

Condition: Window woodwork and floors are intact, but very dirty with an accumulation of debris. A former window at the north wall has been made into a cupboard with intact beaded doors. The door from the Stair Hall is missing, as well as its casing. Ceiling and wall plaster are moisture damaged.

Recommendation #17: To convert bedrooms to offices, remove all plaster to install insulation and utilities and to verify the condition of the structure. Install new plaster, strip and refinish built-ins, floors and wood window and door casing, replacing missing profiles where needed. Install new plaster at walls and ceilings; re-install removed window sashes. At windows facing proposed stair tower, in-fill one window and create a door to the stair at another.

Second Floor of Kitchen El:

Rear Hall:

Conditions: Narrower floorboards than the earlier construction are of a consistent width. Attic floor joists above, which are visible through the collapsed plaster ceiling, are 3x 8 at 24-inch centers. Window and door casings are flat trim or Late Greek Revival. There is an intact beaded wood cupboard with paired doors at the east wall.

First Bedroom:

Condition: Baseboard is 1 x 6 with bead on top; window and door casings are flat trim with minimal scratch bead edges. There is an intact beaded wood cupboard with a board at the east wall. Wiring appears under a shoe molding. Narrow hard pine floorboards similar to the hall are in fair condition, except where removed at disconnected radiator. Moisture-laden plaster is shedding paint and surface finish. Beaded door to the hallway is intact.

Rear Bedroom:

Condition: Similar wood trim, floor and plaster conditions as the first bedroom. Windows at west and north walls are missing their sashes. There is an intact beaded wood cupboard with a board at the west wall. There is a chimney at the north wall losing its plaster due to moisture damage, moisture-laden plaster ceiling is shedding paint. Beaded door to the hallway is intact.

Recommendation #18: To convert bedrooms to offices, remove all plaster to install insulation and utilities and to verify the condition of the structure. Install new plaster, strip and refinish built-ins, floors and wood window and door casing, replacing missing profiles where needed. Install new plaster at walls and ceilings; re-install removed window sashes.

Recommendation #19: Install new fireplace mantel in southeast office, cupboard doors; strip and refinish winder stair enclosure.

Recommendation #20: To improve the thermal performance of the proposed mechanical systems, wood windows should be treated to provide optimum weather resistance and reduce air infiltration. Dependent upon the individual window's conditions, treatments could include wood repairs, sash chain and weight repairs, weather-stripping, glass replacement and re-puttying, hardware adjustment and painting. Restore existing windows and reinstall sashes seven (7) sets of sashes; strip and refinish three (3) existing board doors; install two (2) new replica historic doors on Offices, and two (2) new replica doors on winder stair.

Bathroom:

Condition: The bathroom contains a claw foot tub, wall lavatory and toilet and a lot of miscellaneous debris. Window and door casings are flat trim with minimal scratch bead edges; beaded door to the hallway is intact. Plaster walls and ceiling are moisture-damaged and floorboards are partially collapsed.

Recommendation #21: Renovate existing Bathroom into Half Bath/Pantry combination. Remove all plaster to install insulation and new utilities and to repair the conditions at the floor

framing. Install new subfloor, finish floor and gypsum walls and ceiling, built-ins, cabinetry and plumbing fixtures.

Attic Rooms:

Main Block:

Condition: The third floor or attic room over the earliest portion of the house has plastered stone knee walls near the eaves, approximately 1-foot high, with 6-feet of headroom under the roof ridge. There are wide pine floors, partially covered with linoleum. The undersides of the rafters are plastered except for two large areas of lost plaster and damage caused by roof leaks in the roof valleys. There appears to be recent roof leakage at the northwest roof valley. Evidence of plaster in-filled openings indicates that there formerly were two (2) dormers at the south (front) roof slope of this attic.

On the east gable wall there is a brick chimney built into the room, located between two (2) square windows. At the west wall a chimney is engaged in the thickness of the wall, flanked by similar windows (one boarded over and one containing a louver). The roof structure appears to be 4-inch by 5-inch rafters spaced 24-inches on centers. A plastered wall divides the main attic from the el attic.

Recommendation #22: Remove either the plaster ceiling or the wood floors for installation of insulation. Install new railing and gate at the top of the winder stair. Make masonry repairs at west chimney; rebuild north and east chimneys from the attic floor, through roof to top.

Attic over Kitchen El:

Conditions: Over the kitchen el, the attic space is of similar configuration to the front, except with two (2) dormers, one each facing east and west through the plastered ceilings. Window and door trim is simple flat profile, and the baseboard is flat with a beaded top edge. The chimney built-in to the room at the north gable is cracking apart from years of disuse, moisture damage and freeze-thaw cycling. It is flanked by two (2) windows, larger than in the front attic. Narrow, consistent width pine floorboards run to south to north. There is an area of partially collapsed plaster on the east facing roof near the valley. Visible through the opening is the underside of flake board sheathing installed over former shingle lath spaced at 8-inch on centers. Flat door trim.

Recommendation #23: Remove either the plaster ceiling or the wood floors for installation of insulation. Install two (2) new windows in the existing window openings of the north gable. Restore and re-install existing dormer window sashes.

Roofs:

Conditions: The asphalt roof on the house is installed over oriented-strand board sheathing placed over the original wood shingle lath which is spaced at 8-inch centers.

Recommendation #24: Install new preservative treated Pine wood shingles on roofs of main block and kitchen el including dormers.

Porches:

Conditions: The roofs of the wrapping porch and the front porch are currently asphalt shingles. However, in keeping with the practice of the period of the home, they would have likely been flat seam or standing seam metal (tin) roofs. The ceiling of the east portion of the wrapping porch is partially collapsed.

Recommendation #25: Install standing seam metal roofs on wrapping porch and front porch. Repair/replace portions of wrapping porch ceiling. Repair/replace portions of front porch ceiling, remove lattice screening, and install board handrails. Paint all woodwork.

Sitework:

Conditions: The Murphy House is located across Rockland Road from the Nemours Hospital and on the same lot as other office buildings for the hospital complex, and therefore, might utilize existing parking and pedestrian pathways for access. However, if expected to be rented to a private tenant, a design and budget allowance should be included for an individual access drive, and 6 to 10 parking stalls dedicated to the Murphy House itself.

Recommendation #26: Provide access drive and parking, grading and drainage, and storm water detention for the above.

Recommendation #27: Install landscaping buffers for the above, per local ordinance.

Recommendation #28: Provide signage for the access drive and parking.

END OF SECTION I

SECTION II
STRUCTURAL OBSERVATIONS

SECTION II STRUCTURAL OBSERVATIONS:

Conditions: One of the obstacles to adaptive re-use of the Murphy House for commercial use would be modifying the structural load-carrying capacity of the floors. Residential uses generally have a live-load capacity (occupant and furnishing weights) of approximately 30 pounds per square foot (PSF) and that is the amount required by current code. Since no building code was in effect at the time of construction of the Murphy House, it would be only accidental if the floor member sizes were capable of supporting that amount. Although no structural analysis was performed, from our experience, the floor member sizes appear to be of adequate width and depth (3 to 4 inches wide and 5 ½ to 7 ½ inches deep) for support of residential loads. However, the spans of the floor framing members appear to be stretched too far to adequately support the increased capacity of an office or business use, which by current building code is 50 PSF.

While the floor structure as it exists may have the strength to support the 50 PSF loads, the deflection of the floor members will be in excess of recommended limits, resulting in noticeable sag and "bounce" in existing floor structures and resultant deformation of, and damage to, finish materials such as floorboards, baseboards, built-in cabinets and wall finishes. In addition, damage to structural members was also observed, the result of moisture damage from roof leakage, deterioration from usage and age and probably insect damage as well. Those conditions will weaken the structure as well.

The most expedient remedy to the long-span conditions would be to install a new bearing line in the basement at the centerline of the first floor joists spans, to effectively reduce those spans in half. Then, the first floor partitions would need to be considered as bearing partitions to directly carry the second floor loads to the new carrying beams at the basement locations. Further structural study would be needed to verify whether these modifications would be adequate for the Office loading requirement.

Recommendations #29: Since detailed structural study and recommendations are beyond the scope of this feasibility report, such modifications, which would be needed, are also not included in the cost estimate appended to this report. Therefore, it should be understood that structural modifications surely necessary for the adaptive re-use of the Murphy House, as well as the engineering fees to design them, would be above and beyond the costs enumerated in the feasibility cost estimate.

SECTION III
MECHANICAL, PLUMBING AND ELECTRICAL
CONDITIONS ASSESSMENT AND RECOMMENDATIONS

SECTION III MECHANICAL, ELECTRICAL AND PLUMBING CONDITIONS ANALYSIS & RECOMMENDATIONS:

This portion of the feasibility study provides a cursory analysis of the interior environmental systems at the Murphy House. Generally, it presupposes that the change of use from Residential to Commercial use, combined with the age and dis-use of the house, will necessitate abandonment and replacement of all existing heating, ventilation and air conditioning (HVAC) systems, upgrading or replacement of the electrical service panel(s), branch wiring and circuitry and replacement and/or addition of toilet rooms and pantries for the use of future tenants in a business or office setting.

Mechanical

Insulation:

Condition: During the survey phase, no existing insulation was evident anywhere in the walls, floors or roof of the Murphy House. Major improvements to the thermal integrity of the house's architectural envelope would greatly reduce the heat loss and gain of the interior spaces. This however, may require significant dismantling of exterior wall finishes and the second floor ceiling to facilitate installation of new materials; and consequently would alter the historic character of the interior of the building. Coincidentally, the poor condition of many areas of the interior plaster makes it desirable to remove and replace those finishes, thereby permitting the installation of modern insulation prior to the restoration of architectural elements.

Recommendation #30: (also see Architectural Section): Remove exterior wall finishes where possible without disturbing original woodwork and install foam-board insulation after utility upgrades and prior to re-installation of new finishes. While the second floor ceiling plaster and lath are removed due to damage and for installation of electrical circuitry, install fiberglass batt insulation at entire second floor ceiling joists (attic floor).

The following are recommended modifications to specific materials and architectural elements and areas affected by the proposed installation of new HVAC systems:

Basement:

Conditions: An oil-fired boiler is located near the west wall of the principal (front) basement, and had utilized the west gable chimney for its flue. It appears to be of late 20th century manufacture. This was apparently the only central heating apparatus formerly serving the house. Radiators placed at various locations on the first and second floors were fed from this boiler by one continuous loop of hot water supply pipes. A tandem arrangement of 275-gallon oil tanks is located in the northeast corner of the kitchen el basement, and thus provided fossil fuel to the boiler. The boiler and radiator system appears to have been drained and has been inoperable for years, perhaps for a decade or more. The contents and condition of the oil tank are not a part of this analysis.

Recommendations #31 and #32: While a new hot-water heating system would be an expedient installation, the need for air-conditioning in office uses would necessitate installation of air

handling unit(s) feeding ducted air systems as well. Therefore, a combination of heating and air-conditioning provided from the same forced-air units, through ductwork, would likely be most economical. In a building with solid masonry exterior walls and limited interior walls, to avoid long runs of ductwork in newly created vertical chases, it is expedient to install one air handling system in the basement to supply the first floor spaces through floor mounted registers and a second air-handling unit in the attic to supply the second floor spaces through ceiling-mounted registers. Condensing units necessary for operation of the mechanical systems (air-conditioners or heat-pumps if selected) are proposed to be located alongside the east wall of the front portion of the house, next to the basement areaway and enclosed with a fence for screening purposes.

Enclosed Porch:

Condition: The first floor north area of the open kitchen porch, which is proposed to be enclosed, is on a concrete slab and is remote to other proposed air-handler locations. Therefore, this space is a good candidate for a stand-alone heating and cooling system such as a ductless refrigerant-based wall-mounted air-handler.

Recommendation #33: Install a remote ductless wall-mounted air-handler, such as a "Sanyo" unit to provide air-conditioning, and electric baseboard units to provide heat at the proposed enclosed porch Conference Room.

Chimneys:

Conditions: There are three (3) chimneys extant at the Murphy House, the largest being at the east gable wall of the front section, which contains the flues of two (2) vertically aligned fireplaces. The other two (2) chimneys appear to have been located for stove appliances originally, but later may have been used for modern heating systems. At the west gable wall of the front block of the house, a chimney is contained within the wall from the basement to the roof, most recently used as the flue for the aforementioned boiler, and at the north gable wall of the kitchen el, a chimney is built within the room spaces from the basement to the attic, which probably served as the flue for a cooking and heating (combination) stove in the former kitchen. The conditions of the east and north chimneys are poor, with loss of interior plaster finish showing exposed bricks and loss of bed-pointing, in their respective rooms. In the attics, spawled and cracked bricks and open mortar joints caused by frequent wetting from above, and there are subsequent freeze-thaw cycles while the building has not been in use.

Recommendation #34: The poor condition of the chimneys will require rebuilding of them (with linings if they are going to be used for fossil fuel combustion gases), at least from the attic floor level up to their tops above the roof. This would allow them to meet current building code for height above the roof and should include a fire-clay flue liner in the newly built upper-portion, and installation of a fire cement lining from the attic to the basement below, if they are to be used. An alternative to the linings would be to use high efficiency gas-fired air handlers with PVC exhaust pipes to the exterior, thus abandoning the chimney flues, and re-building the chimneys only for aesthetic reasons.

Plumbing:

Conditions: The current kitchen at the rear (north) of the house contains a metal sink base cabinet with an enameled cast iron sink on top. There exists only one bathroom in the building, on the second floor in the north wing directly over the kitchen, with a cast iron sewer riser in an enclosure along-side the north chimney, leading to a 4-inch cast iron horizontal sewer lateral in the basement. The lateral exits the house on the east wall, in the basement portion under the east open porch. Domestic water systems seem to be partially dismantled and/or are non-operational.

Recommendation #35 & 36: Install a new half bath and pantry on the first floor to service Office Space #1 and renovate the existing bathroom on the second floor into a half bath / pantry combination for the use by Office Space #2.

Recommendation #37: Install new in-coming water service with separation valves and meters for two (2) domestic water systems required in the new Office Spaces. Install water distribution to the two (2) new half-bath and pantry spaces.

Recommendation #38: Further investigate the condition of the out-going sewer lateral and if not usable, install a new one.

Electrical:

Conditions: The Electrical service consists of an overhead primary feeder from the street pole to the house at the east gable wall and is wired through a single meter near grade. From this location the secondary enters the basement through an existing window frame to a load center of 100 Ampere capacity, mounted on the wall separating the front and rear sections of the basement. This service appears to have been installed within the past two (2) decades, and there are several modern circuits extending from the panel box. However, all of the branch wiring could not be examined, and therefore its age or condition could not be fully determined.

Recommendation #39, #40, #41, & #42: Due to the change from residential to commercial use, the electrical system should be completely removed and a new code-compliant service, branch wiring and lighting system installed. This will include, but is not necessarily limited: dual meters, independent panels of minimum 150 Amps, separate branch wiring systems to Office Spaces #1 and #2, receptacles and other devices, and light fixtures and switches.

Recommendation #43: Install separate Security and Alarm systems in Office Spaces #1 and #2, including computer and local area network wiring if so desired.

Recommendation #44: Install separate Emergency Lighting and Exit Signage systems in Office Spaces #1 and #2, as required by code.

Recommendation #45: Install exterior lighting systems and fixtures for security, entry, parking and pathway illumination, wired to timers or dusk-to-dawn photo-sensors.

END OF SECTION III

SECTION IV
ORDER OF MAGNITUDE CONSTRUCTION COST ESTIMATE

**NEMOURS MURPHY HOUSE
SELECTED INTERIOR and EXTERIOR RESTORATION
WILMINGTON, DELAWARE
FEASIBILITY COST ESTIMATE**

The following information must be considered and used in conjunction with the Construction Cost Estimate.

1. Information used in the preparation of this Estimate includes:
 - A. John Milner Architects drawings A-1 to A-3, dated February 12, 2010, received by ICI February 4, 2010.
 - B. John Milner Architects Draft Scope of Work, undated, received by ICI February 4, 2010.

2. This Estimate is based on the following gross building areas:

| | |
|--------------|---------------|
| Basement | 975 SF |
| First Floor | 1,063 SF |
| Second Floor | 947 SF |
| Attic | <u>809 SF</u> |
| Total | 3,794 SF |

3. This Estimate is developed and documented according to the Construction Specification Institute's (CSI) Code of Accounts.
4. This Estimate is based on first quarter, 2010 construction unit prices. No escalation has been included. Once a construction period has been established, the appropriate escalation factor, based on three percent (3%) per year must be added.
5. The general contractor's overhead and profit are included in Section 1.0 General Requirements.
6. No architectural, engineering, or project management fees are included in this Estimate.
7. The purpose of this Estimate is to establish a Feasibility budget for the described work. Once more detailed investigations and design have been completed, this Estimate should be revised and updated.

JOHN MILNER ARCHITECTS, INC.
 NEMOURS MURPHY (PINK) HOUSE
 SELECTED INTERIOR AND EXTERIOR RESTORATION
 WILMINGTON, DELAWARE

ICI #: 210651
 Prep: mcf
 Date: 2/15/2010
 Revised:

SUMMARY - FEASIBILITY COST ESTIMATE

| Account | Description | | Cost/SF 2,985 | Amount |
|---------|---|-----|------------------|-------------------|
| 1.0 | General Requirements (% of Accounts 2.0 through 16.0) | 15% | \$ 38.69 | \$ 115,503 |
| 2.0 | Sitework / Demolition | | \$ 39.98 | 119,349 |
| 3.0 | Concrete | | \$ 1.20 | 3,575 |
| 4.0 | Masonry | | \$ 13.68 | 40,827 |
| 5.0 | Metals | | \$ - | - |
| 6.0 | Woods & Plastics | | \$ 39.33 | 117,411 |
| 7.0 | Moisture Protection | | \$ 19.38 | 57,861 |
| 8.0 | Doors & Windows | | \$ 18.47 | 55,138 |
| 9.0 | Finishes | | \$ 29.89 | 89,232 |
| 10.0 | Specialties | | \$ 1.11 | 3,300 |
| 11.0 | Equipment | | \$ - | - |
| 12.0 | Furnishings | | \$ - | - |
| 13.0 | Special Construction | | \$ - | - |
| 14.0 | Conveying Systems | | \$ - | - |
| 15.0 | Plumbing | | \$ 17.95 | 53,570 |
| 15.5 | HVAC | | \$ 38.50 | 114,923 |
| 16.0 | Electrical | | \$ 38.47 | 114,836 |
| | Subtotal | | \$ 296.66 | \$ 885,524 |
| | Escalation | 0% | | - |
| | TOTAL ESTIMATED CONSTRUCTION COST* | | \$ 296.66 | \$ 885,524 |

*NOTE: This estimate does not take into account any significant structural repairs or remediation of hazardous materials.

JOHN MILNER ARCHITECTS, INC.
 NEMOURS MURPHY (PINK) HOUSE
 SELECTED INTERIOR AND EXTERIOR RESTORATION
 WILMINGTON, DELAWARE

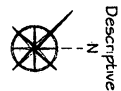
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 Prep: mcf
 Date: 2/15/2010
 Revised:

DETAILS - FEASIBILITY COST ESTIMATE

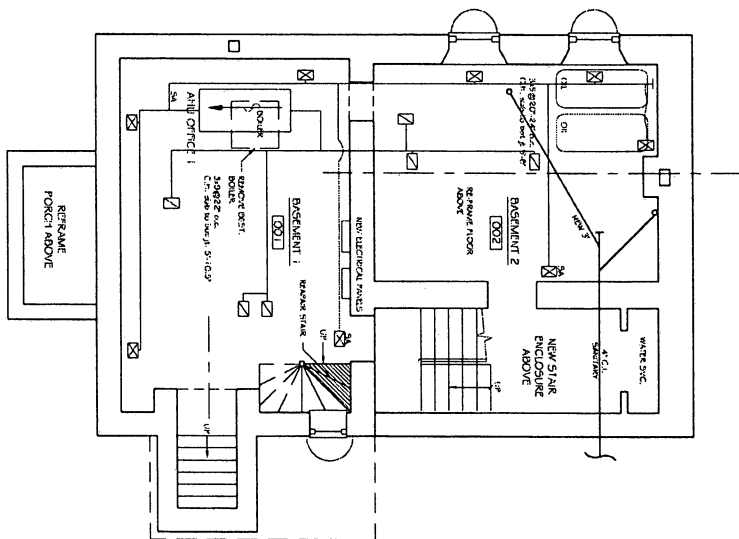
| Account | Description | Quantity | Unit | Unit Cost | Amount |
|---------|------------------------------------|----------|------|-----------------|------------------|
| 8.0 | <u>DOORS & WINDOWS</u> | | | | |
| | Door & Frame w/Hardware - Exterior | 2 | EA | \$ 1,750.00 | \$ 3,500 |
| | - Interior Single | 8 | EA | 1,450.00 | 11,600 |
| | - Interior Double Closet | 1 | PR | 2,450.00 | 2,450 |
| | Restore Existing | 6 | EA | 750.00 | 4,500 |
| | Windows - New Steel Basement | 3 | EA | 1,050.00 | 3,150 |
| | - New Wood @ New Walls | 9 | EA | 975.00 | 8,775 |
| | - Reinstall/Restore Existing | 19 | EA | 850.00 | 16,150 |
| | | | | Subtotal | \$ 50,125 |
| | | | | Contingency 10% | 5,013 |
| | | | | TOTAL | \$ 55,138 |
| 9.0 | <u>FINISHES</u> | | | | |
| | New Plaster @ Walls/Ceilings | 6,200 | SF | \$ 6.50 | \$ 40,300 |
| | Plaster Repairs @ Attic | 1 | LS | 3,500.00 | 3,500 |
| | Repair/Patch Porch Ceiling | 250 | SF | 5.00 | 1,250 |
| | Infill Openings | 3 | EA | 1,200.00 | 3,600 |
| | Stud Partitions w/Plaster | 56 | LF | 175.00 | 9,800 |
| | Refinish Wood Floors or Carpet | 1,680 | SF | 4.50 | 7,560 |
| | Paint Interior Walls/Ceilings | 7,200 | SF | 0.80 | 5,760 |
| | - Doors/Windows | 49 | EA | 150.00 | 7,350 |
| | - Exterior Trim/Siding | 1 | LS | 2,000.00 | 2,000 |
| | | | | Subtotal | \$ 81,120 |
| | | | | Contingency 10% | 8,112 |
| | | | | TOTAL | \$ 89,232 |
| 10.0 | <u>SPECIALTIES</u> | | | | |
| | Bathroom Accessories | 1 | LS | \$ 1,500.00 | \$ 1,500 |
| | Miscellaneous Specialties | 1 | LS | 1,500.00 | 1,500 |
| | | | | Subtotal | \$ 3,000 |
| | | | | Contingency 10% | 300 |
| | | | | TOTAL | \$ 3,300 |

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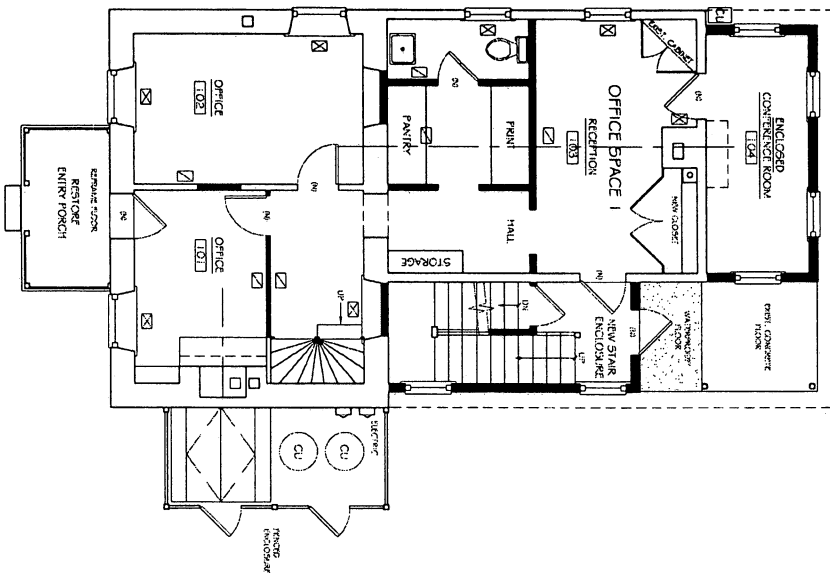
SECTION V
SCHEMATIC DRAWINGS OF
PROPOSED MODIFICATIONS



Descriptive



1 BASEMENT PLAN
SCALE: 1/8" = 1'-0" UTIL/INT ONLY



2 FIRST FLOOR PLAN
SCALE: 1/8" = 1'-0" 975 SF OFFICE
RI= RESTORE (N)=NEW

Contractor shall verify all Dimensions and Existing Conditions before proceeding with the work.

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A1

PROPOSED COMMERCIAL BSMT & FIRST FLOOR PLANS

Selected Interior and Exterior Restoration of:
Nemours Murphy House
Rockland Road & Childrens Drive, Wilmington, DE

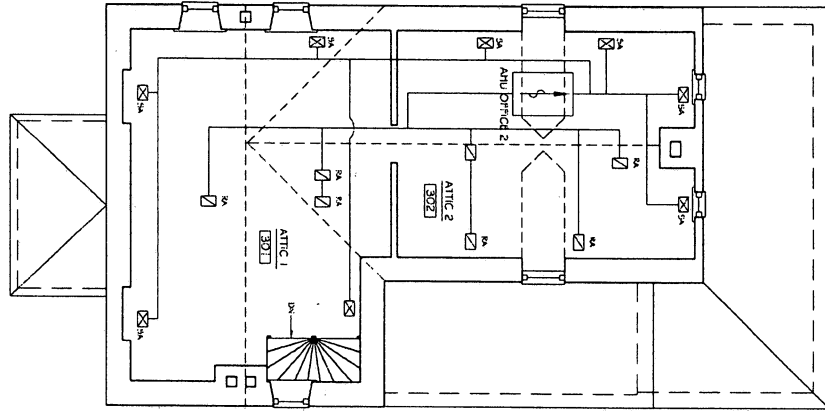
JOHN MILNER ARCHITECTS, Inc.

104 Lakewood Drive, Chadds Ford, Pennsylvania 19317 • (610) 388-0111

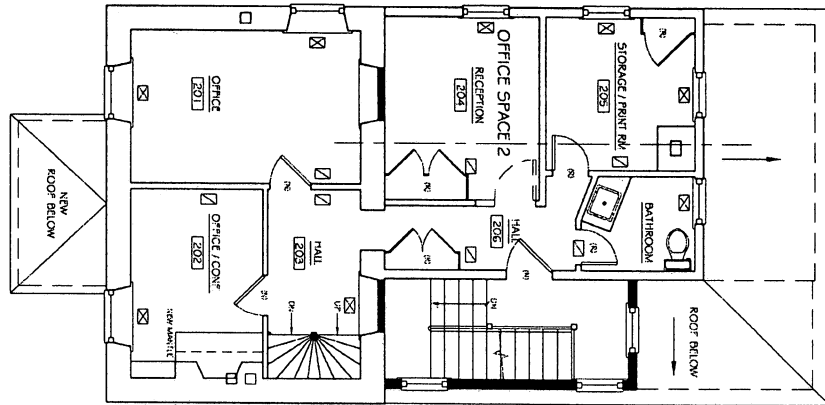
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Drawn: KMM
Checked: DTC
Status: FEASIBILITY

| Revisions: | | Remarks: |
|------------|-------|----------|
| No. | Date: | |
| | | |

Describe



1 ATTIC PLAN
SCALE: 1/8" = 1'-0"



2 SECOND FLOOR PLAN
SCALE: 1/8" = 1'-0"
850 SF OFFICE
R= RESTORE N= NEW

Contractor shall verify all Dimensions and Existing Conditions before proceeding with the work.

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A2

PROPOSED
COMMERCIAL
SECOND &
ATTIC FLOOR
PLANS

Selected Interior and Exterior Restoration of:
Nemours Murphy House
Rockland Road & Childers Drive, Wilmington, DE

JOHN MILNER ARCHITECTS, Inc.

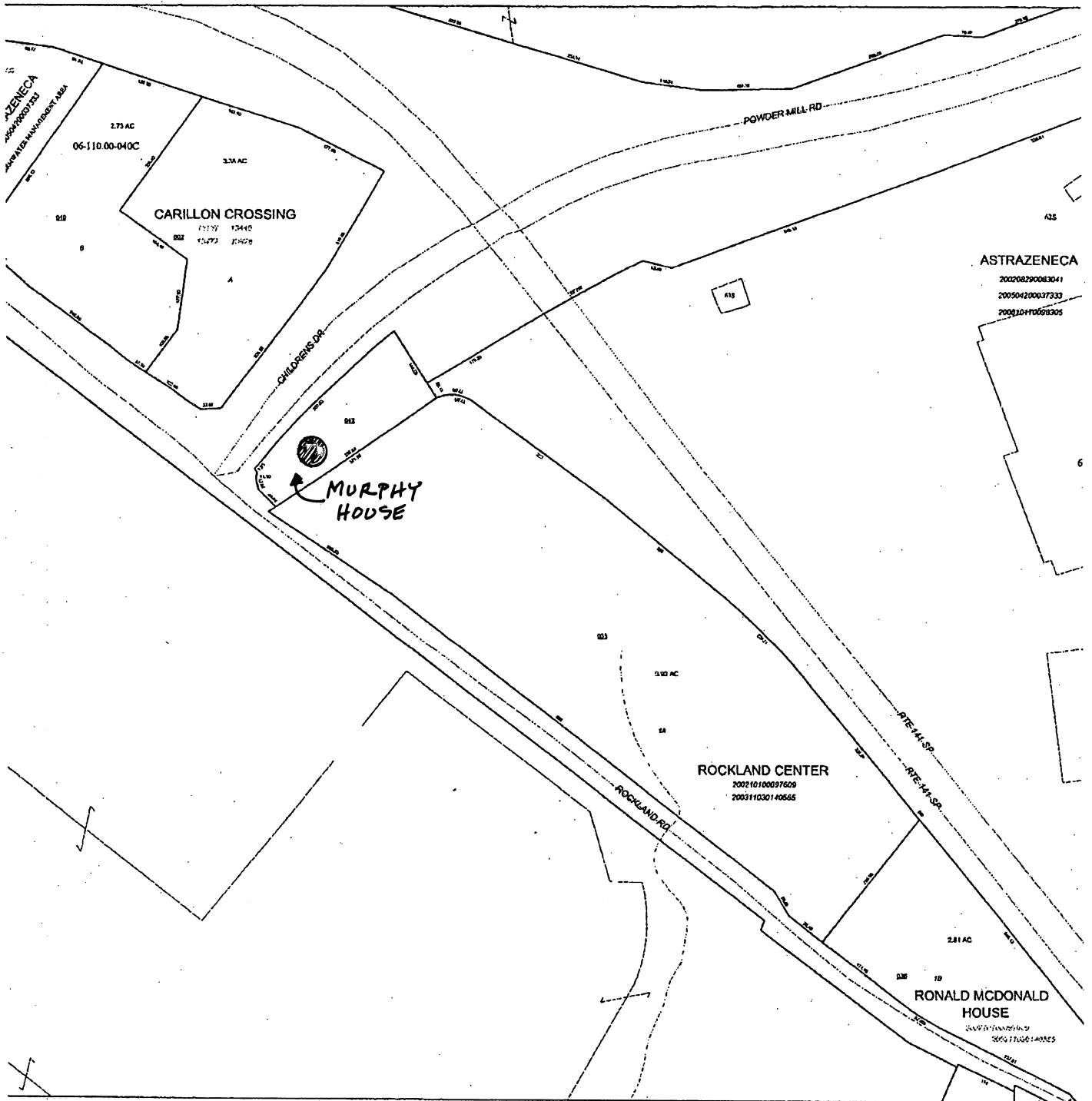
104 Lakewood Drive, Chadds Ford, Pennsylvania 19317 • (610) 388-0111

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Status: FEASIBILITY

Revisions:
No. Date: Remarks:

SECTION VI







APPENDIX A



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ASTRAZENECA
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| | | |
|-----|-----|-----|
| 99 | 100 | 101 |
| 100 | 110 | 111 |
| 119 | 118 | 120 |

- LEGEND**
-  CORPORATE LIMIT LINE
 -  HYDROLOGY LINE
 -  PARCEL LINE
 -  PARCEL NUMBER
 -  LOT LINE
 -  PARCEL HOOK